

Turkish
Online
Journal
of
Distance Education

January 2024

TOJDE

Editorial Board

Owner

Prof. Dr. Fuat ERDAL (Anadolu University Rector)

Editor in Chief

Dr. T. Volkan YUZER (Anadolu University)

Assistant to Editor

Sehla ERTAN (Turkish-German University)

Editorial Board Members

Dr. Abdul Waheed KHAN (Canada)
Dr. Alan TAIT (United Kingdom)
Dr. Anna RYBAK (Poland)
Dr. António TEIXEIRA (Portugal)
Dr. Antonis LIONARAKIS (Greece)
Dr. Aras BOZKURT (Turkiye)
Dr. Asha KANWAR (Canada)
Dr. Bobby HARREVELD (Australia)
Dr. Carmencital CASTOLO (Philippines)
Dr. Cleborne D. MADDUX (Canada)
Dr. David METCALF (USA)
Dr. Dursun GOKDAG (Turkiye)
Dr. Ene KOITLA (Estonia)
Dr. Ezendu ARIWA (United Kingdom)
Dr. Fahriye ALTINAY AKSAL (Turkiye)
Dr. Farhad SABA (USA)
Dr. Ferhan ODABASI (Turkiye)
Dr. Feyzi ULUG (Turkiye)
Dr. Fikret ER (Turkiye)
Dr. Fons NOUWENS (Australia)
Dr. Francis GLASGOW (South America)
Drs. George UBACHS (Netherlands)
Dr. Gilly SALMON (United Kingdom)
Dr. Gonca Telli YAMAMOTO (Turkiye)
Dr. Gulsun KURUBACAK (Turkiye)
Dr. Hakan TUZUN (Turkiye)
Dr. Hanafi ATAN (Malaysia)
Dr. Ilknur KECIK (Turkiye)
Dr. Ipek KURU GONEN (Turkiye)
Dr. Jack KOUMÍ (United Kingdom)
Dr. Jim FLOOD (United Kingdom)
Dr. John TRAXLER (United Kingdom)
Dr. Katherine M. SINITSA (Ukraine)
Dr. Kay Mac KEOGH (Ireland)
Dr. Kinshuk (New Zealand)
Dr. Kursat CAGILTAY (Turkiye)
Dr. Linda HARASIM (Canada)

Dr. Liz MARR (United Kingdom)
Dr. Loreta ULVYDIENE (Lithuania)
Dr. Marina McISAAC (USA)
Dr. Mark BULLEN (Canada)
Dr. Meena HWANG (South Korea)
Dr. Mehmet FIRAT (Turkiye)
Dr. Mehmet KESIM (Turkiye)
Dr. Michael R. SIMONSON (USA)
Dr. Michail KALOGIANNAKIS (France)
Dr. Mihai JALOBEANU (Romania)
Dr. Nabi Bux JUMANI (Pakistan)
Dr. Naeem TARIQ (Pakistan)
Dr. Natalija LEPKOVA (Lithuania)
Dr. Ojat DAROJAT (Indonesia)
Dr. Olaf ZAWACKI-RICHTER (Germany)
Dr. Patrick DANAHHER (Australia)
Dr. Paul KAWACHI (Japan)
Dr. Piet KOMMERS (Netherlands)
Dr. Ramesh C. SHARMA (India)
Dr. Rebecca FERGUSON (United Kingdom)
Dr. Rory McGREAL (Canada)
Dr. Roza DUMBRAVEANU (Moldova)
Dr. Rozhan B. M. IDRUS (Malaysia)
Dr. Santosh PANDA (India)
Dr. Sarah GURI-ROSENBLIT (Israel)
Dr. Shivakumar DEENE (India)
Dr. Simon STOBART (United Kingdom)
Dr. Som NAIDU (Australia)
Dr. Stephen DOWNES (Canada)
Dr. Steve WHEELER (United Kingdom)
Dr. Taerim LEE (South Korea)
Dr. Tamar LOMINADZE (Georgia)
Dr. Tian BELAWATI (Indonesia)
Dr. William John FRASER (South Africa)
Dr. Yasemin GULBAHAR (Turkiye)
Dr. Yavuz AKBULUT (Turkiye)
Dr. Zehra ALTINAY GAZI (Turkiye)
Dr. Zdena LUSTIGOVA (Czech Republic)
Dr. Zhang WEI-YUAN (Hong Kong)

Language Editors

Dr. Meral CAPAR (Anadolu University)
Ilknur CIVAN (Anadolu University)

Composition and Visuals

Kagan KUCUK (Anadolu University)
Aysegul DIBEK (Anadolu University)

Honorary Editorial Board of TOJDE

Prof. Dr. Ugur DEMIRAY - Founder Editor of Turkish Online Journal of Distance Education - TOJDE

Prof. Dr. Cevat ALKAN - The pioneer of educational technology in DE in Turkiye (Turkiye)

Prof. Dr. Engin ATAC - Former Rector of Anadolu University for 1999-2006 period (Turkiye)

Prof. Dr. John BAATH - The well-known Swedish distance educator (Sweden)

Prof. Dr. Tony BATES - Father of DE in Canada (Canada)

Prof. Dr. Yılmaz BUYUKERSEN - The founder of DE in Turkiye (Turkiye)

Prof. Dr. Chris CURRAN - The founder director of National DE Centre in Ireland (Ireland)

Prof. Dr. Chere Campbell GIBSON - She studied for DE all her life. Emeritus Professor (USA)

Prof. Dr. Börje HOLMBERG - He studied for DE. Emeritus Professor (Sweden)

Prof. Dr. James MARAJ - The pioneer of the open university movement (Australia)

Prof. Dr. Charles A. WEDEMEYER - The pioneer of DE in the world (USA)

Indexing

TOJDE is abstracted, indexed and cited by the following databases around the world:

- Emerging Sources Citation Index-ESCI (Web of Science)
- Q2 Level by Scimago Institutions Rankings
- ASOS
- The Education Resources Information Center – ERIC
- EBSCOhost Research Databases
- Genamics JournalSeek
- Google Scholar
- InfoBase Index
- International Institute of Organized Research - I2OR
- Scientific Indexing Service
- SCOPUS
- UlrichsWeb - Global Serials Directory
- SOBIAD

Table of Contents

From The Editor

Welcome to Volume 25 Number 1 of TOJDE

Dave Arthur R. ROBLEDO, Socorro E. AGUJA & Maricar S. PRUDENTE Gotta Catch' Em All: Utilization of Improvised Insect Traps as Home-Based Biology Experiment for Insect Taxonomy	1-19
John Y. H. BAI, Olaf ZAWACKI-RICHTER & Wolfgang MUSKENS Re-Examining the Future Prospects of Artificial Intelligence in Education in Light of the GDPR and ChatGPT	20-32
Neslisah SIKIČIKOGLU, Muharrem KOC, Seray OLCAY & Sezgin VURAN Experiences of Gifted Children with Autism Spectrum Disorder, Their Parents, and Teachers in Turkiye With the Covid-19 Pandemic	33-51
Esra KARAN AYNAGOZ, Burcu UNAL Technology-Based Self-Regulated Learning Strategies and English Self-Efficacy in Online Learning Environments	52-66
Calyd T. CERIO, Lielanie O. BARRION & Evelie P. SERRANO Psychological Impact of the Covid-19 Pandemic on Graduate Students in the Philippines	67-77
Areej ElSayary, Lawrence Meda, Suha Karaki & Laila Mohebi The Effective Use of Virtual Communication in an Online Professional Development Program: Investigating Teachers' Attitudes	78-94
Aysin Gaye USTUN, Engin KURSUN & Halil KAYADUMAN How do Higher Education Institutions Offer Online Courses for On-Campus Students? Pull and Push Factors Influencing Their Decisions	95-117
Zarin Khan MOON, Al AMIN, Hossain ALI & Mahedi HASAN Antecedents to the Underprivileged Undergraduate Students' Intention to Participate in Online Classes	118-135
Merve BULUT & Yaren BULBUL Hierarchical Effect of Academic Self-Efficacy and Socio-Demographic Characteristics on Satisfaction and Dropout of Students with Disability in Higher Education	136-154
Almighty Cortezo TABUENA & Elena Garcia VILLAREAL Usefulness and Challenges of Clustered Self-Directed Learning Modules in Entrepreneurship for Senior High School Distance Learning	155-178
Figen KARAFERYE Investigating Teachers' Experiences with Digital Classroom Management and Incorporating Social and Emotional Learning	179-199
Kamran MIR, Roberto B. FIGUEROA JR. & Aminudin ZUHAIRI An Evaluation of Virtual Learning Environments in Three Open Universities in Asia	200-212
Deniz KAYA & Tamer KUTLUCA E-Learning in Mathematics Education: A Bibliometric Analysis (2012-2022)	213-246
Aysun GUNES, Emin OZEN & Mona AYKUL The Determination of the Sense of Community Levels of University Students in Online Distance Education Environments in Terms of Different Variables	247-259

Ricardo-Adan SALAS-RUEDA & Clara ALVARADO-ZAMORANO Teachers' Perceptions about the Use of Learning Management Systems during the Covid-19 Pandemic Considering Data Science	260-272
Ayse OZKARAMAN, Ozlem KERSU, Fusun UZGOR, Merve CAKIRLI Ozer CELIK, Burcin DANACI & Mesut AYDEMIR Development of Mobile Educational Material for Nurses: A Process Improvement Study	273-288
Gizem SIMSEK & Meral CEYLAN CAPAR A Comparison of Foreign Language Anxiety in Two Different Settings: Online vs Classroom	289-301
Pinar SIK & Ece ZEHİR TOPKAYA Flipped Classroom Model with Young Learners' Vocabulary Learning in Primary Elt Classrooms	302-333
Min Hui LEOW & Rafiza ABDUL RAZAK Malaysian Elementary Learners' Self-Regulation, Motivational Beliefs and Learner Control Motivation when Experiencing Online Tutorials	334-352
Nur HIDAYAT Book Review: Re-Envisioning and Restructuring Blended Learning for Underprivileged Communities	353-356

Dear TOJDE Readers,

Welcome to Volume 25 Number 1 of TOJDE

There are 19 articles and a book review in January 2024 issue. 55 authors write the articles from 9 different countries. Bangladesh, Germany, Indonesia, Malaysia, Mexico, Pakistan, Philippines, Turkiye and United Arab Emirates are the countries.

GOTTA CATCH 'EM ALL: UTILIZATION OF IMPROVISED INSECT TRAPS AS HOME-BASED BIOLOGY EXPERIMENT FOR INSECT TAXONOMY is the 1st article and Dave Arthur ROBLEDO, Socorro AGUJA and Maricar PRUDENTE are the authors of the article. This quasi-experimental study aims to determine the effects of using IITs on students' self-efficacy beliefs and perceived levels of engagement. Results show that IITs effectively improved students' self-efficacy belief, while no improvement was noted in students' perceived levels of engagement in teaching and learning insect taxonomy. The study finds that the IITs activity is relevant in teaching insect taxonomy and delivering practical learning experiences among students in a distance learning modality.

The 2nd article which is written by John Y. H. BAI, Olaf ZAWACKI-RICHTER and Wolfgang MUSKENS and titled as RE-EXAMINING THE FUTURE PROSPECTS OF ARTIFICIAL INTELLIGENCE IN EDUCATION IN LIGHT OF THE GDPR AND CHATGPT. In the article, it has been said that artificial intelligence in education (AIEd) is a fast-growing field of research. In this context authors describe efforts to explore the possible future of AIEd by identifying key variables and their prospects considering General Data Protection Regulation (GDPR) and ChatGPT, a generative AI model capable to producing 'human-like' text. Authors emphasize that these concepts raise questions for the future of AIEd and the underlying function of assessment and highlight the importance of active student participation in the integration of AI in education.

The 3rd article is EXPERIENCES OF GIFTED CHILDREN WITH AUTISM SPECTRUM DISORDER, THEIR PARENTS AND TEACHERS IN TURKEY WITH THE COVID-19 PANDEMIC. The authors of the article are Muharrem KOC, Neslisah OMUR, Seray OLCAY and Sezgin VURAN. This phenomenological research aims to determine the experiences of gifted children with autism spectrum disorder, their parents, and teachers with the COVID-19 pandemic and holistically reveal the reflections of the restrictions in this process and the transition to distance education on the lives and especially the education of gifted children with autism spectrum disorder. The results are discussed in different dimensions in the article.

TECHNOLOGY-BASED SELF-REGULATED LEARNING STRATEGIES AND ENGLISH SELF-EFFICACY IN ONLINE LEARNING ENVIRONMENTS is the 4th article which is written by Burcu UNAL and Esra KARAN. This study, which adopts a quantitative research design, aims to present an investigation into the relationship between preparatory school students' use of technology-based self-regulated English learning strategies and their perceived English self-efficacy as well as the predictability of employing the strategies on their self-efficacy beliefs. Through the study, a statistically significant positive relationship has been found between students' use of technology-assisted English learning strategies and their perceived English self-efficacy beliefs. In addition, regression analysis results show that goal setting and learner evaluation, motivational regulation, and technology-based song-movie learning strategies were strong predictors explaining the change in students' self-efficacy in four language skills.

Calyd CERIO, Lielanie BARRION and Evelie SERRANO are the authors of the 5th article which is titled PSYCHOLOGICAL IMPACT OF THE COVID-19 PANDEMIC ON GRADUATE STUDENTS IN THE PHILIPPINES. The purpose of the study is to provide administrators with policy recommendations for developing effective mental health program interventions for graduate students. In this research, the authors have studied and analysed the potential effects of the COVID-19 pandemic on the lives of graduate students. Specifically, they have examined the factors that influence the anxiety level and its relationship to COVID-19 stressors among graduate students. It has been said that the results of the study may contribute to the growing literature on the impact of anxiety among students, particularly graduate students, due to the pandemic.

THE EFFECTIVE USE OF VIRTUAL COMMUNICATION IN AN ONLINE PROFESSIONAL DEVELOPMENT PROGRAM: INVESTIGATING TEACHERS' ATTITUDES is the 6th article in the issue. The article is written by Areej ELSAYARY, Lawrence MEDA, Suha KARAKI and Laila MOHEBI. The study, which adopts concurrent mixed method, investigates the use of virtual communication in an online professional development program through the lens of teachers' attitudes toward technology. The results indicate that teachers' positive attitudes toward using technology due to its ease of use and the usefulness of the topics presented.

The 7th article is titled HOW DO HIGHER EDUCATION INSTITUTIONS OFFER ONLINE COURSES FOR ON-CAMPUS STUDENTS? PULL AND PUSH FACTORS INFLUENCING THEIR DECISIONS. The authors of the study are Aysin Gaye ÜSTÜN, Engin KURSUN and Halil KAYADUMAN. The purpose of the study is to reveal the pull and push factors that influence the decisions of administrators and practitioners about online courses offered to students on campus in terms of teaching-learning, course content procurement, and assessment-evaluation dimensions. The study adopts nested multi-case studies which is a qualitative research method. Results show that factors like the interaction between students and teachers, legislation, budget, human resources, and organized structuring helped the DECAs decide which models to use in the teaching-learning, course content procurement, and assessment-evaluation dimensions.

The 8th article's authors are Zarin Khan MOON, Al AMIN, Hossain ALI and Mahedi HASAN. The article is titled ANTECEDENTS TO THE UNPRIVILEGED UNDERGRADUATE STUDENTS' INTENTION TO PARTICIPATE IN ONLINE CLASSES. This study aims to explore the antecedents to the underprivileged undergraduate students' intention to participate in online classes in Bangladesh through the integration of the Technology Acceptance Model, Information Systems Success Model, and Theory of Planned Behaviour. The study contributes to e-Learning literature by incorporating three models which may guide policymakers in understanding how to integrate students from all social classes into e-learning systems to eliminate academic digital discrimination.

HIERARCHICAL EFFECT OF ACADEMIC SELF-EFFICACY AND SOCIO-DEMOGRAPHIC CHARACTERISTICS ON SATISFACTION AND DROPOUT OF STUDENTS WITH DISABILITY IN HIGHER EDUCATION is the 9th article which is written by Merve BULUT and Yaren BULBUL. This quantitative research is based on development of the scales and hierarchical regression analyses to determine the resources of academic self-efficacy, satisfaction and the tendency to drop out of students with disability in higher education beyond physical accessibility. The results support the decision makers to increase the quality of more inclusive higher education by considering differences based on education fields, types of disability and rate of (personal) disability and gender.

The authors of the 10th article are Almighty Cortez TABUENA and Elena Garcia VILLAREAL and the title of the article is USEFULNESS AND CHALLENGES OF CLUSTERED SELF-DIRECTED LEARNING MODULES IN ENTREPRENEURSHIP FOR SENIOR HIGH SCHOOL DISTANCE LEARNING. This study aims to examine the usefulness and challenges of the implemented clustered self-directed learning modules in entrepreneurship for senior high school distance learning amidst the emerging pandemic using the descriptive-survey research method. The study uses both quantitative and qualitative methods of analysing the data, including descriptive statistics and thematic analysis. As a result, all the modules were inferred to be very effective and very useful in terms of their usefulness for distance learning.

INVESTIGATING TEACHERS' EXPERIENCES WITH DIGITAL CLASSROOM MANAGEMENT AND INCORPORATING SOCIAL AND EMOTIONAL LEARNING is the 11th study and is written by Figen KARAFERYE. The study explores how primary school teachers managed their digital classrooms while incorporating social and emotional learning into their classroom management practices in the remote teaching period. The findings reveal that many teachers led online classroom management processes similar to their face-to-face experiences but were less effective concerning the developmental needs of each student in the digital classroom. Furthermore, the study yields insight into the stress factors and protective factors within the context of classroom management incorporating SEL, and it provides direction for future implementations concerning teachers' professional learning needs and expectations.

AN EVALUATION OF VIRTUAL LEARNING ENVIRONMENTS IN THREE OPEN UNIVERSITIES IN ASIA is the 12th article. The authors of the study are Kamran MIR, Roberto B. FIGUEROA JR and Aminudin ZUHAIRI. This study investigated the implementation of a learning management system among three open universities in Asia before the COVID-19 pandemic began. It highlights general and technical differences that may have explained the varying degrees of information quality, service quality, system quality, user satisfaction, intention to use, and net benefits which are indicators of the successful implementation of their learning management system.

The 13th article is titled E-LEARNING IN MATHEMATICS EDUCATION: A BIBLIOMETRIC ANALYSIS (2012-2022) and the authors of the study are Deniz KAYA and Tamer KUTLUCA. This study aims to create a comprehensive bibliometric map of published scientific articles on e-learning in mathematics education. The findings which are obtained from 341 different articles published by 1018 authors representing 79 countries between 2012 and 2022 are discussed in different dimensions in the article.

Aysun GUNES, Emin OZEN and Mona AYKUL are the authors of the 14th article which is titled THE DETERMINATION OF THE SENSE OF COMMUNITY LEVELS OF UNIVERSITY STUDENTS IN ONLINE DISTANCE EDUCATION ENVIRONMENTS IN TERMS OF DIFFERENT VARIABLES. The study, which adopts cross-sectional scanning model, aims to determine the level of sense of community of learners studying at a public university in online distance education environments in terms of different variables. As a result, in order to make education more efficient in online learning environments, it has been concluded that in order to strengthen the sense of community, learners can be given tasks that they can discuss and negotiate, learners can be made to work in groups in related environments, etc.

TEACHERS' PERCEPTIONS ABOUT THE USE OF LEARNING MANAGEMENT SYSTEMS DURING THE COVID-19 PANDEMIC CONSIDERING DATA SCIENCE is the 15th article which is written by Ricardo Adan SALAS-RUEDA and Clara ALVARADO-ZAMORAN. The study adopts a quantitative research approach and analyzes the teachers' perception about the use of LMS during the COVID-19 pandemic considering data science. In this context, the results of the study emphasize that machine learning technique indicate that the performance of the school activities in LMS positively influences the learning process, motivation and participation of the students during the COVID-19 pandemic. Also, it has been said that LMS represent a technological alternative to transform the teaching-learning conditions and update the school activities of the courses during the COVID-19 pandemic. Researchers recommends that educational institutions and educators use LMS to cover the educational needs under the distance modality.

The study titled DEVELOPMENT OF MOBILE EDUCATIONAL MATERIAL FOR NURSES: A PROCESS IMPROVEMENT STUDY is the 16th study. The authors are Ayse OZKARAMAN, Ozlem KERSU, Fusun UZGOR, Merve CAKIRLI, Ozer CELIK, Burcin DANACI and Mesut AYDEMIR. The purpose of this methodological study is to develop mobile training material to provide nurses working in university hospital with professional literature and also, to evaluate its visual design, reliability and the quality of information in the developed training material. Therefore, this study was planned with the objective of developing mobile training material to provide nurses working in a university hospital with professional information, and a subsequent evaluation of content validity for quality, reliability of information and suitability of visual design.

A COMPARISON OF FOREIGN LANGUAGE ANXIETY IN TWO DIFFERENT SETTINGS: ONLINE VS CLASSROOM is the 17th article which is written by Gizem SIMSEK and Meral CAPAR. This study adopts explanatory mixed-method research model and aims to examine and compare the foreign language anxiety (FLA) levels of English preparatory school students in two settings namely online and in person classroom lessons. The findings show that moderate levels of FLA were present in both online and in person classroom instruction among participants and the results are discussed in different dimensions in the article.

The 18th article titled FLIPPED CLASSROOM MODEL WITH YOUNG LEARNERS' VOCABULARY LEARNING IN PRIMARY ELT CLASSROOMS is written by Pinar SIK and Ece ZEHİR TOPKAYA. This mixed-method study explores the effect of the flipped classroom model (FCM) on vocabulary learning of young English language learners and their perceptions and experiences about FCM practices. The results reveal the levels of vocabulary learning and retention for the experimental group students were statistically significantly higher than those of the control group students. Also, the qualitative data analysis also confirms the effectiveness of the model for vocabulary learning and revealed its efficiency for language classes of young English language learners.

MALAYSIAN ELEMENTARY LEARNERS' SELF-REGULATION, MOTIVATIONAL BELIEFS AND LEARNER CONTROL MOTIVATION WHEN EXPERIENCING ONLINE TUTORIALS is the 19th article. The study is written by Min Hui LEOW and Rafiza ABDUL RAZAK. This study focuses on self-regulation strategies and motivational beliefs in the context of post-pandemic online tutorials. The aim of this study was to discover the influence of self-regulation strategies on learners' motivational beliefs, and the impact of learners' motivational beliefs on their learner control motivation when experiencing online tutorials. The results of this study reveal a significant relationship between self-regulation and motivational beliefs in order to comprehend learners' motivation for learner control when experiencing online tutorials. Also, the results draw attention on self-regulation strategies to guide online instruction that underpins learners' motivational beliefs and enhances learner control motivation.

There is a book review in this issue. RE-ENVISIONING AND RESTRUCTURING BLENDED LEARNING FOR UNDERPRIVILEGED COMMUNITIES is the title of the book. This is an editorial book, and the editors are Chantelle BOSCH, Dorothy LAUBSCHER and Lydia KYEI-BLANKSON. The reviewer is Nur HIDAYAT.

I wish you all a happy new year. Hope to meet again in the next issue of TOJDE.

Cordially,

Dr. T. Volkan YUZER

Editor in Chief

GOTTA CATCH' EM ALL: UTILIZATION OF IMPROVISED INSECT TRAPS AS HOME-BASED BIOLOGY EXPERIMENT FOR INSECT TAXONOMY

Dr. Dave Arthur R. ROBLEDO

0000-0003-4035-2791
Department of Science Education
De La Salle University
Manila, PHILIPPINES

Dr. Socorro E. AGUJA

0000-0001-7002-4655
De La Salle Araneta University
Malabon City, PHILIPPINES

Dr. Maricar S. PRUDENTE

0000-0003-1156-0380
Department of Science Education
De La Salle University
Manila, PHILIPPINES

Received: 15/12/2023 **Accepted:** 29/05/2023

ABSTRACT

Classifying, naming, and identifying insects have been complicated topics among science teachers and students. This problem is due to the highly technical collection protocols, safekeeping procedures, the unavailability of appropriate learning resources, and the closure of school laboratories and facilities due to the COVID-19 pandemic. Using the remote learning setup, this study utilized Improved Insect Traps (IITs) to provide an authentic learning experience in teaching and learning insect taxonomy at home. The study aimed to determine the effects of using IITs on students' self-efficacy beliefs and perceived levels of engagement. In this quasi-experimental study, 42 students designed and developed their improved insect traps. Insect collection and classification were accomplished within four weeks. A 20-item validated survey questionnaire on self-efficacy and engagement levels was administered via Google Forms. Students' feedback was gathered using virtual focus group discussions and open-ended questions. Results revealed that IITs effectively improved students' self-efficacy beliefs ($Z=0.033$, $p\text{-value}=0.022$, $g=0.68$), while no improvement was noted in students' perceived levels of engagement ($Z=0.143$, $p\text{-value}=0.188$, $g=0.07$) in teaching and learning insect taxonomy. Moreover, students' feedback and responses were classified as Affordances or Constraints. Subthemes such as motivation, satisfaction, authentic learning, safety, and parental involvement were generated in the thematic analysis. Overall, this study found that the IITs activity is relevant in teaching insect taxonomy and delivering practical learning experiences among students in a distance learning modality.

Keywords: Improved insect trap, home-based experiment, distance education, insect taxonomy, self-efficacy, engagements.

INTRODUCTION

Insects are diverse organisms, with over one million species described to date. Insects play an essential role in many ecosystems and facets of human existence, including agriculture, medicine, and pest management (Kjer, 2011; Zhang & Weirauch, 2017). These connections can make insects more enticing to students

and aid in connecting science to real-world situations (Dewey & Lu, 2002). Many insects can be collected, observed, and analyzed in the classroom, giving students hands-on learning and discovery possibilities (Casey et al., 2019). This approach can help students get more involved in learning and gain a better knowledge of scientific ideas. Insects can be used in science classes ranging from primary school to advanced university degrees (Klein et al., 2017). They can also be used to teach biology, ecology, and entomology, among other subjects (Gopnik, 2012).

Insect taxonomy refers to identifying, naming, classifying, and placing insects in different taxonomical categories that correspond to varying degrees of precision (Briggs, 2007). Teaching insect taxonomy has been a major challenge for science educators due to the topic's complexity and a lack of learning and teaching resources (Ingram et al., 2012; Gopnik, 2012; Cajaiba, 2014). Teachers may have limited resources to employ in the classroom, such as textbooks, interactive tools, or educational software. These resources may be outdated or lack the detail needed to teach insect taxonomy effectively (Cajaiba, 2014). Initiatives to change the approaches to teaching insect-related topics have advocated inquiry-based teaching and learning methods in science classrooms (Ebach et al., 2011). Inquiry-based scientific education encourages student participation in the vast array of methods used to examine, model, and explain the world (Sotiriou et al., (2020). Due to their tiny size, fast reproduction rate, and ease of handling, insects can be utilized to promote inquiry-based techniques through experiments (Boero, 2001).

As the COVID-19 pandemic disrupted the world's educational system, science teachers devised multiple strategies and ways to address the different issues and conflicts. One of these strategies is the use of Home-based Biology Experiments (HBEs) that provide authentic learning experiences at home. HBEs are activities that utilize household materials adapted for the remote learning environment and are aligned with standard learning competencies (Robledo, 2021). Insect traps are portable or fixed devices that lure insects with baits such as nectar and UV light (Ford et al., 2020). Although most traps may catch a few insects without insect bait, using insect bait can dramatically increase the number of catches (Boero, 2001). Most of the bait consists of simple sugars and yeast in the form of fermented fruit, sugar water, corn syrup, or alcohol. Many insects are attracted to overripe fruit, fermented foods (such as bread soaked in beer), peanut butter, and sugar (Boero, 2001). Because these materials are affordable, safe to use, easy to acquire, and readily available at home, this study emphasized developing, implementing, and evaluating improvised insect traps (IITs) as home-based biology experiments in teaching insect taxonomy.

THEORETICAL UNDERPINNINGS

The use of IITs as instructional material for insect taxonomy was primarily anchored to the Theory of Engagements, Self-Efficacy theory, and the Cartoon-based teaching model, as demonstrated in Figure 1. The Theory of Engagement emphasized that students learn more effectively and are able to transfer their knowledge to other contexts when they find the lesson meaningful and have a high level of interest in the tasks (Meese et al., 2018). Additionally, the Self-efficacy Theory defines "self-efficacy" as an individual's confidence in their ability to plan and execute the necessary actions to handle anticipated challenges (Maddux, 2013). Various studies have established a correlation between students' self-efficacy and their perceived level of engagement. Hayat et al. (2020) observed that self-efficacy impacts students' learning-related emotions and metacognitive learning strategies, which, in turn, affect their academic performance and engagement. Azila-Gebettor et al. (2021) further noted that self-efficacy enhances students' intellectual engagement when engaging in student-centered activities. As home-based biology experiments, Improvised Insect Traps (IITs) are considered student-centered since they allow students to design, implement, and evaluate their homemade insect traps. The Cartoon-based teaching model suggests that using cartoons in instruction can increase student participation, interest, and engagement, as they find discussing and studying cartoons more enjoyable, and the combination of words and familiar images resonates with them (Balim et al., 2016). Therefore, students' perceived levels of self-efficacy and engagement were assessed as indicators of the effectiveness of IITs as a learning activity.

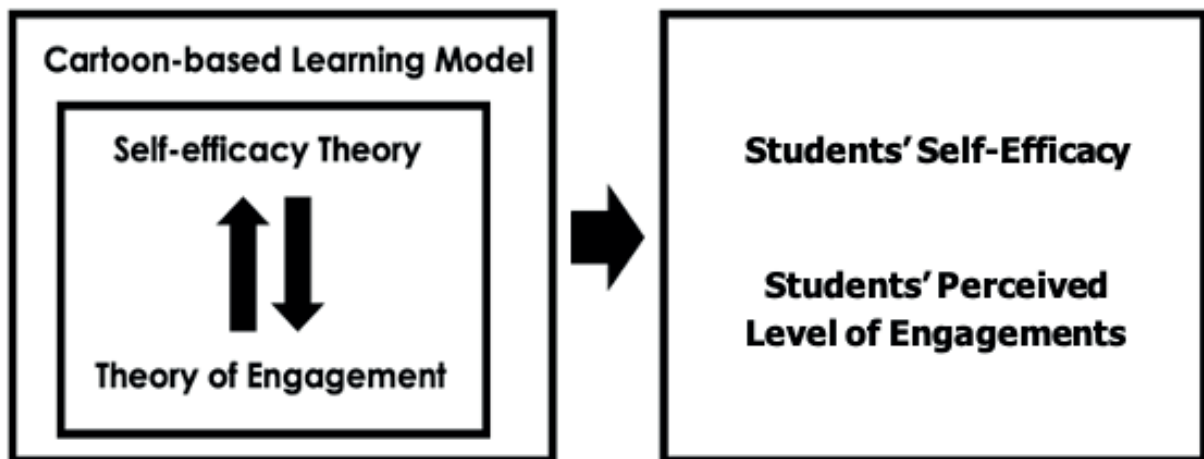


Figure 1. Theoretical underpinnings of the development, implementation, and evaluation of Improved Insect Traps (IITs) as Home-based Experiment

In this study, the Japanese cartoon series “Pokemon” was used as the theme to increase students’ motivation, as some characters are insect-type Pokemon which may be relevant to the activity, as presented in Figure 2. Pokemon is a creature-collecting game simulation for urban youth with the famous tagline, “Gotta Catch’ Em All” (Clark, 2016). The use of Pokemon as a theme in teaching and learning has been a major topic among researchers and educators. Daley (2016) mentioned that Pokemon Go could captivate students’ attention and intention to participate in class activities. This claim was confirmed by Emily (2016), who found that Pokemon-related activities significantly enhanced students’ literacy and academic achievement in science subjects. In the context of this activity, the students received “badges” based on the number of collected species of insects. The idea of using “pokemon badges” in this study was adapted from the cartoon series, where characters received badges to recognize how much they interacted with the game (Clark, 2016).

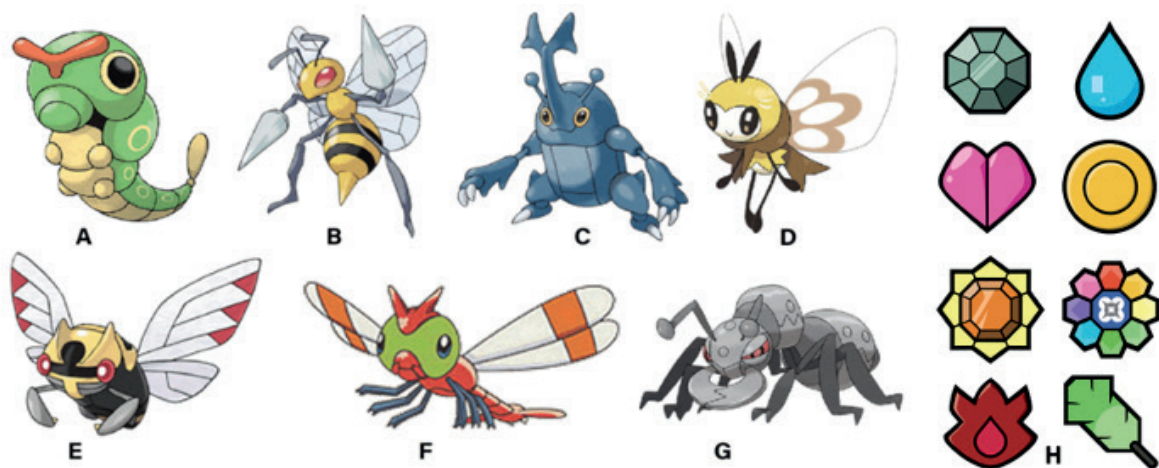


Figure 2. Examples of insect-type Pokemon used as “theme” for the improvised insect traps (IITs). (A- Caterpie (Caterpillar); B- Beedrill (Bumblebee); C- Heracross (Rhinoceros beetle); D- Ribombee (Bee fly); E- Ninjask (Cicada); F- Yanma –(Dragonfly); G- Durant (Ant); H – Samples of badges

Image source: Clark (2016)

PURPOSE OF THE STUDY

Due to the complexity and abundance of insects, students' appreciation of insect taxonomy and other invertebrates remain limited (Ingram & Golick, 2018). To mitigate this lack of knowledge and appreciation for insects, science education efforts have centered on identifying necessary learning competencies and learning resources to deliver authentic experiences in learning despite the disruption brought by the COVID-19 pandemic (Chu et al., 2022; Lapada et al., 2020; Robledo et al., 2021). To the researchers' knowledge, no studies have been conducted to assess the effectiveness of home-based experiments in learning insect taxonomy. Thus, this study aimed to investigate the effects of the improvised insect traps (IITs) activity on students' self-efficacy and perceived level of engagement in insect taxonomy. Specifically, this study sought to answer the following research questions.

1. To what extent does the improvised insect traps (IIT) activity affect students' level of self-efficacy in learning insect taxonomy?
2. To what extent does the improvised insect traps (IIT) activity affect students' perceived level of engagement?
3. What are the affordances and constraints experienced by the students during the development, implementation, and evaluation of improvised insect traps?

METHOD

The study employed the educational action research design (Brydon-Miller et al., 2017) using a quasi-experimental mixed-method approach. The principal purpose of educational action research is to improve the student's learning outcomes. Findings of educational action research can help teachers meet the needs of their students and help them attain their full potential by reviewing and changing their teaching approaches (Kidd & Kral, 2005; Arcidiacono et al., 2016). Moreover, a pre/post-test design was used to determine the effects of the IITs on students' perceived level of engagement and self-efficacy.

Participants

The IITs activity was performed by 42 Grade 11 students who agreed to participate in the study (42 out of 63) from a private school in Manila City, Philippines. The participants were selected using the convenience sampling method, which primarily depends on their availability and willingness to participate in the study (Galloway, 2005). After which, a virtual orientation with the parents was conducted to discuss the objectives of the activity, hazards and risks mitigation strategies, and the roles of the parents as home-based supervisors. Table 1 presents the characteristics of the involved participants. As shown below, all participants were aware and knowledgeable of Pokemon, implying that the IIT activity's theme might be relevant to them.

Table 1. Characteristics of the Research Participants (N=42)

Characteristics	n	Percentage (%)
Gender		
<i>Male</i>	30	71.4
<i>Female</i>	12	28.6
Familiarity to Pokemon		
<i>Yes</i>	42	100
<i>No</i>	0	0

Development and Validation of the Improved Insect Traps (IITs) Activity

The IITs worksheet was developed based on the prescribed and standard procedures emphasized in the studies by Heath et al. (1995) and Snyder et al. (2022). Before implementation, IITs activity was pilot-tested and validated by groups of science teachers and insect experts following the validation protocol of Stephenson (2020). During the first validation stage, two insect scientists evaluated the accuracy and

relevance of the proposed IITs worksheet. Terminologies and instructions were improved based on their comments and suggestions. Instruments used in the validation of IIT (by scientists and experts) were appended in Appendix C-B. During the second stage, three science teachers performed the activity based on the procedures indicated in the worksheet, using different baits (honey, light, candy). For comparison of activities, a commercially available insect trap (Safer[®]) was used as the control. The traps were placed in an area known to have a diverse insect population (e.g. garden, under the tree) and left for 24 hours. After the exposure period, the traps were emptied, and baits were refilled for the next cycle of collection for three consecutive days. The average number of collected insects may indicate the efficiency of the IITs design in attracting and collecting insects vs. the control.

The insects caught in the traps were gathered and initially identified using the Picture Insect[®] mobile software – an open-source software developed by Next Vision Limited (2022) that utilizes artificial intelligence for insect identification. Initial identification was verified using a standard insect taxonomy protocol (Example: Insect Identification Guide, University of Georgia, 2012). This activity may require reference materials such as field guides or other online resources. Validation was accomplished by comparing the total number of gathered insects in each trap vs. the control and the evaluation ratings and comments from the experts. Science teachers' comments and perceptions were also collected to determine the strengths, weaknesses, and risks associated with the activity, as presented in Table 2.

Table 2. Results of the Validation of Improvised Insect Traps (IITs) Activity

Traps	Average No. of Insects per Day	Efficiency % (vs. control)	Experts' Comments	Teachers' Comments
Trap 1 (honey)	35	85.37	<i>This trap was effective in gathering flying insects such as beetles.</i>	<i>The activity was fun. For sure, students will enjoy this.</i>
Trap 2 (light)	36	87.80	<i>A little bit expensive but effective in collecting insects.</i>	<i>The procedure is easy to follow.</i>
Trap 3 (candy)	33	80.49	<i>Candy may attract other invertebrates. It is recommended to use different kinds of bait</i>	<i>This activity is innovative and appropriate for remote learning.</i>
Safer Insect Trap (Control)	41	100	Not evaluated	Not evaluated

Overall, the validators (science teachers and experts) gave positive feedback about the efficiency of IITs and their experiences performing the activity. Several suggestions from the validators were noted and considered, such as safety issues in handling scissors and sharp objects, some expensive materials, and hazards in working with insects that are a vector of diseases. To address these concerns, the validated IITs worksheet has sections for pre-cautionary measures and waste disposal (Appendix A).

Data Collection and Analysis

A formal letter was initially sent to the Office of the School Principal to ask for permission and ethics approval to conduct the study. After approval, a virtual orientation with the parents and students was conducted to discuss the objectives of the study, the risk associated with the activity, and the roles of the parents as supervisors during the implementation stage. Sarnikova (2022) noted that parents, as educational stakeholders, should assume the role of supervisor at home in remote learning programs. To ensure research ethics and data privacy, online consent and data privacy forms were sent to the parents and students after the orientation. This study was conducted for four weeks. Before constructing IITs, a 20-item pretest questionnaire was sent to the students via google forms to determine their initial level of self-efficacy and perceived level of engagement. The first week was allotted to design and prepare the materials necessary to construct their improvised insect traps. Using the IIT Activity Sheet (Appendix 1), students built their improvised insect traps (IIT) during the second week using the recyclable materials readily found at home, as

shown in Figure 3. Some students used different baits such as sugar solution, light blub, honey, corn starch, and many more. Students’ designs and outputs were presented via Zoom in one synchronous virtual class.

As summarized in Figure 4, students deployed their insect traps in their preferred or designated locations in the third week, such as under a tree, near the window, garage, garden, etc. The insect traps were continuously and closely monitored for one week. At the end of the third week, captured insects were carefully collected, preserved, and photographed using smartphones for identification. Proper handling of insects was observed, as indicated in the worksheet. Insect photographs were uploaded to a Google Drive for data storage and sharing. The identification of insects was made collaboratively using Google Sheets in synchronous sessions via Zoom. Students performed the identification in groups (4 members) to attain consensus and to have interrater identifications. Insects were initially grouped and classified according to their Orders (Coleoptera, Hymenoptera, Lepidoptera, Diptera, etc.) and identified using the Picture Insect[®] software and were confirmed using the standard Insect Identification Guide (University of Georgia, 2012). During the fourth week, students presented their findings and outputs in a virtual synchronous session. Groups with the highest number of collected species or genera received Pokemon badges as tokens of recognition. Moreover, they accomplished the post-test questionnaire via Google Forms and participated in a focus group discussion to share their insights and experiences in performing IITs activity.

Descriptive statistics such as mean, frequency, and normalized gains were used to analyze the pre/post-test scores. All quantitative data were analyzed using SPSS v.26. Students’ feedback and perceptions from the virtual focus group discussion were reviewed and coded twice. Thematic analysis was used to describe and interpret the qualitative data (Braun and Clarke, 2006). More details about the protocol used in the thematic analysis are presented in Appendix B.



Figure 3. Samples of Improvised Insect Traps (IITs) made using recyclable materials.

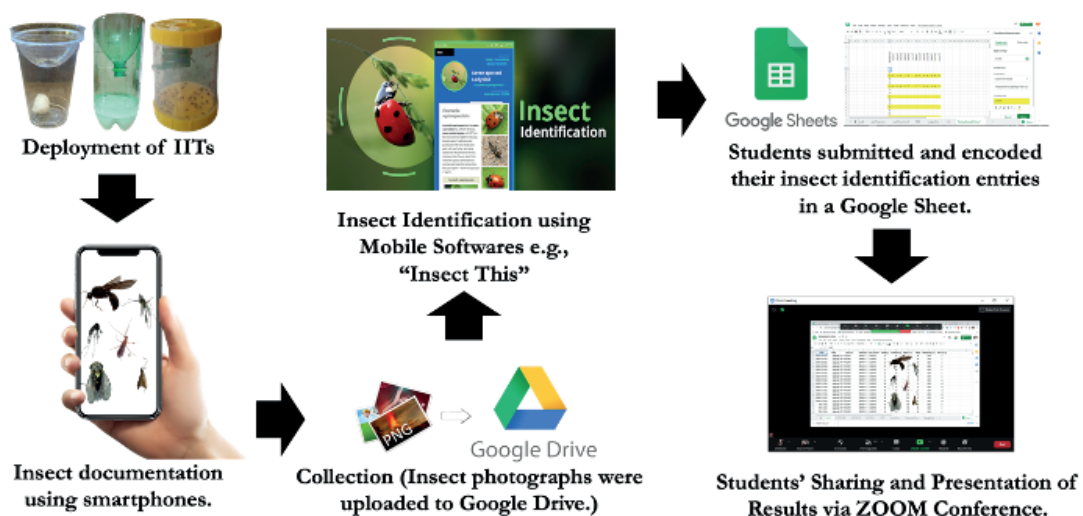


Figure 4. Procedures in the Implementation of IITs and Presentation of Results

Pre/Post-Test Questionnaires on Self-Efficacy and Perceived Level of Engagements

The parallel 20-item pre/post-test questionnaire for self-efficacy and perceived levels of engagement was adopted from the studies of Axboe et al. (2016) and Boulton et al. (2019). Some items from the instrument were removed and paraphrased for contextualization. To assess its face validity, the science coordinator and two science teachers evaluated the questionnaire to gauge the suitability of the items for measuring the variables of interest. Questions such as “Are the instrument’s components related to what’s being measured?” “Is the measurement method appropriate for measuring the variable?” and “Is the measure appearing to be suitable for capturing the variable?” were asked during the evaluation. Overall, the validators gave positive feedback regarding the face validity of instruments such as “Clearly relevant for what it’s measuring”, “Appropriate for the participants,” and “Adequate for its purpose.”. To assess the reliability of the pre/post-test questionnaire, the instrument was pilot tested on a group of Grade 12 science students (N=22) who performed a similar home-based activity. Cronbach alpha values were calculated to measure the internal consistency of each instrument’s dimension. Results showed that the dimensions of the instruments had good and excellent levels of reliability, as shown in Table 3. Table 4 shows the 4-point Likert scale used to interpret the results, which was adopted from the paper of Pimentel (2019). The validated pre/post-test questionnaire is available in Appendix C.

Table 3. Cronbach alpha values for each dimension of the pre/post-test questionnaire

Dimensions	No. of items	Cronbach Alpha	Reliability
Self-efficacy	10	0.89	Good
Perceived Level of Engagement	10	0.91	Excellent
Overall	20	0.90	Excellent

Table 4. Likert Scale Range and Descriptions

Scale	Interval	Range Difference	Description
1	1.00-1.75	0.75	Strongly Disagree (SD)
2	1.76-2.51	0.75	Disagree (D)
3	2.52-3.27	0.75	Agree (A)
4	3.28-4.00	0.72	Strongly Agree (SA)

Virtual Focus Group Discussion

To better understand the students’ perceptions and experiences with the IITs activity, a virtual focus group discussion (FGD) was conducted via Zoom using the protocol of Wong (2008). FGD is a qualitative research technique used to learn about participants’ perspectives, attitudes, and experiences (O.Nyumba et al., 2018). Initially, a total number of 39 participants were recruited from the original group of participants. Participants were invited based on their availability and willingness to participate. Using Google Jam Board, prompts and questions such as “What were your thoughts and expectations before participating in the activity?”, “What was your experience building and using the improvised insect trap?” “What are your perceptions about the theme of the activity – Pokemon?” were posted on the screen during the discussion. Students responded by posting “sticky notes” on the collaborative board, as shown in Figure 5. Follow-up questions were given to further expound the responses of students’ regarding their perceptions and experiences. After the FGD, the video recording of the session and sticky note responses was extracted and transcribed. Coding was done twice for thematic analysis, as described in Appendix C.

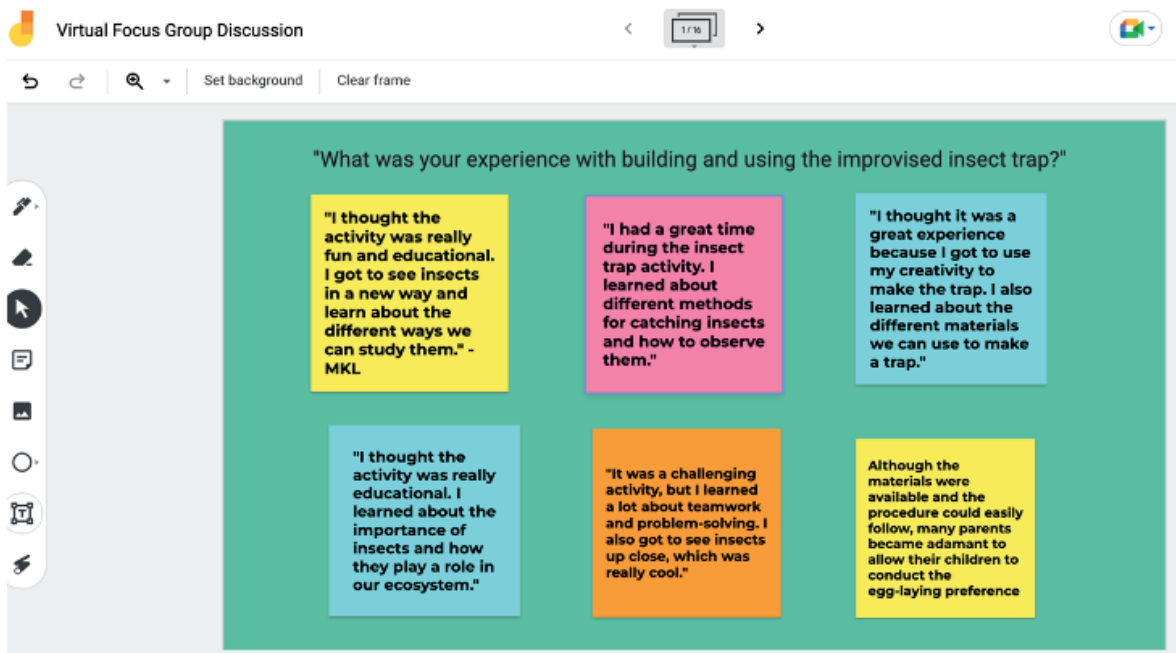


Figure 5. Sample of Google Jam Board used during the virtual focus group discussion

RESULTS

Results of the Normality Test

Given the limited sample size of this study, identifying the distribution of the variables was critical for selecting a practical statistical approach. Shapiro Wilk test was used to compare the sample data to the normal distribution to determine whether the sample data deviates significantly from normality (Shapiro & Wilk, 1965). Table 5 shows that the distribution of self-efficacy and perceived levels of engagement ratings departed significantly from normality ($W=0.922$, $p=0.121$; $W=0.843$, $p=0.166$, respectively). Based on these results, non-parametric tests and the median were used to analyze the variables.

Table 5. Results of Shapiro Wilk Tests

Variables	Shapiro Wilk Test		
	Statistics (<i>W</i>)	<i>df</i>	Sig.
Self-Efficacy	0.922	41	0.121
Perceived Engagements	0.843	41	0.166

*significant at $p<0.05$

Students' Self-efficacy in Performing IITs Activity

Students' self-efficacy is an essential variable in evaluating students' experiences in performing activities in science class. Hu et al. (2020) noted that students' self-efficacy might reflect their enthusiasm, participation, and interest in class activities. In this study, students' self-efficacy was assessed before and after performing the IITs activity. Table 6 shows the frequency and percentage distribution of the students' responses regarding the self-efficacy indicators. Looking at the pretest results, most students disagreed about confidence and comfortability in using materials to create functional insect traps (47.4% and 47.6%, respectively). It was also noted from the initial assessment that most of the students (52.4%) doubted their success in doing the IITs activity. These findings imply that before the conduct of the activity, most of the students had relatively low to mid-level confidence and positive belief regarding their performance. These claims were confirmed in some of the students' responses during the virtual FGD, as shown below.

“Insects are not my thing. I feel gross and disgusted whenever I see insects.”

“I thought this activity would be very complicated. Can’t imagine catching insects and identifying them.”

“I love Pokemon, but I am not sure about real insects. Some of them are not cute at all. Scary!”

Table 6. Frequency Distribution of Students’ Responses on the Indicators of Self-Efficacy

Items	Pretest (%)				Mdn	Post-test (%)				Mdn
	SA	A	D	SD		SA	A	D	SD	
1. I am confident in my ability to create an effective improvised insect trap.	2 (4.8)	15 (38.5)	5 (11.9)	0 (0.0)	3	39 (92.9)	3 (7.1)	0 (0.0)	0 (0.0)	4
2. I am capable of using the materials available to create a functional insect trap.	1 (2.4)	16 (38.1)	20 (47.6)	5 (11.9)	2.5	40 (95.2)	2 (7.8)	0 (0.0)	0 (0.0)	4
3. I believe I have the skills necessary to successfully complete this activity.	4 (9.5)	12 (28.6)	22 (52.4)	4 (9.5)	2.5	30 (71.4)	12 (28.6)	2 (4.8)	0 (0.0)	4
4. I am capable of using my creativity to design an improvised insect trap.	3 (7.1)	21 (50.0)	10 (23.8)	8 (19.0)	3	12 (28.6)	30 (71.4)	0 (0.0)	0 (0.0)	4
5. I feel comfortable taking risks and trying new things in this activity.	2 (4.8)	12 (28.6)	20 (47.6)	8 (19.0)	2.5	32 (76.2)	10 (23.8)	0 (0.0)	0 (0.0)	4
6. I am confident in my ability to think critically and problem-solve while creating an insect trap.	3 (7.1)	22 (52.4)	15 (35.7)	2 (4.8)	3	26 (69.1)	16 (38.1)	1 (2.4)	0 (0.0)	4
7. I believe that I can successfully complete the improvised insect trap activity without assistance.	2 (4.8)	23 (54.8)	13 (31.0)	4 (9.5)	3	40 (95.2)	0 (0)	2 (4.8)	0 (0.0)	4
8. I am capable of using my prior knowledge and experience to inform my insect trap design.	3 (7.1)	12 (28.6)	20 (47.6)	7 (16.7)	2.5	23 (54.8)	19 (45.2)	0 (0.0)	0 (0.0)	4
9. I am comfortable working independently in this activity.	2 (4.8)	18 (42.9)	20 (47.6)	2 (4.8)	2.5	13 (31.0)	29 (69.0)	2 (4.8)	0 (0.0)	4
10. I believe that I will be successful in completing the improvised insect trap activity.	3 (7.1)	16 (38.1)	20 (47.6)	3 (7.1)	2.5	41 (97.6)	1 (2.4)	0 (0.0)	0 (0.0)	4

Regarding the post-test results, it was evident that most students (>90%) strongly agreed or agreed on the indicators of their confidence, certainty, beliefs, and satisfaction after performing the activity. Forty (95.2%) noted that they could finish the IIT activity successfully without assistance. Thirty-nine students (92.9%) showed that they were confident with their skills in making improvised insect traps in the future. Almost all of them (97.6%) expressed that they could complete the activity successfully in the future. These findings denote those students had a positive level of self-efficacy after doing the IITs activity. To compare the difference between the responses from the pretest and post-test, Wilcoxon Signed Rank Test and Haiké’s Gain were used, as shown in Table 7. Findings revealed that the median post-test rank was statistically higher than the median pretest rank regarding the students’ self-efficacy in performing IITs activity ($Z=0.033$, $p=0.022$), with a g -value of 0.68, indicating a medium increase.

Table 7. Results of Wilcoxon Signed Ranked Test on Students' Self-Efficacy (N=42)

Variable	Tests	Mdn	Z value	p-value	Haike's Gain (g)	Verbal Interpretation
Self-efficacy	Pretest	2.5	0.033	0.022*	0.68	Medium
	Post-test	4.0				

Results demonstrate that authentic learning activities such as the IITs might improve students' confidence, resiliency, and self-efficacy by allowing them to work independently under minimal supervision of the teacher. Evidence of improvements in their self-efficacy was reflected in students' responses, such as follows

“Designing and constructing our insect traps are remarkable experiences because I felt like I am an engineer/scientist crafting a prototype for my experiments. Surely, I am confident and satisfied with the design that I have made.”

“Since this activity was performed at home, I had more freedom to work independently and test things out of curiosity. During the orientation activity, I thought it would be challenging. But I noticed that it is easy to build, and the collection and identification are fun! I believe I can do more of this next time!”

Students' Perceived Levels of Engagement

By understanding students' level of engagement, educators can personalize their instruction to meet the individual needs of their students. Thus, this study assessed the perceived levels of engagement of the students before and after doing the IITs activity. As presented in Table 8, the pretest results show that students agreed on the items regarding the indicators of perceived levels of engagement. Most students had positive confirmation regarding the impact of IITs activity on their learning. Before the activity, they noted that they felt excited (52.4%), motivated to participate in the activity (54.8%), excited about the Pokemon theme (69.9%), and believed that their learnings would be used in real-life (59.5). Moreover, they also thought that the IIT activity would help them understand the lesson better, and they will be showing their creativity and imagination in designing improvised traps (52.4 and 69.9, respectively). However, most students disagreed regarding their interest in participating in future activities like the IIT activity (47.6%). These results imply that students had positive perceptions and motivation to participate before the conduct of the IITs activity but were hesitant at the same time to perform more similar activities. These claims were reflected in their responses during the virtual focus group discussion, as presented below.

“During the orientation, I was excited to learn that we would use Pokemon terms and rules to perform the activity. Making our improvised trap design sounds exciting that time!”

“Catching insects sounds cool, so I felt motivated to perform the activity.”

“Before doing the activity, I felt confident that it would help me understand the complex topic of insect taxonomy.”

Table 8. Frequency Distribution of Students' Responses on the Indicators of Engagement

Items	Pretest (%)				Mdn	Post-test (%)				Mdn
	SA	A	D	SD		SA	A	D	SD	
1. I believe that the IIT activity was valuable and helped me to understand insect taxonomy.	21 (50.0)	21 (50.0)	0 (0.0)	0 (0.0)	3.5	38 (90.5)	4 (9.5)	0 (0.0)	0 (0.0)	4
2. I found the IIT activity interesting and enjoyable.	19 (45.2)	22 (52.4)	1 (2.4)	0 (0.0)	3.5	36 (85.7)	6 (14.3)	0 (0.0)	0 (0.0)	4
3. I was motivated to participate in the IITs activity.	23 (54.8)	15 (35.7)	4 (9.5)	0 (0.0)	3.5	35 (83.3)	5 (11.9)	2 (4.8)	0 (0.0)	4
4. The Pokemon theme held my attention, and I was focused throughout the activity.	26 (69.9)	16 (38.1)	0 (0.0)	0 (0.0)	3.5	40 (95.2)	2 (4.8)	0 (0.0)	0 (0.0)	4
5. I was able to understand the purpose of the activity and why it is important.	26 (69.9)	14 (33.3)	2 (4.8)	0 (0.0)	3.5	32 (76.2)	10 (23.8)	0 (0.0)	0 (0.0)	4
6. I was able to apply what I learned from the IITs activity to real-life situations.	25 (59.5)	17 (40.5)	0 (0.0)	0 (0.0)	3.5	26 (61.9)	15 (35.7)	1 (2.4)	0 (0.0)	4
7. I felt challenged by the IIT activity, and I was able to solve the problems effectively.	10 (23.8)	32 (76.2)	0 (0.0)	0 (0.0)	3	37 (88.1)	3 (7.1)	2 (4.8)	0 (0.0)	4
8. The IITs activity helped me develop new knowledge and skills.	20 (47.6)	22 (52.4)	0 (0.0)	0 (0.0)	3.5	40 (95.2)	1 (2.4)	1 (2.4)	0 (0.0)	4
9. I was able to use my creativity and imagination during the IITs activity.	14 (33.3)	26 (61.9)	2 (4.8)	0 (0.0)	3	38 (90.5)	4 (9.5)	0 (0.0)	0 (0.0)	4
10. I would like to participate in similar activities in the future.	7 (16.7)	15 (35.7)	20 (47.6)	0 (0.0)	2.5	38 (90.5)	4 (9.5)	0 (0.0)	0 (0.0)	4

Table 9. Results of Wilcoxon Signed Ranked Test on Students' Perceived Level of Engagement (N=42)

Variable	Tests	Mdn	Z value	p-value	Haiké's Gain (g)	Verbal Interpretation
Perceived Level of Engagement	Pretest	3.5	0.143	0.188	0.07	Negligible
	Post-test	4.0				

On a different page, post-test results show that most students strongly agreed on all the indicators of their engagement in doing the IITs activity. Thirty-eight students noted that the IITs activity helped them understand the concept of insect taxonomy (90.5%). Most of them enjoyed the activity (85.7%) and were motivated to finish it (83.3%). The students perceived using Pokemon as a theme in the IITs activity as helpful in keeping their focus consistent and motivated (95.2%). Interestingly, there was an evident positive shift regarding students' perceptions of their interest in participating in future similar activities (69.0%). Although a significant change was observed on the last indicator, Table 9 displayed no significant difference between the overall median pre/post-test ranks ($Z=0.143$, $p=0.188$), which was confirmed by Haiké's gain value of 0.07, indicating a negligible change. These results convey that students' positive perceptions of their level of engagement were maintained and consistent throughout the activity. These reports were apparent in some of their responses, as presented below.

“The improvisation aspect of the activity made it unique and challenging. I enjoyed the process of coming up with creative solutions to trap insects. It was a great experience in learning insect taxonomy.”

“My excitement level before and after the activity was skyrocketing. I never thought we could do experiments like this at home. I look forward to doing more of this in the future.”

“The activity was so much fun and educational at the same time. I learned about the different classifications of insects and how to make an improvised trap. I was amazed by the variety of insects we caught.”

“Even though the activity was performed remotely, I was really impressed by the level of engagement I had during the insect trap activity. Everyone was eager to learn and participate, making the experience more enjoyable.”

“The activity was well-organized, and the instructions were clear. I felt confident in my ability to create a successful trap, and I was thrilled when we caught so many insects.”

Affordances and Constraints of Using the IITs Activity

By assessing the affordances and constraints in performing the IITs activity, this study aimed to identify the strengths of the activity and the areas for improvement. Using the recordings and responses of the students during the virtual focus group discussion, thematic analysis was performed to generate the themes and subthemes. Responses were classified into two themes (Affordances and Constraints). For the affordances, three subthemes emerged – motivation, satisfaction, and authentic learning. The use of Pokemon as a theme in the activity was found appealing among the students. They mentioned that Pokemon badges made the activity more exciting and fun. Most of the students gave positive feedback regarding the effects of the Pokemon theme on their motivation, as demonstrated below.

“I was motivated to participate in the IIT activity because of the Pokemon concept. It made the activity feel like a fun and interactive game, which kept me engaged and interested in learning about insects.”

“The Pokemon aspect of the activity made it unique and exciting. I felt like I was on a real-life adventure, searching for different types of insects. It was a great way to bring the learning to life.”

“The Pokemon theme made the IIT activity more engaging and entertaining. I was motivated to participate because I felt like I was part of a real-life Pokemon adventure, searching for new and exciting insects.”

Regarding the satisfaction level of the students, it was evident during the virtual FGD that most students had good learning experiences while doing the IITs activity. They expressed their satisfaction with the quality of the trap design, the number of caught insects, the accuracy of their insect identification, and their overall experience. These claims were apparent in their responses as follows.

“I was delighted with the IIT activity. I felt like I learned a lot about insects and their taxonomy and had a lot of fun in the process.”

“The IIT activity was a great learning experience. I was satisfied with the level of engagement and interaction, and I felt like I gained a deeper understanding of insect taxonomy.”

“I was thrilled with the IIT activity. I felt like I could apply what I learned in class and had a lot of fun in the process.”

In this study, IITs activity was used as a home-based experiment to deliver authentic home learning for insect taxonomy. Some students mentioned that they found the IITs activity helpful as they learned new first-hand experiences. Other students emphasized that they preferred doing hands-on activities at home rather than performing virtual simulations and activities. Hereunder are some of the excerpts from students' responses.

"The IIT activity was a fantastic example of hands-on, real-world learning. I felt like I could apply what I learned in class, and it was a lot more interesting than just identifying insects."

"I thought the IIT activity was a great representation of authentic learning. It allowed us to see insects in their natural habitats and was much more engaging than just doing virtual simulations."

On the different side of the coin, the negative comments from students regarding the IITs activity were classified as "Constraints". Under this theme, two subthemes were generated – safety and parental involvement. Students raised some issues regarding the implementation of the activity. Some of them were concerned regarding the kind of insects that they were dealing with. They were worried about mosquitos and other beetles that may carry diseases. They also mentioned the unsatisfactory level of supervision that some of the parents implemented during the activity. Although it was emphasized during the orientation program that students should wear protective clothing during the deployment of traps, close and strict supervision of the parents were necessary to monitor these guidelines.

Some of the quotations from students' feedback are presented below.

"I was concerned about the safety of doing the IIT activity. I felt there wasn't enough adult supervision, and I was worried about getting stung or bitten by insects."

"The risk of getting bitten by mosquitoes during the IIT activity was a major concern for me. I felt there wasn't enough protection and worried about my safety."

"I was worried about the risk of disease transmission from the mosquitoes, and it made me feel unsafe."

"The instructions for safely handling the mosquitoes were not clear, and it made me feel unsure about what I was doing, afraid of being bitten by the mosquitoes, and I didn't feel confident in my ability to protect myself."

DISCUSSIONS

Learning insect taxonomy has been challenging for students due to the lack of appropriate learning activities. This concern was further aggravated by the school closure brought about by the COVID-19 pandemic. Students' self-efficacy has been an essential variable in determining the effectiveness of IITs as a learning activity for insect taxonomy. Findings revealed that students had a low level of confidence and self-efficacy before the implementation of the IITs activity. This might be due to their fear of insects and initial impression regarding the complexity of the activity. Lane et al. (2021) mentioned that students' first impressions of the activity played a significant role in their succeeding performance in class. Moreover, Ernst et al. (2012) noted that using insects in education might be an excellent approach to enhance the learning experience but may pose significant drawbacks and challenges, such as these invertebrates might induce panic or anxiety among students. On a positive note, considerable improvement was observed in their self-efficacy after doing the IITs activity. These findings indicate that as a home-based experiment, the IITs activity enhanced the students' confidence in making improvised traps and learning insect taxonomy. This claim supports the studies by Ainscough et al. (2016) and Robledo & Prudente (2022), which emphasized that academic self-efficacy encompasses judgments regarding one's ability to perform academic tasks and is greatly influenced by doing hands-on activities independently.

According to Bandura's self-efficacy hypothesis, individuals who engage in hands-on tasks and successfully finish them are more likely to develop a sense of self-efficacy (Bandura, 1977). Students can see the direct outcomes of their activities by making and using IITs, which can boost their confidence in their abilities to solve issues and carry out tasks effectively. Furthermore, the ability to design, build, and test their IITs can promote a sense of ownership and responsibility, increasing self-efficacy (Schunk, 1991). Gowda and Mohamed (2020) discovered that hands-on science activities might boost students' self-efficacy and confidence in their abilities. Similarly, Robledo et al. (2021) and Villanueva and Enright (2020) found that hands-on learning experiences can improve students' problem-solving skills, leading to self-efficacy improvement.

The perceived levels of engagement of the students indicate their satisfaction, learning experience, and motivation in doing a learning task. Pretest results revealed that students had positive perceptions and expectations of their engagements and participation in the IITs activity. This perceived level of engagement was consistent and maintained throughout the activity, as confirmed in the post-test results. No significant improvement in students' engagement was found after the activity, maybe because they initially had a relatively high level of perceived engagement. These findings were controversial as they contradict the previous study by Qua et al. (2021), which explained that using hands-on activity might significantly improve the engagement levels of the students in science classes. Salgueira et al. (2012) added that students' degree of engagement and involvement was influenced by their characteristics and demographics, which was not considered in this study due to the small number of participants.

Other possible reasons for the conservation of the students' perceived engagement levels are the following: the activity is highly relevant and engaging, the virtual classroom environment is positive, and the use of a personalized learning approach. Mebert et al. (2020) discovered that pupils are more likely to be engaged when the learning material is relevant and engaging. If students perceive the IIT to be exciting and relevant, they are more likely to be involved before and after the activity. Qui (2022) and Chu et al. (2021) explained that a conducive, friendly, and supportive classroom environment could boost student participation and engagement. Moreover, a study by Grijpma et al. (2022) noted that active learning strategies could increase student engagement. Students may be more engaged and retain learning if they participate in hands-on activities such as the IIT.

Several affordances and constraints transpired during the virtual focus group discussion. Students believed that using "Pokemon" as the theme of the activity enhanced their motivation to participate. They also mentioned that they were highly satisfied with the activity as they were able to apply their learning in real life and got the chance to perform authentic learning activities at home. These findings support the study of Marquet et al. (2017), wherein they found that by incorporating Pokemon Go in teaching strategies, teachers can create a fun and engaging Pokemon-themed activity that will enhance student learning motivation but also reinforce essential skills and concepts in a meaningful and memorable way. Kong (2021) added that authentic learning experiences could improve student satisfaction, engagement, and motivation. Teachers may help students recognize the value of their education and encourage a lifelong love of learning by providing them with relevant, empowering, collaborative, and individualized learning experiences. On the other hand, students raised concerns regarding safety regarding the presence of mosquitos and the low-level parental involvement during the activity. Knopik et al. (2021) discussed that some parents might be unaware of the significance of educational activity or the role they can play in their child's education. Parents' understanding and participation can be increased by providing precise and straightforward information about the activity and the necessity of parental involvement. These constraints mentioned by students are expected based on the nature of the activity. Thus, building stronger connections and constant communication with parents is necessary to ensure that the guidelines and protocol are implemented accordingly.

CONCLUSION

Engaging in the activity of using improvised insect traps (IITs) proved to be instrumental in increasing students' interest and active involvement in the field of insect taxonomy. Students' feedback and responses indicated that their knowledge and proficiency in insect identification significantly advanced as a result of collecting insects using these traps and learning to distinguish between species based on observable traits like size, shape, color, and markings. Furthermore, the incorporation of insect traps in the learning

process provided students with an opportunity to delve into the principles of classification and gain a deeper understanding of the hierarchical structure utilized in taxonomy for categorizing organisms. Moreover, the utilization of improvised insect traps not only served as an educational tool but also played a vital role in fostering environmental consciousness and promoting the conservation of insect diversity, thereby highlighting their ecological importance within ecosystems.

Limitations and Recommendations

There are several limitations to consider when evaluating the effectiveness of improvised insect traps (IITs) as a home-based activity. Firstly, the study's sample size may be limited, which could impact the generalizability of the findings. Secondly, the study may not have accounted for all relevant variables, such as socioeconomic status or prior knowledge of insects, which have the potential to influence the results. Additionally, reliance on self-reported data in the study introduces the possibility of biases or inaccuracies. To address these limitations, future research should aim to employ larger and more diverse samples, control for important variables, and utilize data collection methods beyond self-reports, such as observations and output evaluations. Furthermore, conducting an analysis of the long-term effects of the activity, including changes in knowledge, attitudes, or behaviors related to insects and the environment, would provide valuable insights. By implementing these recommended procedures, future studies can offer a more comprehensive understanding of the outcomes associated with homemade insect traps as a home-based activity.

Acknowledgments: The researchers would like to acknowledge the support and participation of the students, teachers, and school administration of Saint Jude Catholic School, Manila, Philippines.

Authors' Note: This study was partially funded by the research support grant from the Department of Science and Technology – Capacity Building Program for Mathematics and Science Education (DOST-CBPMSE)

BIODATA AND CONTACT ADDRESSES OF AUTHORS



Dave Arthur R. ROBLEDO is a licensed professional teacher and a certified National Geographic Educator who is currently pursuing his Ph.D. in Environmental Chemistry and Ecotoxicology at the Center for Marine and Environmental Resources of Ehime University under the Advanced Science Research Fellowship Program. As a member of the Iwata Laboratory of Ecotoxicology, he focuses on evaluating the estrogenic potencies of environmental pollutants on killer whale estrogen receptors and other mammalian species. In 2022, he successfully completed his first doctorate, Ph.D. in Science Education with a major in Biology, at De La Salle University-Manila, earning the Outstanding Dissertation Award. He obtained his Master of Science in

Teaching Biology from the same university in 2018 and graduated Magna Cum Laude with a BSED major in Biological Science from Batangas State University in 2016. Throughout his academic and teaching career, Mr. Robledo has actively engaged in research and academic activities, presenting his work and participating in various international conferences and conventions across Asia, Europe, and Latin America. His primary fields of research interest encompass biology education, home-based science experiments, environmental science, microbiology, environmental chemistry, and ecotoxicology.

Dave Arthur R. ROBLEDO
Laboratory of Environmental Toxicology
Address: Center for Marine Environmental Studies (CMES), Ehime University
Bunkyo-cho 2-5, Matsuyama, Ehime 790-8577 Japan
Phone: +639178364520
E-mail: rdavearthur@gmail.com



Socorro Echevarria AGUJA is a Full Professor of the Department of Graduate School, College of Education of De La Salle Araneta University, Malabon City, Philippines. Dr. Aguja gained her PhD in Horticulture at Ehime University in Japan at March 2000. Her academic interest areas are horticulture, citriculture, environmental monitoring of persistent toxic substances, action research, climate change literacy, and integration of technology in the teaching and learning Science She has more than 25 journal articles published in international indexes, 1 international book chapter and other national and international articles, papers submitted and presented in international meetings and conferences. Dr.

Aguja was also the recipient of the 2016 Lifetime National Achievement Award of the National Research Council of the Philippines. Prof. Aguja served as the Vice Dean of the Graduate School at De La Salle Araneta University from SY 2017-2021. For FY 2023-2025, Dr. Aguja serves as the President of the Biology Teachers' Association of the Philippines, National Capital Region Chapter.

Socorro Echevarria AGUJA
Graduate School, De La Salle Araneta University
Address: Araneta Boulevard, Potrero, Malabon City 1475 Philippines
Phone: +63-905-2817-519
E-mail: socorro.aguja@dlsau.edu.ph



Maricar Sison PRUDENTE is a Full Professor of the Department of Science Education, Br. Andrew Gonzalez College of Education of De La Salle University, Manila, Philippines. Dr. Prudente gained her PhD in Environmental Chemistry and Ecotoxicology at Ehime University in Japan at March 1999. Her academic interest areas are environmental monitoring of persistent toxic substances, action research, climate change literacy, integration of technology in the teaching and learning Science She has more than 65 journal articles published in international indexes, 2 international book chapters and other national and international articles, papers submitted and presented in international meetings and conferences. Dr.

Prudente was also the recipient of the 2015 Lifetime National Achievement Award of the National Research Council of the Philippines (NRCP). Prof. Prudente was also recognized as the 2018 Outstanding Filipino JSPS Fellow in the field of Education by the Department of Science and Technology (DOST) and the Japan Society for the Promotion of Science (JSPS). Prof. Prudente is the Chairperson and Organizer of the Action Research Action Learning (ARAL), an International Research Congress held annually at De La Salle University Manila since 2015. For FY 2023-2025, Prof. Prudente serves as the National President of the Biology Teachers' Association of the Philippines Inc.

Maricar Sison PRUDENTE
Department of Science Education, De La Salle University
Address: 2401 Taft Avenue, Manila 1004 Philippines
Phone: +63-917-568-6718
E-mail: maricar.prudente@dlsu.edu.ph

REFERENCES

- Ainscough, L., Foulis, E., Colthorpe, K., Zimbardi, K., Robertson-Dean, M., Chunduri, P., & Lluca, L. (2016). Changes in Biology Self-Efficacy during a First-Year University Course. <https://doi.org/10.1187/cbe.15-04-0092>
- Arcidiacono, C., Grimaldi, D., Di Martino, S., and Procentese, F. (2016). Participatory visual methods in the 'Psychology loves Porta Capuana' project. *Act. Res.* 14, 376–392. <https://doi.org/10.1177/1476750315626502>

- Axboe, M.K., Christensen, K.S., Kofoed, PE. et al. Development and validation of a self-efficacy questionnaire (SE-12) measuring the clinical communication skills of health care professionals. *BMC Med Educ* 16, 272 (2016). <https://doi.org/10.1186/s12909-016-0798-7>
- Azila-Gbettor E., Mensah C., Abiemo M.K., & Bokor M., (2021) Predicting student engagement from self-efficacy and autonomous motivation: A cross-sectional study, *Cogent Education*, 8:1, <https://doi.org/10.1080/2331186X.2021.1942638>
- Bandura, A. (1977). Self-efficacy: toward a unifying theory of behavioral change. *Psychological review*, 84(2), 191.
- Boulton, C. A., Hughes, E., Kent, C., Smith, J. R., & Williams, H. T. P. (2019). Student engagement and well-being over time at a higher education institution. *PloS one*, 14(11), e0225770. <https://doi.org/10.1371/journal.pone.0225770>
- Braun, V. & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3, 77-101.
- Brydon-Miller, M., Prudente, M., & Aguja, S. (2017). Lighting a spark, seeing the light: educational action research as transformative practice. SAGE Publications Ltd, <https://www.doi.org/10.4135/9781473983953.n22>
- Cajaiba, R. L., (2014) Difficulty of Science and Biology Teachers to Teach Entomology in Elementary and High Schools in the State of Para, Northern Brazil. *American Journal of Educational Research*.; 2(6):389-392. <https://doi.org/10.12691/education-2-6-10>
- Casey Parker, Lina Bernaola, Benjamin W Lee, Dane Elmquist, Abigail Cohen, Adrian Marshall, James Hepler, Adrian Pekarcik, Emily Justus, Kendall King, Tae-Young Lee, Carlos Esquivel, Kayleigh Hauri, Christopher McCullough, Whitney Hadden, Max Ragozzino, Morgan Roth, James Villegas, Emily Kraus, Michael Becker, Megan Mulcahy, Rui Chen, Priyanka Mittapelly, C Scott Clem, Rachel Skinner, Tanya Josek, Daniel Pearlstein, Jonathan Tetlie, Anh Tran, Anthony Auletta, Edwin Benkert, III, Dylan Tussey, Entomology in the 21st Century: Tackling Insect Invasions, Promoting Advancements in Technology, and Using Effective Science Communication—2018 Student Debates, *Journal of Insect Science*, Volume 19, Issue 4, July 2019, 4, <https://doi.org/10.1093/jisesa/iez069>
- Chu, M.M. and Robledo, D.A., An Investigation on the Effects of Varying Temperatures on Gelatin Denaturation in Response to Enzymatic Reactions from Fruit Extracts (April 17, 2022). *Journal of Industrial Biotechnology*, 2022, Available at SSRN: <https://ssrn.com/abstract=4085991>
- Chu, M.M., Labarez, E.H., Reños L., Velasco, J.R., and Robledo, D.A, Out of the Classroom: IB Students' Experiences and Tips on the Use of Home-based Biology Experiments for Internal Assessment (May 3, 2021). *Universe International Journal of Interdisciplinary Research* Vol. 1 Issue 11. <http://dx.doi.org/10.2139/ssrn.3839113>
- Daly, J. (2016). Gotta catch 'em all: The captivating PR of Pokemon Go [Web log post]. Retrieved from <http://www.adweek.com/socialtimes/joan-daly-gotham-pr-guest-post-pokemon-go/643143>
- Dewey, T., & Lu, Y.-W. (2002). Teaching entomology: a challenge for the 21st century. *Annual review of entomology*, 47, 367-392.
- Emily, H. (2017). Pokemon GO: Implications for Literacy in the Classroom. *The Reading Teacher*, 70(6), 729– 732. <https://doi.org/10.1002/trtr.1565>
- Ernst, C., Vinke, K., Giberson, D., & Buddle, C. (2012). Insects in education: Creating tolerance for some of the world's smallest citizens. In R. Lemelin (Ed.), *The Management of Insects in Recreation and Tourism* (pp. 289-305). Cambridge: Cambridge University Press. <https://doi.org/10.1017/CBO9781139003339.022>
- Galloway, A. (2005). Encyclopedia of Social Measurement || Non-Probability Sampling., (), 859–864. <https://10.1016/b0-12-369398-5/00382-0>
- Gopnik A. (2012). Scientific thinking in young children: theoretical advances, empirical research, and policy implications. *Science* (New York, N.Y.), 337(6102), 1623–1627. <https://doi.org/10.1126/science.1223416>
- Gowda, A. & Mohamed, M. (2020). The impact of hands-on science activities on students' self-efficacy and confidence. *International Journal of Science and Mathematics Education*, 18(1), 1-15.

- Grijpma JW, Mak-van der Vossen M, Kusurkar RA, Meeter M, de la Croix A (2022) Medical student engagement in small-group active learning: A stimulated recall study. *Med Educ.* 2022 Apr;56(4):432-443. <https://doi.org/10.1111/medu.14710>
- Hayat, A.A., Shateri, K., Amini, M. et al. Relationships between academic self-efficacy, learning-related emotions, and metacognitive learning strategies with academic performance in medical students: a structural equation model. *BMC Med Educ* 20, 76 (2020). <https://doi.org/10.1186/s12909-020-01995-9>
- Heath, R. R., Epsky, N. D., Guzman, A., Dueben, B. D., Manukian, A., & Meyer, W. L. (1995, October 1). Development of a Dry Plastic Insect Trap with Food-Based Synthetic Attractant for the Mediterranean and Mexican Fruit Flies (Diptera: Tephritidae). *Journal of Economic Entomology*, 88(5), 1307–1315. <https://doi.org/10.1093/jee/88.5.1307>
- Hu, X., Jiang, Y. & Bi, H. (2020). Measuring science self-efficacy with a focus on the perceived competence dimension: using mixed methods to develop an instrument and explore changes through cross-sectional and longitudinal analyses in high school. *IJ STEM Ed* 9, 47. <https://doi.org/10.1186/s40594-022-00363-x>
- Ingram E, Golick D. (2018) The Six-Legged Subject: A Survey of Secondary Science Teachers' Incorporation of Insects into U.S. Life Science Instruction. *Insects.* 2018 Mar 14;9(1):32. <https://doi.org/10.3390/insects9010032>
- Kidd, S. A., and Kral, M. J. (2005). Practicing participatory action research. *J. Couns. Psychol.* 52, 187–195. <https://10.1037/0022-0167.52.2.187>
- Klein, A. M., Vaissière, B. E., Cane, J. H., Steffan-Dewenter, I., Cunningham, S. A., Kremen, C., & Tscharntke, T. (2007). Importance of pollinators in changing landscapes for world crops. *Proceedings. Biological sciences*, 274(1608), 303–313. <https://doi.org/10.1098/rspb.2006.3721>
- Kong Y. (2021). The Role of Experiential Learning on Students' Motivation and Classroom Engagement. *Frontiers in psychology*, 12, 771272. <https://doi.org/10.3389/fpsyg.2021.771272>
- Lane AK, Meaders CL, Shuman JK, Stetzer MR, Vinson EL, Couch BA, Smith MK, Stains M. Making a First Impression: Exploring What Instructors Do and Say on the First Day of Introductory STEM Courses. *CBE Life Sci Educ.* 2021 Mar;20(1):ar7. <https://doi.org/10.1187/cbe.20-05-0098>
- Lapada A.A., Fabrea, M. F., Roldan, R. D. A., & Farooqi, A. Z. (2020, June 1). Teachers' Covid-19 awareness, distance learning education experiences and perceptions towards institutional readiness and challenges. *International Journal of Learning, Teaching and Educational Research.* Society for Research and Knowledge Management. <https://doi.org/10.26803/ijlter.19.6.8>
- Marquet O, Alberico C, Adlakha D, Hipp JA. Examining Motivations to Play Pokemon GO and Their Influence on Perceived Outcomes and Physical Activity. *JMIR Serious Games.* 2017 Oct 24;5(4):e21. <https://doi.org/10.2196/games.8048>
- Mebert, L., Barnes, R., Dalley, J., Gawarecki, L., Ghazi-Nezami, F., Shafer, G., Slater, J.A., & Yezbick, E.L. (2020). Fostering student engagement through a real-world, collaborative project across disciplines and institutions. *Higher Education Pedagogies*, 5, 30 - 51. <https://doi.org/10.1080/23752696.2020.1750306>
- O.Nyumba, Tobias; Wilson, Kerrie; Derrick, Christina J.; Mukherjee, Nibedita; Geneletti, Davide (2018). The use of focus group discussion methodology: Insights from two decades of application in conservation. *Methods in Ecology and Evolution*, 9(1), 20–32. <https://10.1111/2041-210X.12860>
- Qua K, Haider R, Junk DJ, Berger NA. Sustaining Student Engagement - Successes and Challenges of a Virtual STEM Program for High School Students. *J STEM Outreach.* 2021 Aug;4(3):10.15695/jstem/v4i3.09. <https://doi.org/10.15695/jstem/v4i3.09>
- Qiu F. (2022) Reviewing the role of positive classroom climate in improving English as a foreign language students' social interaction in the online classroom. *Front Psychol.* 2022 Oct 21;13:1012524. <https://doi.org/10.3389/fpsyg.2022.1012524>

- Robledo, D.A., Lapada, A. Miguel, F., and Alam, Z. (2021). COVID-19 Vaccine Confidence and Hesitancy Among Schools' Stakeholders: A Philippine Survey (May 10, 2021). *Journal of Cardiovascular Disease and Research* Vol 12 Issue 3 29-35, 2021, <https://ssrn.com/abstract=3846821>
- Robledo, Dave Arthur, Biology at Home: The Six Attributes of Home-based Biology Experiments (HBEs) for Remote Authentic Learning (April 24, 2021). *PSYCHOLOGY AND EDUCATION* (2021)58(3): Pages:4319-43123, <https://ssrn.com/abstract=3836530>
- Robledo, D.A., Miguel F., Pillar, G.A., Errabo D.D., Cajimat R., Aguja S., Prudente M. Students' Knowledge gains, Self-efficacy, Perceived Level of Engagement, and Perceptions with regard to Home-based Biology Experiments (HBEs) (March 2023). *Journal of Turkish Science Education* Vol 20 Issue 1 84-118. <https://www.tused.org/index.php/tused/article/view/1824>
- Robledo, D.A., and Prudente, M.S, (2022). "A Virtual Fieldtrip": Effects of Google Earth Learning Activities (GELA) on Students' Environmental Awareness and Environmental Attitudes. In *Proceedings of the 2022 13th International Conference on E-Education, E-Business, E-Management, and E-Learning (IC4E '22)*. Association for Computing Machinery, New York, NY, USA, 1–8. <https://doi.org/10.1145/3514262.3514293>
- Salgueira A, Costa P, Goncalves M, Magalhães E, Costa MJ. Individual characteristics and student's engagement in scientific research: a cross-sectional study. *BMC Med Educ*. 2012 Oct 15; 12:95. <https://10.1186/1472-6920-12-95>
- Sarnikova G (2022). Parents' Approaches to Their Children's Education and Related Issues During the COVID-19 Pandemic in the Slovak and the Czech Republic. *J Fam Issues*. Jul 19: <https://doi.org/10.1177/0192513X221075633>
- Schunk, D. H. (1991). Self-efficacy and academic motivation. *Educational psychologist*, 26(3-4), 207-231.
- Shapiro, S.S. and Wilk, M.B. (1965) An Analysis of Variance Test for Normality (Complete Samples). *Biometrika*, 52, 591-611.
- Snyder, J.; Dickens, K.L.; Halbert, S.E.; Dowling, S.; Russell, D.; Henderson, R.; Rohrig, E.; Ramadugu, C. The Development and Evaluation of Insect Traps for the Asian Citrus Psyllid, *Diaphorina citri* (Hemiptera: Psyllidae), Vector of Citrus Huanglongbing. *Insects* 2022, 13, 295. <https://doi.org/10.3390/insects13030295>
- Sotiriou, S.A., Lazoudis, A. & Bogner, F.X. Inquiry-based learning and E-learning: how to serve high and low achievers. *Smart Learn. Environ.* 7, 29 (2020). <https://doi.org/10.1186/s40561-020-00130-x>
- Stephenson R., 2029., Development and Validation of Scientific Practices Assessment Tasks for the General Chemistry Laboratory, *Journal of Chemical Education*, vol. 97, no. 4, pp. 884–893, 2020. <https://10.1021/acs.jchemed.9b00897>
- Villanueva, K. & Enright, R. (2020). The effects of hands-on learning on students' self-efficacy and problem-solving skills. *Journal of Education and Practice*, 11(16), 63-70.
- Schunk, D. H. (1991). Self-efficacy and academic motivation. *Educational psychologist*, 26(3-4), 207-231.
- Wong L. P. (2008). Focus group discussion: a tool for health and medical research. *Singapore medical journal*, 49(3), 256–261.
- Zhang, J., & Weirauch, C. (2017). Insect taxonomy: challenges and prospects. *Annual review of entomology*, 62, 241-260.

RE-EXAMINING THE FUTURE PROSPECTS OF ARTIFICIAL INTELLIGENCE IN EDUCATION IN LIGHT OF THE GDPR AND ChatGPT

Dr. John Y. H. BAI

ORCID: 0000-0001-6688-7837

Center for Open Education Research (COER)
Carl von Ossietzky University of Oldenburg
Oldenburg, GERMANY

Dr. Olaf ZAWACKI-RICHTER

ORCID: 0000-0003-1482-8303

Center for Open Education Research (COER)
Carl von Ossietzky University of Oldenburg
Oldenburg, GERMANY

Dr. Wolfgang MUSKENS

ORCID: 0000-0002-5515-8302

Center for Open Education Research (COER)
Carl von Ossietzky University of Oldenburg
Oldenburg, GERMANY

Received: 08/02/2023 **Accepted:** 16/05/2023

ABSTRACT

Artificial intelligence in education (AIEd) is a fast-growing field of research. In previous work, we described efforts to explore the possible futures of AIEd by identifying key variables and their future prospects. This paper re-examines our discussions on the governance of data and the role of students and teachers by considering the implications of 1) a recent case related to the General Data Protection Regulation (GDPR) and 2) the release of ChatGPT, a generative AI model capable to producing 'human-like' text. These events raise questions for the future of AIEd and the underlying function of assessment, and highlight the importance of active student participation in the integration of AI in education.

Keywords: Artificial intelligence in education, General Data Protection Regulation, ChatGPT, writing and assessment, AI and society.

INTRODUCTION

Artificial intelligence (AI) has been described as a 'general purpose' technology that has the potential to transform societies and economies (Tuomi, 2018). The UNESCO Commission on the Ethics of Scientific Knowledge and Technology (COMEST, 2019) notes that the term "artificial intelligence" does not have one singular definition but is often defined in terms of 'computers that perform tasks usually associated with human intelligence'. COMEST (2019) trace this form back to a 1955 research project, that specified their working assumption that: "the study is to proceed on the basis of the conjecture that every aspect of learning or any other feature of intelligence can in principle be so precisely described that a machine can be made to simulate it" (McCarthy et al., 2016, p. 12). While our understandings of learning and other features of intelligence continue to evolve with ongoing research, an alternative definition that circumvents the unknowns of human intelligence is provided in Nilsson (2009): "artificial intelligence is that activity devoted to making machines intelligent, and intelligence is that quality that enables an entity to function appropriately and with foresight in its environment" (p. xiii). The later definition provides a functional

approach and covers a wide range of algorithms and computational systems that can learn to recognize patterns in complex data and generalize those patterns to novel data.

A growing research literature on artificial intelligence in education (AIEd) illustrates the interest in integrating AI technologies in education (see Bozkurt, Karadeniz, Baneres, Guerrero-Roldan, Rodriguez, 2021; Zawacki-Richter, Marin, Bond, & Gouverneur, 2019, for reviews). In their review of primary AIEd research, Zawacki-Richter et al. (2019) noted that very few papers were led by first authors from education departments, and very few discussed ethical considerations. This contrasts with numerous discussion papers that have highlighted the need to address the ethics of AIEd applications (e.g., du Boulay, 2022; Facer & Selwyn, 2021; Tuomi, 2018; Zeide, 2019) and with policy work on the ethics of AI in general (e.g., IEEE, 2019; OECD, 2022; UNESCO, 2021). These discussions raise a number of ethical issues with inequitable applications of AI, such as the risks to data protection and human agency, and the risk of further exacerbating existing inequalities (see Hu, Neupane, Echaiz, Sibal, & Rivera Lam, 2019, for discussion). Within these discussions, an oft-cited mechanism for mitigating risk is to incorporate comprehensive, multi-stakeholder dialogue during the design and implementation of AI systems. Thus, when considering AIEd specifically, the present research project aims to address the need Zawacki-Richter et al. (2019) identified “for educational perspectives on these technological developments” (p. 22).

The initial goal of the present project is to gather the perspectives of educators on the potential futures of AIEd. We first drew on techniques from future management (Fink & Siebe, 2011; Gutschow & Jorgens, 2016, 2019) to identify key variables (strategy elements) that will impact the future of AIEd and their possible outcomes (future options). Combinations of future options provide a structured method for developing strategic scenarios for AIEd applications, while making explicit the underlying assumptions for different macro and meso conditions (see Bai, Zawacki-Richter, & Muskens, 2022, for discussion). These strategic scenarios are developed to serve as the basis for international focus-group discussions and online surveys of faculty members in higher education.

Table 1. Strategy elements and future options identified in Bai, Zawacki-Richter, & Muskens (2022)

Strategy Element	Future Options				
Access to data	Laissez-faire	Heavily regulated	Limited but open	Limited and sporadic	Limited and proprietary
Funding	Primarily market-based	Public-private partnerships		Primarily government-funded	Mixed funding
Role of developers	Off-the-shelf	Subscription-based		Developers as researchers	Open-access
Role of teachers	Replacement	Division of labour		Retraining	Mixed-bag
Scope of applications	Piecemeal			Comprehensive	

In our previous work (Bai et al., 2022), we described the process and reasoning for identifying five strategy elements and their future prospects (Table 1). We also discussed the inherent subjectivity in imagining possible futures, arguing that “much like AI algorithms, human predictions of the future are based on data gathered from the past.” (p. 49). Since the submission of that paper, the ever-changing landscape of AIEd has drawn our attention to two events that prompt us to revisit our previous discussion; namely: 1) a decision by the Garante per la protezione dei dati personali (2021) to fine a university 200,000 Euro for the use of an e-proctoring system that violated sections of the General Data Protection Regulation (GDPR), and 2) the release of ChatGPT (OpenAI, 2022), a language model capable of producing ‘human-like’ text. In light of these two events, the present paper re-examines and expands our previous discussions on the governance of data and the roles of students and teachers.

THE GDPR AND GOVERNANCE OF DATA

In our previous work, we identified access to data as an important strategy element that would impact the trajectory of AIED development (Bai et al., 2022). Furthermore, we contrasted different regulatory approaches ranging from laissez-faire to heavily regulated, arguing that ‘light-touch’ regulatory environments (Cath, Wachter, Mittelstadt, Taddeo, & Floridi, 2018) may allow the collection of more learner data for AIED research and development, while further opening the risks of privacy violations and the misuse of learner data (e.g., Human Rights Watch, 2022; Laird, Grant-Chapman, Venzke, & Quay-de la Vallee, 2022; Russell, Reidenberg, Martin, & Norton, 2018). In contrast, regulatory environments that prioritize privacy and data protection may enforce restrictions that limit some AIED applications.

In regard to the heavily-regulated end of the continuum, our discussion of the EU’s GDPR identified a number of issues that seemed most relevant to AIED. These included the possible designation of some AIED applications as “high-risk” (Proposal for a Regulation of the European Parliament and of the Council laying down harmonized rules on Artificial Intelligence (Artificial Intelligence Act) and amending certain Union legislative acts, COM(2021) 206 final), the right not to be subject to a decision based solely on automated processing (Article 22), and the right to obtain an explanation for automated decisions (Recital 71; but see Edwards & Veale, 2018; Wachter, Mittelstadt, & Floridi, 2018, for critical discussions). However, a recent decision issued by the Italian Data Protection Authority (Garante per la protezione dei dati personali; hereafter “Garante”) highlights gaps in our discussion and identifies a range of articles relevant to future AIED developments in the EU.

In the Garante (2021) decision against the “Luigi Bocconi” University in Milan, a student complained of possible violations of the GDPR arising from the use of an e-proctoring system to identify and monitor students during online exams (see Bincoletto, 2021; European Data Protection Board, 2021; Liguori & Petrucci, 2021; for summaries of the decision in English). Specifically, software provided by Respondus Inc., a USA-based company, would (among other functions): take photos of the students’ identification cards and a panoramic shot of their rooms at the beginning of the exam, and then capture recordings of the students via their webcams and monitor other applications running on the students’ computers during the exam. An AI algorithm then processed the video images to raise ‘flags’ for “suspicious” behaviors (e.g., looking away from the screen, face partially present or absent from video) and assign a “Review Priority” (“low”, “medium”, or “high”) for teachers to review later.

The university noted that the e-proctoring system was implemented during the SARS-CoV-2 emergency and argued that consent from the students served as the legal basis for the processing of students’ biometric data (i.e., facial images of the students). However, the Garante (2021) decision noted that “students’ consent was not freely given... in relation to their unequal position in the university, especially during exams” (Bincoletto, 2021, p. 589). In addition, the decision noted issues with inadequate information given to students regarding the processing and retention of their data, including the transfer of personal data to the USA where Respondus Inc. is based. In total, the decision cited violations of multiple articles in the GDPR including: Article 5 paragraph 1, letters a), c), and e) (lawfulness, fairness, transparency; data minimization; storage limitation); Article 6 (lawful processing); Article 9 (special category data); Article 13 (information); Article 25 (privacy by default and by design); Article 35 (data protection impact assessment); and Articles 44 and 46 (transfers of personal data to a third country; European Data Protection Board, 2021).

This case supports our previous argument on the importance of data governance for the future of AIED but also highlights gaps in our discussion of the GDPR (Bai et al., 2022). Specifically, this case suggests that our previous discussion underestimated the degree of complexity involved in implementing some types of AIED applications in heavily-regulated environments. However, a complete discussion of the legal nuances of the Garante (2021) decision is beyond the scope of the current paper and the ability of its authors. Our summary of the decision is based on English-language sources consisting of a single academic paper (Bincoletto, 2021), materials from webpages (European Data Protection Board, 2021; Liguori & Petrucci, 2021), and a machine-translated version of the original decision. We hope that interested readers, particularly those who are or collaborate with legal scholars fluent in Italian, will continue to explore the implications of the decision for the future of AIED in the EU.

ChatGPT AND RE-ASSESSING ASSESSMENT

Another event that prompted us to revisit our previous discussion is the recent “research preview” release of ChatGPT (OpenAI, 2022). Following from the UNESCO (2015) Qingdao declaration, which noted that: “successful integration of ICT [information and communication technologies] into teaching and learning requires rethinking the role of teachers and reforming their preparation and professional development” (p. 2), our previous work discussed the potential roles of teachers as AI technologies are integrated into education. We argued that “the potential for AI technologies to transform education provides an opportunity to re-examine what it means to teach and to learn” (Bai et al., 2022, p. 63). The release and subsequent availability of ChatGPT presents such an opportunity by raising questions about the underlying function and purpose of written assessments.

ChatGPT is a recent addition to a group of Generative Pre-trained Transformer (GPT) models developed by OpenAI. ChatGPT’s precursor GPT-3 is a 175-billion parameter model trained on large amounts of text data scraped from the internet (Brown et al., 2020). Like ChatGPT, GPT-3 was “designed to generate sequences of words, code or other data, starting from a source input” or “prompt” (Floridi & Chiriatti, 2020, p. 684). However, one of the key developments since GPT-3.5 seems to be that ChatGPT was fine-tuned through human feedback (see Lambert & von Werra, 2022) to produce text in a ‘conversational way’ (OpenAI, 2022). In practice, the interface allows users to input sequences of prompts and obtain outputs in a familiar chatbot format. However, ChatGPT has attracted much attention for its ‘human-like’ output across a wide range of different prompts, demonstrating impressive ‘few-shot’ and ‘zero-shot’ performance without the need to fine-tune the model for specific tasks (Brown et al., 2020; cf. Sanh et al., 2022, for demonstration of improved zero-shot performance after multi-task training).

The release of ChatGPT drew substantial media coverage and boosted the estimated value of OpenAI (Rudolph et al., 2023), which operates as a “capped profit” company (Brockman et al., 2019). While some of the media coverage has been aptly critiqued as “alarmist and sensationalist reporting” (Rudolph et al., 2023, p. 13), a growing number of academic articles have also started to explore the capabilities and implications of ChatGPT for education (e.g., Gilson et al., 2022; Susnjak, 2022; Tate, Doroudi, Ritchie, & Xu, 2023; Ventayen, 2023). A common concern identified in these discussions is ChatGPT’s capacity to generate ‘human-like’ essays that can evade plagiarism detectors (e.g., Ventayen, 2023; Yeadon et al., 2022) and its potential use for academic misconduct during online exams (Susnjak, 2022). Indeed, recent research suggests that GPT-3.5 can generate 300-word essays comparable to second year Physics students (Yeadon et al., 2022) and ChatGPT can generate correct answers for 42-64% of questions drawn from question banks used to prepare for the United States Medical Licensing Examination (Gilson et al., 2022; see also Bommarito & Katz, 2022, for related work on GPT-3.5 and multiple-choice questions provided by the USA National Conference of Bar Examiners).

Technological developments that challenge the integrity of written assessments are not unprecedented. For example, within the literature on automated essay scoring (AES; see Bai, Zawacki-Richter, Bozkurt et al., 2022, for review), Perelman and colleagues’ work on the Basic Automatic BS Essay Language (BABEL) Generator demonstrates how synthetic text can be generated to contain features often associated with high-scoring essays (see Perelman, 2020, for summary). However, while BABEL-generated text is deliberately nonsensical, ChatGPT can generate text that is difficult for humans to distinguish from that written by other humans (see Ippolito, Duckworth, Callison-Burch, & Eck, 2020, for related research with GPT-2).

The potential for AI-generated text to evade both human and automated systems for detecting plagiarism raises questions not only about the feasibility of using written work for assessment, but also about the purpose and function of essays (see Rudolph et al., 2023; Tate et al., 2023, Yeadon et al., 2022, for discussions). As Rudolph et al. (2023) note, in a potential future where students can submit AI-generated essays that are then automatically screened and scored by other AI tools, “a first AI circumvents a second AI and is assessed by a third AI. All that the humans do is press a couple of keys, and nobody learns anything” (p. 13). This perspective is an apt reminder that essays are not only assigned for the purpose of assessment, but also serve an important role in learning. Indeed, writing itself can be conceptualized as an opportunity to exercise and refine critical thinking skills (see Flower & Hayes, 1981; Kurfiss, 1988; for related discussions). How the practice of writing and its relation to critical thinking will change in the future depend on how tools like

ChatGPT are applied and what affordances these technologies offer for students and teachers (see Kasneci et al., 2023; Rudolph et al., 2023, for discussions).

AN EXAMPLE ESSAY GENERATED BY ChatGPT

We ran a brief probe of ChatGPT's capabilities with the prompt "Write a 300-word essay on the ethics of AI with 3 references in APA format". The output was a vague but passable essay, logically structured with three body paragraphs between an introduction and a conclusion (Appendix A). The content identified some relevant ethical concerns, including the potential for malicious uses of AI (see e.g., McGuffie & Newhouse, 2020), the risk of entrenching existing inequalities (see e.g., Hu et al., 2019; IEEE, 2019), and the implications of AI on human labor (see e.g., Frey & Osborne, 2013; but also, Coelli & Borland, 2019). However, the essay lacked in-text citations and all three references generated by ChatGPT contained inaccuracies. Other authors have previously observed that ChatGPT-generated references tend to be inaccurate or fictitious (e.g., Tate et al., 2023). Likewise, we found that "The ethics of artificial intelligence", a highly cited chapter first published by Bostrom and Yudkowsky in 2014 was misattributed to "Green, T. R.", and "The ethics of algorithms" does not seem to exist but was nonetheless attributed to "Sunstein, C. R.". These author names may refer to Timothy R. Green and Cass R. Sunstein, both prolific and highly cited academics in the fields of agriculture and law, respectively.

The misattribution of authors and the 'stitched-together' composition of the references highlight an important facet of language models: that they do not (always) faithfully reproduce strings in the training data (cf. Carlini et al., 2021). Instead, language models predict sequences of words probabilistically based on patterns in the training data (Bender et al., 2021; Floridi & Chiriatti, 2020). Thus, it is possible that strings (e.g., authors, titles, and publishers) that appear more frequently in the training data are more likely to be represented in ChatGPT's output (see Wei, Garrette, Linzen, & Pavlick, 2021, for related work). However, such a conclusion remains speculative and requires further analysis of ChatGPT-generated references.

From an educator's perspective, learning to choose appropriate references and integrating ideas from different sources are important skills particularly in higher education. The ability to identify who stated what, how they stated it, and on what basis they stated it are all important components for engaging critically with research literature and tracking the development of different ideas. Thus, more work is needed to address whether these processes can or should be 'offloaded' to tools like ChatGPT and to explore the potential consequences of such offloading (see Risko & Gilbert, 2016).

From a broader perspective, amongst papers that do not focus solely on technical capabilities and potential applications, a common concern raised about technological development is what effect these technologies may have on people (Bender et al., 2021; Prabhakaran, Mitchell, Gebru, & Gabriel, 2022; Tuomi, 2018). In the case of language models, Floridi and Chiriatti (2020) note that their availability "represents the arrival of a new age in which we can now mass produce good and cheap semantic artefacts" (p. 690). These "cheap semantic artefacts" may be used dishonestly (Susnjak, 2022) or maliciously (McGuffie & Newhouse, 2020) to change the behavior of their human readers, or they may be used as learning opportunities to engage in critical thinking (Rudolph et al., 2023). Regardless of how they are used, the value of semantic artefacts depends the value assigned to them by humans. As Bender et al. (2021) argue, "the human tendency to attribute meaning to text" (p. 618), combined with the ability of language models to reproduce biases in their training data, means that uncritical reading of synthetic text can further perpetuate inaccurate and harmful worldviews (see McGuffie & Newhouse, 2020, for a salient example). Therefore, it is vital that education sectors prepare students with the skills to engage critically with a world filled with both human- and AI-generated media.

THE ACTIVE ROLE OF STUDENTS IN AIEd

The discussions of how students may use or "misuse" generative-AI tools highlight the importance of student participation in the development of AIEd. In our previous work, we argued that "learners and teachers, the stakeholders who stand to be most affected by AIEd integration, need to be active participants in multi-

stakeholder discussions about how AI is integrated in education.” (Bai et al., 2022, p. 62). However, due to our initial goal of gathering educator perspectives, we did not discuss the role of students as an equally important strategy element (cf. Table 1). Indeed, multiple participants in preliminary focus-group discussions have highlighted this gap by raising the issue of student agency. Thus, this final section addresses the active role of students for the future of AIED.

Research on the motivations of students engaging in plagiarism and academic misconduct is not new (see e.g., Bennett, 2005; Parnter, 2022). Indeed, Eaton, Stoesz, and Seeland (2022) have traced the industry of commercial contract cheating back to the 1930s. However, the availability of tools like ChatGPT makes the means of producing essays widely accessible and lowers the costs of time, money, and effort involved. As Yeadon et al. (2022) note “these tools essentially represent a wide spread democratization of paid essay writing services” (p. 9). Therefore, it seems pertinent to consider the value proposition for students tasked with written assignments. Specifically, what purpose does and should essay writing fulfill? If written assignments serve primarily as an assessment tool, students focused on extrinsic goals (see Krou, Fong, & Hoff, 2021) may perceive essay writing simply as an obstacle to obtaining good grades. In contrast, if essays serve as opportunities for students to exercise critical thinking and receive meaningful feedback, students may perceive writing to be an important skill to practice. Ultimately, if we want to understand how students will use ChatGPT and other AI tools, we need to engage students in participatory research (Prabhakaran et al., 2022) and allow them space to share their perspectives. Nevertheless, it is up to institutions and educators to make the value of writing explicit and to engage students in collaborative relationships (see Macfarlane & Tomlinson, 2017, for a critical discussion).

The release of ChatGPT has led to very different responses across different institutions (Rudolph et al., 2023) with some calling for further development in AI tools capable of detecting synthetic text (Susnjak, 2022). However, such an adversarial approach may result in a ‘cat-and-mouse game’ between students and institutions, in which learning is relegated below the goal of countering the latest tool used by the other side (see Perelman, 2020). The legal challenge that resulted in the *Garante* (2021) decision provides just one example of such an outcome. AlgorithmWatch (2020) report another case in which, despite student protests, the Danish Ministry of Education implemented an exam monitoring software for online high-school exams. In response, a student gained access to the underlying code and shared details for bypassing the system (Schou, 2019). While acknowledging the importance of ensuring assessment integrity, these challenges to institutional decisions demonstrate students critically engaging with their world (hooks, 2010) and highlight the importance of consulting with students before implementing AIED tools.

Institutional decisions regarding AI tools also have implications for the relationship between students and the teachers tasked with assessing their learning. Adversarial and ‘policing’ approaches could degrade trust and disrupt the practices of teaching and learning. In contrast, Rudolph et al. (2023) makes a compelling case for “an approach that builds trusting relationships with our students in a student-centric pedagogy and assessments for and as learning rather than solely assessments of learning” (p. 13). While the most suitable approach is likely to differ across different contexts and cultures, the cases of generative AI and digital-proctoring tools considered above highlight the importance of actively involving students in the integration of AI in education.

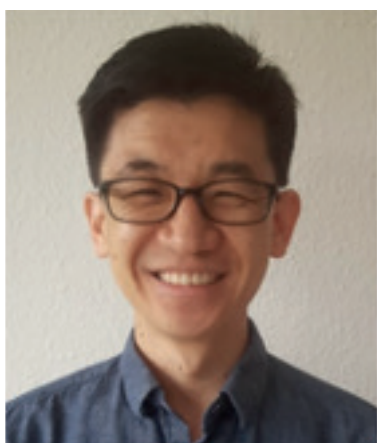
CONCLUSION

In the present project, we use future-planning methods to explore the opportunities and risks of integrating AI in education (see Bai et al., 2022). However, such an approach relies on ongoing engagement with a diverse range of perspectives (Prabhakaran et al., 2022). We concluded our previous work by acknowledging that “the visions of possible futures presented here are neither complete nor objective” (p. 63). While the present paper re-examines and extends our discussion in light of the *Garante* (2021) decision and the release of ChatGPT, our original conclusion remains true. Our visions of possible futures remain incomplete and the collaborative activities involved in shaping the future of AIED require ongoing, multi-stakeholder dialogue between legal scholars (e.g., Bincoletto, 2021), computer scientists and AI ethicists (e.g., Bender et al., 2021; Prabhakaran et al., 2022), educators (Zawacki-Richter et al., 2019), and students.

Authors' Note: This article has been presented in the 5th International Open & Distance Learning Conference- IODL 2022.

Acknowledgements: This project is funded by the Volkswagen Foundation and the Ministry of Science and Culture in Lower Saxony (2N3743). We thank the team of international researchers at the Center for Open Education Research (COER) for insightful discussions that shaped the elements in Table 1; particular thanks to Victoria I. Marin, Cengiz Hakan Aydin, Aras Bozkurt, Insung Jung, Junhong Xiao, and Patricia Slagter van Tryon for their active collaboration. We also thank Sreekari Vogeti and Laura N. Peters for their valuable comments on early drafts of this paper.

BIODATA and CONTACT ADDRESSES of AUTHORS



Dr. John Y. H. BAI is a Postdoctoral Researcher in the Faculty of Education and Social Sciences at the Carl von Ossietzky University of Oldenburg. He completed his PhD in Experimental Psychology at the University of Auckland, New Zealand, where he worked as a Research Fellow and Lecturer. In collaboration with the international team at the Center for Open Education Research (COER), he is currently working on the project “Prospects for the Future of Learning: Artificial Intelligence Applications in Higher Education”, funded by the Volkswagen Foundation and The Lower Saxony Ministry of Science and Culture. This international project aims to collect perspectives of higher education faculty to contribute to the interdisciplinary and multi-stakeholder discussion on AI and society. His research interests include artificial intelligence, research design, and the interaction between individuals and their environments.

John Y. H. BAI
Center for Open Education Research (COER), Faculty of Education and Social Sciences
Address: Carl von Ossietzky Universität Oldenburg, 26129, Oldenburg, Germany
Phone: +49-(0)441-798-0
E-mail: john.yihao.bai@uni-oldenburg.de



Dr. Olaf ZAWACKI-RICHTER is a professor of educational technology at the University of Oldenburg in Germany. He is the Dean of the Faculty of Education and Social Sciences and Director of the Center for Open Education Research (COER). Olaf has over 25 years of professional experience in the field of open, distance, and digital education. He has also served as a consultant and advisor, including work for the United Nations' International Labor Organization, the Office of Technology Assessment at the German Bundestag, and the German Science and Humanities Council (Wissenschaftsrat). Dr. Zawacki-Richter has authored over 150 journal articles and edited several books, including “Online Distance Education – Towards a Research Agenda”, “Systematic Reviews in Educational Research”, “Open and Distance Education in Australia, Europe and the Americas: National Perspectives in a Digital

Age” (Vol. 1), and “Open and Distance Education in Asia, Africa and the Middle East: National Perspectives in a Digital Age” (Vol. 2) – all published open access. He is an Associate Editor of the “Online Learning Journal” (OLJ) and a member of the editorial board of the “International Review of Research in Open and Distance Learning” (IRRODL), “Open Learning”, the “Turkish Online Journal of Distance Education” (Turkiye), and the “The Journal for Higher Education Development” (Austria). In 2022 Olaf published together with Professor Insung Jung the open-access Handbook of Open, Distance, and Digital Education (ODDE) in Springer's Major Reference Series.

Olaf ZAWACKI-RICHTER

Center for Open Education Research (COER), Faculty of Education and Social Sciences

Address: Carl von Ossietzky Universität Oldenburg, 26129, Oldenburg, Germany

Phone: +49-(0)441-798-0

E-mail: olaf.zawacki.richter@uni-oldenburg.de



Dr. Wolfgang MUSKENS has worked as a researcher at the Carl von Ossietzky University of Oldenburg, Faculty of Educational and Social Sciences since 2001. Wolfgang has worked in the field of Recognition of Prior Learning for more than 15 years, and has been involved in many projects on APL (Accreditation of Prior Learning), RPL, and PLAR (Prior Learning Assessment and Recognition). He contributed to the establishment of Germany's first PLAR-service at the University of Oldenburg in 2017. His academic background is a Doctorate in personality psychology and a habilitation in the field of Lifelong Learning. He studied at the Universities of Dusseldorf and Koblenz-Landau, where he earned his degree in 2001. With regards to methods, he is interested in structure-giving techniques like Latent Class Analysis and Factor Analysis.

Wolfgang MUSKENS

Center for Open Education Research (COER), Faculty of Education and Social Sciences

Address: Carl von Ossietzky Universität Oldenburg, 26129, Oldenburg, Germany

Phone: +49-(0)441-798-0

E-mail: wolfgang.mueskens@uni-oldenburg.de

REFERENCES

- AlgorithmWatch. (2020). *Automating society report 2020*. <https://automatingsociety.algorithmwatch.org>
- Bai, J. Y. H., Zawacki-Richter, O., Bozkurt, A., Lee, K., Fanguy, M., Cefa Sari, B., & Marin, V. I. (2022). Automated essay scoring (AES) systems: Opportunities and challenges for open and distance education. In *Proceedings of The Tenth Pan-Commonwealth Forum on Open Learning (PCF10)*. <https://doi.org/10.56059/pcf10.8339>
- Bai, J. Y. H., Zawacki-Richter, O., & Muskens, W. (2022). Developing strategic scenarios for artificial intelligence applications in higher education. In *5th International Open and Distance Learning Conference Proceedings Book* (pp. 47-70). Eskisehir, Turkey. <https://iodl.anadolu.edu.tr/proceedings-iodl-2022>
- Bender, E. M., Gebru, T., McMillan-Major, A., & Shmitchell, S. (2021). On the dangers of stochastic parrots: Can language models be too big?. In *Proceedings of the 2021 ACM Conference on Fairness, Accountability, and Transparency* (pp. 610-623). <https://doi.org/10.1145/3442188.3445922>
- Bennett, R. (2005). Factors associated with student plagiarism in a post-1992 university. *Assessment & Evaluation in Higher Education*, 30, 137-162. <https://doi.org/10.1080/0260293042000264244>
- Bincoletto, G. (2021). E-proctoring during students' exams: emergency remote teaching at stake. *European Data Protection Law Review*, 7, 586-591. <https://doi.org/10.21552/edpl/2021/4/15>
- Bommarito II, M., & Katz, D. M. (2022). *GPT takes the Bar Exam*. arXiv preprint. <https://doi.org/10.48550/arXiv.2212.14402>
- Bostrom, N., & Yudkowsky, E. (2014). The ethics of artificial intelligence. In K. Frankish & W. Ramsey (Eds.), *The Cambridge Handbook of Artificial Intelligence* (pp. 316-334). Cambridge University Press. <https://doi.org/10.1017/CBO9781139046855.020>

- Bozkurt, A., Karadeniz, A., Baneres, D., Guerrero-Roldan, & A.E., Rodriguez, M. E. (2021). Artificial intelligence and reflections from educational landscape: A review of AI studies in half a century. *Sustainability*, 13, Article 800. <https://doi.org/10.3390/su13020800>
- Brockman, G., Sutskever, I., & OpenAI. (2019, March 11). *OpenAI LP*. OpenAI Blog. <https://openai.com/blog/openai-lp/>
- Brown, T. B., Mann, B., Ryder, N., Subbiah, M., Kaplan, J, Dhariwal, P., ... & Amodei, D. (2020). Language models are few-shot learners. *Advances in Neural Information Processing Systems*, 33, 1877-1901. <https://doi.org/10.48550/arXiv.2005.14165>
- Carlini, N., Tramer, F., Wallace, E., Jagielski, M., Herbert-Voss, A., Lee, K., ... & Raffel, C. (2021, August 11-13). Extracting Training Data from Large Language Models. In *The Proceedings of the 30th USENIX Security Symposium* (pp. 2633- 2650). <https://www.usenix.org/system/files/sec21-carlini-extracting.pdf>
- Cath, C., Wachter, S., Mittelstadt, B., Taddeo, M., & Floridi, L. (2018). Artificial intelligence and the ‘good society’: The US, EU, and UK approach. *Science and Engineering Ethics*, 24, 505-528. <https://doi.org/10.1007/s11948-017-9901-7>
- Coelli, M. B., & Borland, J. (2019). Behind the headline number: *Why not to rely on Frey and Osborne’s predictions of potential job loss from automation*. Melbourne Institute Applied Economic & Social Research. https://melbourneinstitute.unimelb.edu.au/__data/assets/pdf_file/0005/3197111/wp2019n10.pdf
- Commission on the Ethics of Scientific Knowledge and Technology (2019). *Preliminary study on the ethics of artificial intelligence*. UNESCO. <https://unesdoc.unesco.org/ark:/48223/pf0000367823>
- du Boulay, B. (2022). Artificial Intelligence in Education and Ethics. In O. Zawacki-Richter & I. Jung (Eds.), *Handbook of Open, Distance and Digital Education*. Springer Nature Singapore. https://doi.org/10.1007/978-981-19-0351-9_6-1
- Eaton, S.E., Stoesz, B.M., Seeland, J. (2022). Listening to Ghosts: A qualitative study of narratives from contract cheating writers from the 1930s onwards. In S. E. Eaton, G. J. Curtis, B. M. Stoesz, J. Clare, K. Rundle, & J. Seeland (Eds.), *Contract Cheating in Higher Education: Global Perspectives on Theory, Practice, and Policy* (pp. 251-269). Springer International Publishing. https://doi.org/10.1007/978-3-031-12680-2_18
- Edwards, L., & Veale, M. (2017). Slave to the algorithm: Why a right to an explanation is probably not the remedy you are looking for. *Duke Law & Technology Review*, 16, 18-84. <https://doi.org/10.2139/ssrn.2972855>
- European Data Protection Board (2021, September 16). *Italian SA finds monitoring system for online university exams to be in breach of privacy, fines university*. https://edpb.europa.eu/news/news/2021/italian-sa-finds-monitoring-system-online-university-exams-be-breach-privacy-fines_en
- Facer, K., & Selwyn, N. (2021). *Digital technology and the futures of education: Towards ‘Non-Stupid’ optimism*. Paper commissioned for the UNESCO Futures of Education report. <https://unesdoc.unesco.org/ark:/48223/pf0000377071.locale=en>
- Fink, A., & Siebe, A. (2011). *Handbuch Zukunftsmanagement: Werkzeuge der strategischen Planung und Fruherkennung*. Campus Verlag GmbH.
- Floridi, L., & Chiriatti, M. (2020). GPT-3: Its nature, scope, limits, and consequences. *Minds and Machines*, 30, 681-694. <https://doi.org/10.1007/s11023-020-09548-1>
- Flower, L., & Hayes, J. R. (1981). A cognitive process theory of writing. *College Composition and Communication*, 32, 365-387.
- Frey, C. B., & Osborne, M. (2013). *The future of employment*. Oxford Martin Programme on Technology and Employment. <https://www.oxfordmartin.ox.ac.uk/downloads/academic/future-of-employment.pdf>

- Garante per la protezione dei dati personali. (2021). *Ordinanza ingiunzione nei confronti di Università Commerciale “Luigi Bocconi” di Milano - 16 settembre 2021 [9703988]*. <https://www.garanteprivacy.it/web/guest/home/docweb/-/docweb-display/docweb/9703988>
- General Data Protection and Regulation. (Regulation 2016/679). European Parliament, Council of the European Union. <https://eur-lex.europa.eu/eli/reg/2016/679/oj>
- Gilson, A., Safranek, C., Huang, T., Socrates, V., Chi, L., Taylor, R. A., & Chartash, D. (2022). *How well does ChatGPT do when taking the medical licensing exams? The implications of large language models for medical education and knowledge assessment*. medRxiv preprint. <https://doi.org/10.1101/2022.12.23.22283901>
- Gutschow, K., & Jorgens, J. (2016). *Einführung von Verfahren zur Validierung nichtformalen und informellen Lernens – Anforderungen und Handlungsoptionen Zwischenbericht*. Federal Institute for Vocational Education and Training.
- Gutschow, K., & Jorgens, J. (2019). *Einführung von Verfahren zur Validierung nichtformalen und informellen Lernens – Anforderungen und Handlungsoptionen*. Federal Institute for Vocational Education and Training.
- hooks, b. (2010). *Teaching critical thinking: Practical wisdom*. Routledge. <https://doi.org/10.4324/9780203869192>
- Hu, X., Neupane, B., Echaiz, L. F., Sibal, P., & Rivera Lam, M. (2019). *Steering AI and advanced ICTs for knowledge societies: A Rights, Openness, Access, and Multi-stakeholder Perspective*. UNESCO Publishing. <https://unesdoc.unesco.org/ark:/48223/pf0000372132>
- Human Rights Watch. (2022). *“How dare they peep into my private life?” Children’s rights violations by governments that endorsed online learning during the Covid-19 pandemic*. <https://www.hrw.org/report/2022/05/25/how-dare-they-peep-my-private-life/childrens-rights-violations-governments>
- IEEE. (2019). *Ethically Aligned Design: A Vision for Prioritizing Human Well-being with Autonomous and Intelligent Systems* (1st Ed.). The IEEE Global Initiative on Ethics of Autonomous and Intelligent Systems. <https://standards.ieee.org/content/ieeestandards/en/industry-connections/ec/autonomous-systems.html>
- Ippolito, D., Duckworth, D., Callison-Burch, C., & Eck, D. (2019). *Automatic detection of generated text is easiest when humans are fooled*. arXiv preprint. <https://doi.org/10.48550/arXiv.1911.00650>
- Kasneci, E., Sessler, K., Kuchemann, S., Bannert, M., Dementieva, D., Fishcher, F., ... & Kasneci, G. (2023). *ChatGPT for Good? On Opportunities and Challenges of Large Language Models for Education*. edArXiv preprint. <https://doi.org/10.35542/osf.io/5er8f>
- Krou, M. R., Fong, C. J., & Hoff, M. A. (2021). Achievement motivation and academic dishonesty: A meta-analytic investigation. *Educational Psychology Review*, 33, 427-458. <https://doi.org/10.1007/s10648-020-09557-7>
- Kurfiss, J. G. (1988). *Critical Thinking: Theory, Research, Practice, and Possibilities*. ASHE-ERIC Higher Education Report No. 2. George Washington University. <https://files.eric.ed.gov/fulltext/ED304041.pdf>
- Laird, E., Grant-Chapman, H., Venzke, C., & Quay-de la Vallee, H. (2022). *Hidden harms: The misleading promise of monitoring students online*. The Center for Democracy & Technology. <https://cdt.org/wp-content/uploads/2022/08/Hidden-Harms-The-Misleading-Promiseof-Monitoring-Students-Online-Research-Report-Final-Accessible.pdf>
- Lambert, N. & von Werra, L. (2022, December 9). *Illustrating Reinforcement Learning from Human Feedback (RLHF)*. Hugging Face Blog. <https://huggingface.co/blog/rlhf>
- Liguori, L. & Petrucci, L. (2021, October, 21). *The Italian Data Protection Authority fines Italian university Bocconi for unlawful processing of students’ personal data*. Portolano Cavallo. <https://portolano.it/en/newsletter/portolano-cavallo-inform-digital-ip/the-italian-data-protection-authority-fines-italian-university-bocconi-for-unlawful-processing-of-students-personal-data>

- Macfarlane, B., & Tomlinson, M. (2017). Critiques of student engagement. *Higher Education Policy*, 30, 5-21. <https://doi.org/10.1057/s41307-016-0027-3>
- McCarthy, J., Minsky, M. L., Rochester, N., & Shannon, C. E. (2006). A proposal for the Dartmouth summer research project on artificial intelligence, August 31, 1955. *AI Magazine*, 27, 12-14.
- McGuffie, K., & Newhouse, A. (2020). *The radicalization risks of GPT-3 and advanced neural language models*. arXiv preprint. <https://doi.org/10.48550/arXiv.2009.06807>
- Nilsson, N. J. (2009). *The quest for artificial intelligence*. Cambridge University Press.
- OECD. (2022). *Recommendation of the Council on Artificial Intelligence*. OECD/LEGAL/0449. <https://legalinstruments.oecd.org/en/instruments/OECD-LEGAL-0449>
- OpenAI (2022, November 30). *ChatGPT: Optimizing language models for dialogue*. OpenAI Blog. <https://openai.com/blog/chatgpt/>
- Parther, C. (2022). The rise of contract cheating in graduate education. In S. E. Eaton, G. J. Curtis, B. M. Stoesz, J. Clare, K. Rundle, & J. Seeland (Eds.), *Contract Cheating in Higher Education: Global Perspectives on Theory, Practice, and Policy* (pp. 251-269). Springer International Publishing. https://doi.org/10.1007/978-3-031-12680-2_17
- Perelman, L. (2020). The BABEL generator and e-Rater: 21st Century writing constructs and automated essay scoring (AES). *Journal of Writing Assessment*, 13. <https://escholarship.org/uc/item/263565cq>
- Prabhakaran, V., Mitchell, M., Gebru, T., & Gabriel, I. (2022). *A human rights-based approach to responsible AI*. arXiv preprint. <https://doi.org/10.48550/arXiv.2210.02667>
- Risko, E. F., & Gilbert, S. J. (2016). Cognitive offloading. *Trends in Cognitive Sciences*, 20, 676-688. <https://doi.org/10.1016/j.tics.2016.07.002>
- Rudolph, J., Tan, S., & Tan, S. (2023). ChatGPT: Bullshit spewer or the end of traditional assessments in higher education?. *Journal of Applied Learning and Teaching*, 6. <https://doi.org/10.37074/jalt.2023.6.1.9>
- Russell, N. C., Reidenberg, J. R., Martin, E., & Norton, T. B. (2018). *Transparency and the marketplace for student data*. Center on Law and Information Policy, Fordham Law School. <https://ir.lawnet.fordham.edu/clip/4>
- Sanh, V., Webson, A., Raffel, C., Bach, S. H., Sutawika, L., Alyafeai, Z., ... & Rush, A. M. (2021). *Multitask prompted training enables zero-shot task generalization*. arXiv preprint. <https://doi.org/10.48550/arXiv.2110.08207>
- Schou, C. (2019, March 9). *The nadir of surveillance (Den Digitale Provevagt)*. <https://secret.club/2019/03/07/exam-surveillance.html>
- Susnjak, T. (2022). *ChatGPT: The end of online exam integrity?*. arXiv preprint. <https://doi.org/10.48550/arXiv.2212.09292>
- Tate, T., Doroudi, S., Ritchie, D., & Xu, Y. (2023). *Educational research and AI-generated writing: Confronting the coming tsunami*. EdArXiv preprint. <https://doi.org/10.35542/osf.io/4mec3>
- Tuomi, I. (2018). *The impact of artificial intelligence on learning, teaching, and education*. European Commission, Joint Research Centre. <https://doi.org/10.2760/12297>
- UNESCO (2015) *Qingdao Declaration ICT- and Post-2015 Education. Seize digital opportunities. Lead education transformation*. United Nations Educational, Scientific and Cultural Organization. https://en.unesco.org/icted/sites/default/files/2019-04/37_qingdao_declaration.pdf
- UNESCO. (2021). *Recommendation on the ethics of artificial intelligence*. United Nations Educational, Scientific and Cultural Organization. <https://unesdoc.unesco.org/ark:/48223/pf0000381137>
- Ventayen, R. J. M. (2023). *OpenAI ChatGPT Generated Results: Similarity Index of Artificial Intelligence-Based Contents*. <http://doi.org/10.2139/ssrn.4332664>

- Wachter, S., Mittelstadt, B., & Floridi, L. (2017). Why a right to explanation of automated decision-making does not exist in the General Data Protection Regulation. *International Data Privacy Law*, 7, 76-99. <https://doi.org/10.1093/idpl/ix005>
- Wei, J., Garrette, D., Linzen, T., & Pavlick, E. (2021). *Frequency effects on syntactic rule learning in transformers*. arXiv preprint. <https://doi.org/10.48550/arXiv.2109.07020>
- Yeadon, W., Inyang, O. O., Mizouri, A., Peach, A., & Testrow, C. (2022). *The death of the short-form physics essay in the coming ai revolution*. arXiv preprint. <https://doi.org/10.48550/arXiv.2212.11661>
- Zawacki-Richter, O., Marin, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education—where are the educators? *International Journal of Educational Technology in Higher Education*, 16, 1-27. <https://doi.org/10.1186/s41239-019-0171-0>
- Zeide, E. (2019). Artificial intelligence in higher education: Applications, promise and perils, and ethical questions. *Educause Review*, 54, 31-39. <https://er.educause.edu/articles/2019/8/artificial-intelligence-in-higher-education-applications-promise-and-perils-and-ethical-questions>

APPENDIX

ChatGPT output following the prompt “Write a 300-word essay on the ethics of AI with 3 references in APA format” (italics added):

The Ethics of AI is a growing area of concern as artificial intelligence continues to develop and become more prevalent in our society. AI has the potential to change the way we live, work, and interact with the world in profound ways, but it also raises a number of ethical questions about its impact on our lives and the way it is used.

One of the main concerns about AI is that it has the potential to be used for malicious purposes, such as cyber attacks, hacking, and mass surveillance. As AI becomes more advanced, it will become easier for individuals or organizations to use it to carry out harmful activities without detection. This is why it is important to ensure that AI is developed and used in an ethical and responsible manner, with strong privacy and security measures in place to prevent abuse.

Another area of concern is that AI has the potential to be biased and perpetuate existing inequalities in society. For example, if an AI system is trained on biased data, it may make biased decisions that discriminate against certain groups of people. It is crucial to ensure that AI is developed in a way that is transparent and accountable, and that it is tested and validated to avoid perpetuating existing biases.

Lastly, there are also concerns about the potential job losses and other economic impacts that may result from the widespread adoption of AI. While AI has the potential to greatly increase productivity and efficiency, it may also lead to widespread job losses as machines replace human workers. This is why it is important to think about the ethical implications of AI and ensure that its benefits are distributed fairly.

In conclusion, the ethics of AI is a complex and important area of discussion. To ensure that AI is developed and used in an ethical and responsible manner, it is crucial to consider its potential impacts on privacy, security, and the distribution of its benefits. By considering these ethical questions and working to develop AI in an ethical and responsible way, we can ensure that its benefits are realized while minimizing its potential harm.

References:

Green, T. R. (2018). The ethics of artificial intelligence. Cambridge University Press.

Zhang, H., & Chen, Y. (2019). Artificial intelligence: A comprehensive review and ethical considerations. Journal of medical systems, 43(12), 592.

Sunstein, C. R. (2020). The ethics of algorithms. Cambridge University Press.

EXPERIENCES OF GIFTED CHILDREN WITH AUTISM SPECTRUM DISORDER, THEIR PARENTS, AND TEACHERS IN TURKIYE WITH THE COVID-19 PANDEMIC

Neslisah SIKIKOGLU

ORCID: 0000-0002-1443-9335
Department of Special Education
Anadolu University
Eskisehir, TURKIYE

Muharrem KOC

ORCID: 0000-0002-9138-2205
Department of Guidance and Psychological Counseling
Hacettepe University
Ankara, TURKIYE

Dr. Seray OLCAY

ORCID: 0000-0002-5007-7466
Department of Special Education
Hacettepe University
Ankara, TURKIYE

Dr. Sezgin VURAN

ORCID: 0000-0001-7658-1102
Department of Special Education
Anadolu University
Eskisehir, TURKIYE

Received: 02/10/2022 **Accepted:** 12/04/2023

ABSTRACT

This study aimed to determine the experiences of gifted children with autism spectrum disorder, their parents, and teachers with the COVID-19 pandemic and holistically reveal the reflections of the restrictions in this process and the transition to distance education on the lives and especially the education of gifted children with autism spectrum disorder (ASD). The study was designed with a phenomenological research design, one of the qualitative research methods. The study participants were gifted children with ASD, aged between 6-14 and continuing their education through inclusion, their parents and teachers. The research data were collected through semi-structured interviews and analyzed in detail by interpretive phenomenological analysis. As a result of the data analysis, two themes, "The impacts of the COVID-19 pandemic on life" and "Distance education and its impacts in the COVID-19 process", and 12 categories were reached. Recommendations were presented in line with the study findings and the literature.

Keywords: Autism spectrum disorder, superior intelligence, gifted child with ASD, distance education, COVID-19 Pandemic, twice-exceptional.

INTRODUCTION

The restrictions experienced due to the COVID-19 pandemic and the transition to distance education affected students with autism spectrum disorder (ASD), as well as all students. Students with autism spectrum disorder (ASD) are individuals who experience difficulties in social interaction and communication, have limited interest and repetitive behavior patterns, and have difficulties in adapting to uncertainties and new

situations due to their routines (American Psychiatric Association, [APA], 2013). Difficulties adapting to routine changes and new situations can sometimes bring about behavioral problems such as sleep and nutritional problems, harming oneself and people around, meltdown and high anxiety levels (Amorim et al., 2020). These listed features can cause such individuals and their parents to be heavily impacted by changes in their lives. The COVID-19 pandemic has significantly changed the home and school lives of students with ASD since it has restricted daily and social life and includes uncontrolled uncertainties; students with ASD have been among the groups most affected by the pandemic due to these changes (Hume et al., 2020). The status of being affected has undoubtedly differed according to students' level of being affected by ASD, their level of intelligence, and the region of residence. Thus, Stenhoff, Pennington, and Tapp (2020) stressed that students with ASD living in rural areas received limited education due to the inadequacies they experienced in accessing technology during the COVID-19 pandemic. Moreover, since gifted children with ASD continue their education in inclusive settings in Türkiye, students with this diagnosis have had the opportunity to benefit from services offered only within the scope of general education during the COVID-19 pandemic.

The education to be provided to gifted children with ASD, in other words, twice-exceptional students, is expected to be of quality that meets their needs related to both ASD and superior intelligence (Rimm et al., 2018). While there are differences regarding the quality of education provided during the COVID-19 pandemic in Türkiye, it is known that gifted children with ASD participate in the education provided online by their teachers, just like their typically developing peers. Thus, teachers have carried out educational activities with students who have had access to the internet through platforms such as EBA (Education Information Network) prepared by the Ministry of National Education (MoNE) (a digital education platform where students and their parents log in with the usernames and passwords defined for them and there is educational content for students at all levels from preschool to high school) or Zoom. Furthermore, 1500 activity plans for mathematics, 1000 for life sciences, 500 for science, and 500 for social studies and religious culture for students with ASD have been made available to students, their parents, and teachers via EBA (Sani-Bozkurt et al., 2022). Apart from the educational opportunities directly provided to students with ASD, many discourses and conferences have been organized by various federations, foundations, and associations, and parents and teachers of students with ASD have been informed about what to do in this process (Gorgun & Balikci, 2021; Sani-Bozkurt et al., 2022; Yilmaz & Atli, 2020). A study examining the research conducted by institutions related to ASD on students with ASD and their families during the COVID-19 pandemic in Türkiye and worldwide showed that supporting contents regarding education, health, and public policies on the COVID-19 pandemic were frequently presented through webinars, visual representations, electronic text resources, and online communication platforms; studies specific to students with ASD having different characteristics were not conducted, while frequently informative studies and rarely practical studies were carried out (Cetin & Ercan, 2021; Sani-Bozkurt, 2021; Yakut, 2021). Hence, both the services offered in practice and the research findings made it necessary to determine how gifted children with ASD benefited from the distance education process during the COVID-19 pandemic, what kind of difficulties they experienced, what kind of precautions should be taken in case of similar situations in the future and examine the experiences of stakeholders in this process. On the other hand, restrictions and the distance education process caused students with ASD to spend a significant part of their time at home with their family members, which has brought about many changes in the daily lives of students and their families, from routines to family interaction (Dogan and Gorgu, 2022; Mumbardo-Adam et al., 2021).

While no study in the available literature has focused on the experiences of gifted children with ASD with the COVID-19 process from their own perspectives, some studies have focused on the views and experiences of parents and teachers of students with ASD. It is seen that these studies have aimed to reveal the current situation. In one of these studies, Mumbardo-Adam et al. (2021) researched how the quarantine practice affected the daily lives and routines of children and adolescents with ASD and their parents during the COVID-19 pandemic. In the study carried out with 47 parents of children with ASD aged 2-17, their views on the impacts of quarantine on their daily lives were obtained. The study findings revealed that children with ASD and their parents adapted better to quarantine than expected, children communicated better with their parents, and young people participated in their domestic routines more frequently. Parents indicated that they developed new strategies to manage the quarantine, such as structuring their days, using

visual aids for learning or leisure time, or benefiting from new technologies. Another study (Hornstra et al., 2022) examined the motivation, well-being, and satisfaction of typically developing students and students with special needs before and during the quarantine through their parents' experiences (n = 470). The study results demonstrated that gifted students with attention deficit and hyperactivity disorder and ASD had higher academic motivation, well-being, and satisfaction during the quarantine than typically developing students. According to the findings of qualitative research conducted during the pandemic and aiming to describe how parents provided education to their children with ASD (Cahapay, 2020; Majoko and Dudu, 2020), families realized that each family member had an important place in education during the pandemic, they could create routines without difficulties in the transition from school to home with the support of other family members, and families started to prepare for a new social life, especially for the post-pandemic period, with cooperation among themselves and with other families.

Studies aiming to reveal the impacts of the COVID-19 pandemic from teachers' perspectives examined how teachers evaluated the effectiveness of distance education and the problems experienced. In the study performed with 67 primary school teachers to research the effectiveness of online learning during the COVID-19 pandemic, the data collected from teachers through semi-structured interviews and questionnaires revealed that teachers mentioned the importance of technological readiness for online learning to be effective and the cooperation of all stakeholders (teachers, parents, and school administrators) (Aliyyah et al., 2020). In the study carried out to determine the impacts of participation in online educational activities at home during the COVID-19 pandemic (Putri et al., 2020), opinions were obtained from 15 primary school teachers and two parents. Unlike other studies, the research concluded that limited communication and socialization among students caused more significant problems for students with ASD. The study also determined that children attending the first, second, and third grades of primary school, regardless of whether they had a diagnosis or not, experienced problems due to the lack of technology usage skills. It was observed that teachers showed limitations in their technology usage skills, spent a longer time in front of the screen to create e-content and provide feedback to students about their study, established more intensive communication for a longer time with parents, and indicated these listed points as problems. The study revealed the difficulties experienced in the online learning environment in this respect. Another remarkable finding of the study was that parents emphasized that they were not competent to teach at home and needed more support to help their children learn at home.

As a result, studies focusing on parents' and teachers' views (Aliyyah et al., 2020; Cahapay, 2020; Hornstra et al., 2022; Majoko and Dudu, 2020; Putri et al., 2020) demonstrated that parents of students with ASD made more efforts for the education of their children during the pandemic, their domestic interaction with their children with ASD increased, and they realized the importance of cooperation with all stakeholders involved in their children's education. The research revealed that the lack of skills in using technology adversely affected teachers' ability to provide effective education in online environments and students' access to quality education, and teachers thought that distance education restricted the interaction of students with ASD. It is observed that the above-mentioned studies asked the views of parents and teachers of students with ASD on distance education during the COVID-19 pandemic in general, without focusing on their individual differences, and the opinions and experiences of students with ASD, the direct beneficiaries of distance education, were not adequately mentioned. It is also seen that the studies did not sufficiently examine the impacts of the COVID-19 pandemic on the daily lives of students with ASD, in addition to their educational lives, and there is a need for studies performed to this end. Based on the limitations listed in the present study, it is aimed to holistically reveal the reflections of the restrictions experienced due to the COVID-19 pandemic and the transition to distance education on the lives of gifted children with ASD, especially their education, by focusing on the experiences of students with ASD, their parents, and teachers.

METHOD

This study was designed with a phenomenological research design, one of the qualitative research methods. Phenomenological research is a research design focusing on the experiences of individuals and aiming to reveal an individual's experiences and perceptions regarding any phenomenon (Miller and Fredericks, 2003; Yildirim and Simsek, 2013). This study aimed to reveal the experiences of gifted children with ASD, their parents, and teachers with the COVID-19 pandemic process.

Participants

Criterion sampling, one of the purposive sampling methods, was employed to determine this study's participants. Purposive sampling predicts the creation of the sample from people, events, objects, or situations with the qualities and criteria determined for the problem (Yildirim and Simsek, 2013), and in this method, the criterion is determined by researchers themselves (Marshall and Rossman, 2014). Four criteria were determined in this study:

- 1- The students to be interviewed should continue their education through inclusion depending on the ASD diagnosis.
- 2- The students to be interviewed should be gifted.
- 3- The parents to be interviewed should live in the same house as the students to be interviewed.
- 4- The teachers to be interviewed should be the teachers of the students to be interviewed.

While determining the participants, first, the parents of the students who were evaluated and followed up in the special education departments of the universities (Hacettepe and Anadolu Universities) where the researchers worked and who met the criteria were contacted. The parents were informed about the study's purpose and process. In the beginning, eight students and eight parents agreed to participate in the study. However, three students with normal intelligence levels and their parents were not included in the study since they did not meet the specified criteria. Later, these students' teachers were contacted, and the study's purpose was explained to them. Three of these five teachers agreed to join the research as volunteers, and the other two stated they could not participate due to time limitations. There are health committee reports showing that the student participants are diagnosed with ASD and educational evaluation reports indicating that they continue their education through inclusion. Additionally, all of the students are gifted individuals. The intelligence levels of Kayra, Ozgur, and Gokhan were determined using the Anatolian-Sak Intelligence Scale (ASIS). The intelligence level of Zafer was determined by the TONI-4 intelligence test, whereas the intelligence level of Burak was determined by the Wechsler Intelligence Scale (WISC-R). The study was conducted with five students aged between 6-14 years and meeting the determined criteria, their parents (n = 5), and the teachers of Ozgur, Zafer, and Burak (n = 3) who agreed to be interviewed. Table 1 summarizes the demographic information of gifted children with ASD, their parents, and teachers. The students were given code names.

Table 1. Participants' Characteristics

Information on the Students				Information on the Parents				Information on the Teachers		
Name	Age	Grade	Intelligence Level	Parent	Age	Education Level	Occupation	Gender	Age	Branch
Kayra	9	4	133-Gifted	Father	47	Undergraduate	Teacher			
Ozgur	7	2	149-Gifted	Mother	32	Associate Degree	Draftsman Housewife	Female	41	Primary school teacher
Gokhan	6	1	151-Gifted	Mother	40	Undergraduate	Banker Housewife			
Zafer	14	9	122-Gifted	Mother	42	High School	Civil servant	Female	36	School counselor
Burak	13	7	Gifted	Mother	33	Primary School	Housewife	Male	29	School counselor

Data Collection and Analysis

Data were collected through semi-structured interviews in this study. Thus, it was aimed to reveal the experiences of the interviewed individuals in more detail (Yildirim and Simsek, 2013). Since interviews were held with students, parents, and teachers within the scope of the study, the researchers created three separate semi-structured interview forms. To this end, first, the researchers reviewed the literature on the subject in detail, each researcher prepared questions suitable for the study's aim, and, thus, a question pool was created. Afterward, the researchers examined all questions and made the necessary arrangements. Then, to evaluate the suitability of the questions, the opinion of eight experts was obtained, and the questionnaire was finalized. The interview questions are included in Appendix-1.

The first interviews were conducted online by two researchers between June 15 and June 30, 2020. Before the interviews, the participants were informed about the aim and content of the study, it was stated that they could ask questions again in case of an incomprehensible question, and explanations were made that their identities would be kept confidential. Furthermore, permission was requested to take audio or video recordings for analyses to be conducted in a healthier way. Consent was obtained from the participants that they were informed and willing to participate in the study under the stated conditions. Moreover, parental consent was acquired for the student participants. The interviews lasted 10-30 minutes. The second interviews were held by the same two researchers between January 25 and February 5, 2021. By conducting two interviews at different times, it was aimed to reveal differences, if any, in the experiences of the student participants and their parents from the onset of the COVID-19 pandemic to the subsequent period. The father of Kayra and the mothers of Gokhan, Ozgur, Burak, and Zafer were included in the second interview. A total of 18 interviews were conducted. Since the first and subsequent interviews did not differ significantly, the data obtained from both interviews were analyzed holistically.

The research data were analyzed by interpretive phenomenological analysis, which aims to explain a certain situation inductively under unpredictable conditions (Smith and Osborn, 2008). Before the data analysis, the interview records taken with the participants' permission were converted into text by two researchers, and the texts were confirmed by two different researchers. All data were transcribed into a Word document and made ready for analysis. Afterward, the data were analyzed in detail by conducting an interpretive phenomenological analysis. To this end, first, the study authors searched for what the experiences regarding the phenomenon were in the texts and how they were realized (Creswell, 2007) and coded the interview transcripts independently. The authors checked the codes and themes of the other group in pairs. After the coding and themes, the authors agreed on codes and themes by holding four online conferences. The two main themes and 12 categories are detailed in the results.

The Scale

Validity and reliability aim to increase credibility in qualitative research (Creswell, 2013; Guler, Halicioglu, Tasgin, 2015; Yildirim and Simsek, 2016). Credibility, consistency, transferability, and confirmability are among the validity and reliability strategies used in research (Guba and Lincoln, 1982). To this end, the listed strategies were used in the study. The interviews were conducted at different times, and it was aimed to reveal whether the data collected were periodic or not. Researcher diversity was ensured in the study; the data were collected and analyzed by more than one researcher. The listed points contributed to ensuring the credibility of the study. Moreover, it was aimed to ensure transferability in the study by describing in detail the data collection process and analysis, including direct quotations in the results, and using the purposive sampling method to determine the participants. During the study process, the researchers approached the whole process critically and carried out external audits. To provide consistency in the study, interview transcripts, codes, and themes were checked by the researchers, and online conferences were organized until a consensus was reached. Additionally, ethical principles of honesty, objectivity, confidentiality, respect, and openness (Aydin, 2016) were taken into account in the study. The research was conducted by obtaining approval from the Scientific Research and Publication Ethics Committee of a university. Voluntary consent for the study was obtained from each participant, the participants were coded, and their confidentiality was taken as a basis. No intervention affecting the participants' views was performed during the study, and the results were reported with the participants' consent.

FINDINGS

This section contains the results obtained as a result of the data analysis. Two themes and 12 categories were reached as a result of the study. Table 2 presents the themes and categories reached.

Table 2. Themes and Categories

Theme	Categories
1. The Impacts of the COVID-19 Pandemic on Life	1.1. The meaning of COVID-19 and first reactions
	1.2. Difficulties of the COVID-19 process
	1.3. Things changed by the COVID-19 process
	1.4. Reflections of the COVID-19 process on family communication and interaction
	1.5. Coping strategies in the COVID-19 process
2. Distance Education and Its Impacts in the COVID-19 Process	2.1. Applications in distance education
	2.2. Reactions to applications in distance education
	2.3. Positive aspects of distance education
	2.4. Inadequate aspects of distance education
	2.5. Difficulties in distance education
	2.6. Coping strategies with difficulties in distance education
	2.7. Expectations and recommendations for the improvement of the distance education process

Theme 1. The Impacts of the COVID-19 Pandemic on Life

The participants shared their experiences regarding the impacts of the COVID-19 pandemic on their lives in the categories of “The meaning of COVID-19 and first reactions, difficulties of the COVID-19 process, things changed by the COVID-19 process, reflections of the COVID-19 process and family communication and interaction, and coping strategies in the COVID-19 process.” The student participants, their parents, and teachers expressed the most experience in the category of “Difficulties of the COVID-19 process.”

The Meaning of COVID-19 and First Reactions

This category includes the views of the parent participants on how they explained COVID-19 to their children and the views of the student participants on how they made sense of COVID-19. All parent participants indicated that they told their children what the virus was, its dangers, what kind of effects it could have, what to do in this process, and why they had to stay at home. One of the parent participants explained COVID-19 to his child as follows, “*We said there was a disease. There was already a lot of broadcast about it on TV, especially on EBA. He watched the presentation in between, and we also talked about it. We said, if we paid attention, we would not become infected. Our child never went outside until he was allowed (Kayra’s father).*”

All student participants also expressed their views and experiences with regard to taking precautions against COVID-19 and adapting to this situation. While one student participant explained what precautions he took against COVID-19 in the following way, “*I didn’t go outside too much to protect myself from the pandemic (Kayra).*”, another student participant expressed this almost without skipping any item, “*Okay, let me explain it this way. First, you should wash your hands. Second, you should spend the first 14 days at home if you have returned from abroad. You should not accept visitors and isolate yourself. During isolation, you should not enter the person’s room without a mask. You should not touch your hands, eyes, nose, and mouth (Ozgur).*” Furthermore, one of the student participants was observed to have a very high awareness of COVID-19. This student participant gave clues that he was aware of the conspiracy theories on the subject by saying, “*People think of it as a biological weapon, an act of human revenge, or a natural phenomenon. Coronavirus is a cousin of the flu. It causes diseases such as pneumonia, shortness of breath, and kidney failure. I think the cause of the pandemic is nature’s cleaning itself (Kayra).*” and also declared that he had his own opinion by saying, “*I think.*”

Difficulties of the COVID-19 Process

This category addressed the problems that the student, parent, and teacher participants experienced, such as limited social interaction and communication during the pandemic, the disruption of daily routines, and the restriction of going outside. All parent participants stated that their children had problems due to the inability to go outside during this process. One parent expressed the problems they experienced as follows, "... children wanted to go outside all the time, there are numerous side effects of not being able to take them out (Kayra's father)." Additionally, two parent participants mentioned the difficulties related to sleep and eating (meal) patterns that emerged with the disruption of their children's routines and the retardation observed in development. For example, one parent participant expressed the problems in the sleep and eating pattern by saying, "I said, his routine was disrupted. Gokhan used to sleep at 21:30 before. He has difficulty falling asleep, especially due to the influence of TV. His sleep and eating patterns have been disrupted. He is hungry all the time." and expressed the retardation observed in development in the following way, "His speech has regressed because he no longer makes an effort to be understood. There were letters he had learned. He started to swallow them slowly. Or the words he used to pronounce correctly started to disappear a little (Gokhan's mother)."

Two student participants also stated that they experienced problems due to being unable to go outside, similar to their parents. One student participant drew attention to a problem he experienced due to the inability to go outside by saying, "I miss going out with my friends." In parallel with the views of both students and parents, one of the teacher participants mentioned the possible problems in the process by saying, "He is probably very bored at home because being at home all the time is very difficult even for us adults, but it must be even more difficult for children. There has probably been a regression in education and academic issues (Zafer's teacher)."

Things Changed by the COVID-19 Process

This category addressed the changes experienced by the student, parent, and teacher participants in the COVID-19 process. All parent participants mentioned that they experienced positive and negative changes in their children's lives and their own lives during the pandemic. Four parent participants who mentioned positive changes stated that their children's interaction with family members and people in their immediate surroundings and their independent learning efforts increased. One of these parent participants emphasized an increase in her child's interaction with others by saying, "Burak used to play by himself. Since other children were aware of his condition, they knew he would not be able to play and communicate like the others. But I told them, Burak understands everything, he is like this because you don't play with him and don't talk to him. ... When I used to tell him to go out, he used to say, "No, mom, I won't go, the kids don't like me, they don't want me." But it changed a bit in this process and his friends started to play with him (Burak's mother)." The other parent participant said that his child was trying to learn something with his own effort in this process and stated his experiences as follows, "He made different designs, by the way. He worked in Word. He worked in Excel. He strived to do something by himself (Kayra's father)." Three student participants said they experienced new things in this process and mentioned the positive changes caused by the process. One of the students said that he experienced new things in this process, "I enjoyed preparing other foods, meals, and desserts (Ozgur)".

Two teacher participants expressed that they understood the importance of technology and family education better during the COVID-19 pandemic and, thus, emphasized the positive changes in their lives. One of the teachers mentioned the positive changes caused by the process by saying, "It is understanding the importance of technology (Burak's teacher)." Another teacher emphasized that she understood the importance of educating parents as follows, "I understood the importance of educating parents on the intervention methods regarding the problem behaviors of students with ASD (Zafer's teacher)." One of the teacher participants stated that the rapid transition to distance education and using television for this purpose was an important and positive step by saying, "Frankly speaking, the ministry immediately adapted to distance education with EBA. Lessons started to be taught with distance education. They provided it on TV for families with internet problems. In this sense, they carried out distance education well on the basis of the MoNE (Ozgur's teacher)."

On the other hand, all the student and teacher participants and three parent participants mentioned the negative changes the pandemic created in their lives. Whereas one parent participant expressed the negative changes in his child's life as follows, "He wanted to watch too much TV because he wanted to spend time and

couldn't find much to do. He wanted a tablet computer a lot. He wanted a computer very much (Kayra's father)." Another parent participant indicated this by saying, *"Burak used to be a child going to the grocery store every day, but he can't do this now. We also said that this disease caused death. He knows what death is, so he was very impressed by it. He says, I don't want to die (Burak's mother)."* Another parent participant described the negative changes in her life by emphasizing an increase in her workload in the following way, *"I have to cook all the time. Things such as housework, etc. started to be much more intense. I started to get up earlier. Just in this way, I could get my work done (Zafer's mother)."*

The student participants mentioned the negative changes brought about by the process, like their parents, and expressed their longing for school and friends. One of the student participants said that his homework load was very high due to online education by saying, *"Of course, my homework has increased to fill the free time (Kayra)."* and indicated his longing for school by stating, *"It makes you feel a longing for school (Kayra)."* Another student participant expressed his negative experiences with the following sentences, *"It was nice at first, but then I started to feel lonely. I distanced myself from my friends a little. I gained more weight. I spent more time on the internet (Zafer)."*

All of the teacher participants mentioned the negative changes in the education and training process and the indirect impacts of these changes on students. For example, one teacher participant mentioned the negative changes in the education and training process by saying, *"These social skills could not be developed because children did not enter environments such as school settings, parks, etc. (Burak's teacher)."* and indicated the indirect impacts of these changes on children's social communication and interaction skills.

Reflections of the COVID-19 Process on Family Communication and Interaction

This category addressed the views and experiences of the student and parent participants regarding the differences created by the COVID-19 process in family communication and interaction. The statements discussed in this category were also mentioned as positive changes in the category of things changed by the process. However, since communication and interaction difficulties are among the main symptom areas in ASD, it was decided to mention these findings under a separate category. One of the parent participants sharing her experiences in this category emphasized the increased interaction with the sibling during the quarantine by stating, *"The dialogue between them is very good. I took out all their toys. They play together. They are in constant dialogue while playing games on the phone. The thing I became most grateful for in this process was the communication with his sibling (Ozgur's mother)."* The student participant also shared his experiences in this process in a way supporting his parent's views, *"I played games with my sibling. He also loved me a lot (Ozgur)."* Moreover, two student participants expressed they were very happy to spend time with their parents during the pandemic in the following way, *"I went on a picnic with my father, and we had dinner there. I loved staying at home (Burak)."*, *"I became very happy. We are happy because there is my mother and father. We are happy because they are at home (Ozgur)."* Two parent participants also emphasized that their communication increased as the time they spent with their children increased. The words of one of the parent participants are the statement explaining this in the best way, *"Seven hours a day. If we think the road takes the remaining one hour, then I used not to take care of Gokhan for eight hours a day. We took care of each other and became friends with each other. We learned to be friends with each other. We started to spend eight hours more together (Gokhan's mother)."*

Coping Strategies in the COVID-19 Process

In this category, the student participants usually mentioned the methods of protecting themselves, whereas the parent participants made explanations about the coping strategies their children used to protect themselves and they used to arrange their domestic life and meet their children's needs. For example, a parent participant expressed the experiences regarding the efforts her child made to protect himself from the virus as follows, *"He never goes out without a mask (Burak's mother)."* In addition to wearing a mask, one of the student participants stated that he tried to protect himself by staying at home, *"I protected myself by staying at home. I don't wear gloves, but I wear a mask when going out (Zafer)."*

Three parent participants mentioned their experiences in coping with having to stay at home continuously. While one of the parent participants expressed her experiences by stating, *“We made changes to the program to increase the quality of the time we spent at home. We bought supporting books. We normally buy them, but this time we bought them not for fun. We bought them to follow the school and create a school environment (Gokhan’s mother)”*, another parent participant stated the following, *“We rearranged his room. We tried to expand the area for play in line with his needs. We expanded the hours for using TV and tablet computer. We tried to spend more time when there were things he wanted to do with us. We encouraged him a bit to make his own choices. In other words, instead of telling him, “Come, let’s do this,” we fulfilled his wishes. Sometimes, we even did not fulfill them intentionally. He is already aware that he can’t have everything he wants, but sometimes we didn’t consciously fulfill his wishes because we thought we should make him feel this (Kayra’s father).”* However, one of the parent participants expressing her view on the coping strategies stated she realized her child was overloaded while trying to cope with the process in the following way, *“We make the program. After all, children are not together. They don’t wait their turn, we study fast, naturally; otherwise, time does not pass at home. Maybe, it was too much for him. Maybe, we exaggerated. Maybe, I went too far (Gokhan’s mother).”* and questioned the effectiveness of the strategy she used.

Theme 2. Distance Education and Its Impacts in the COVID-19 Process

The participants shared their experiences regarding distance education during the COVID-19 pandemic in the categories of “applications in distance education, reactions to applications in distance education, positive aspects of distance education, inadequate aspects of distance education, difficulties in distance education, coping strategies with difficulties in distance education, and expectations and recommendations for the improvement of the distance education process.” The student participants, their parents, and teachers emphasized the category “inadequate aspects of distance education” the most.

Applications in Distance Education

This category included the opinions and experiences of the student, parent, and teacher participants in which they mentioned the activities in the distance education process. Three parent participants stated what they did to support the development of their children in the distance education process in this category. One of the parent participants said, *“We provided the homework control regarding the lesson subjects, identified his deficiencies and supported him, and separated the books he had read and had not read. We encouraged him to read the books he had not read. Those he enjoyed because he has the feature of reading again and again. We encouraged him in this respect. We already provided physical support with his education as implementers (Kayra’s father).”* Another parent participant expressed her views regarding the activities they carried out to support her child in the distance education process as follows, *“Our biggest advantage in this process is that he attended the first grade because I also provided support to him. Maybe if he had attended the 10th and 11th grades, he would have done it alone. We continued our lessons. We continued doing his homework and bought sourcebooks. We bought story books (Ozgur’s mother).”*

Three student participants indicated that they participated in the educational activities carried out during the distance education process. One of the student participants expressed his experiences on this issue in the following way, *“There are live lessons. I am doing homework. I follow the lessons on EBA TV from time to time (Kayra).”*, while another student participant expressed his experiences by saying, *“I watch them on TV, I open TRT EBA and follow the lessons (Ozgur).”* Another student participant stated the things done in the process as follows, *“There is EBA. There is nothing else than EBA (Zafer).”*

Two teacher participants mentioned what they did to support the academic development of students with ASD during the distance education process. One of the teacher participants expressed what they did to support their students in the following way, *“We lectured every day, taught lessons, sent videos and activities, and received feedback (Ozgur’s teacher).”*, while another teacher participant explained this by stating, *“I sent the information published by the ministry during the distance education process to the families and tried to talk to the families every 2-3 days in general. I could not teach live lessons, etc. There were also phone applications, and I tried to support the family with them. I informed the families about listening to academicians via Zoom.”* On

the contrary, one of the teacher participants emphasized that she did not make an additional application or individualized education program for gifted children with ASD in this process. The views of the teacher participant on the subject were as follows: *“Frankly speaking, I didn’t do a separate study with Ozgur in my class. His parents had asked for several sources before. I sent supplementary resources to them. (Ozgur’s teacher).”*

Reactions to Applications in Distance Education

This category included the views of the student, parent, and teacher participants in which they shared their negative experiences with distance education. Four parent participants showed reactions to the applications in the distance education process and stated that they had negative experiences. A parent participant expressed her negative views on distance education applications in the following way, *“It didn’t benefit us at all. In fact, Burak was very enthusiastic about all, for EBA TV and other applications. But then he saw it was always the same thing, and he got bored... (Burak’s mother).”* Another parent participant expressed her reaction to distance education applications by saying, *“EBA was the best thing to do in this process, but that doesn’t work either (Ozgur’s mother).”*

Four student participants emphasized that they were not satisfied with the applications in the distance education process and shared that they had negative experiences with distance education. For example, a student participant expressed the negativities he experienced as follows, *“Well, it’s good, but I don’t want to get up, enter EBA or ZOOM on the phone and listen to lessons. As a negative aspect, coronavirus has forced us into an environment (Zafer).”*

Similar to the parents and student participants, the teacher participants also mentioned their negative experiences with this process. One of the teacher participants emphasized that the applications in the distance education process were not inclusive for all students by stating, *“Live lessons are also not for all children (Burak’s teacher).”* and shared his negative experiences with distance education.

Positive Aspects of Distance Education

The student, parent, and teacher participants mentioned not only the negative aspects but also the positive aspects of distance education during the COVID-19 pandemic. This category involved the participants’ positive experiences. Although two parent participants found the distance education process insufficient, they said they were pleased with the continuation of the process. A parent participant expressed his views on this subject as follows, *“Well, reestablishing bilateral relations with the teacher and classmates made him very happy. Doing something together made him very happy. Distance education was beneficial for him not to interrupt his education (Kayra’s father).”*

A student participant stated he liked to study in the home environment very much and reported his positive view on distance education in the following way, *“I think it is nice to study at home because I always watch EBA TV at home. I receive my education from there. I liked EBA TV. That’s why home is better for me. It is better to be at home (Burak).”*

Two teacher participants indicated that they found technological developments in the distance education process positive. A teacher participant expressed the positive aspects of distance education in the following way, *“Although the phone applications prepared by the MoNE do not appeal to all students with special needs, I think they are useful in some skills such as concept teaching (Burak’s teacher).”* Another teacher participant stated that the applications prepared for students with ASD in the distance education process were beneficial by saying, *“Students having tablet computers and smartphones can benefit from these applications. There are also entertaining activities for individuals with ASD (Ozgur’s teacher).”*

Inadequate Aspects of Distance Education

All participants mentioned the inadequacies they encountered in the education of students with ASD during the distance education process in this category. A parent participant indicated that they experienced the lack of teacher authority in the distance education process, which prevented the education from reaching its goal and expressed this as follows, *“Now, the kindergarten is very crowded. Therefore, we would not prefer Zoom.”*

When there is no authority in special education and it is not one-on-one, there is not much benefit to us because he does not feel the teacher's authority and sanction (Gokhan's mother)." Another parent participant emphasized the inadequacy of the content of educational programs prepared for distance education by saying, "... *My son got bored because they were constantly showing things like far-close, small-big. He already knows them and says to me, "Mom, there is nothing for me here." At first, he thought that they would show something, and he would study and write by looking at it (Burak's mother).*" The student participants stated that they benefited from a limited number of programs in this process in the following way, "*There is EBA. There is nothing else than EBA (Zafer)*", "*I did not benefit from any other education other than EBA (Burak).*"

The experiences of the teacher participants in the distance education process also revealed the inadequate aspects of the process. For example, a teacher participant indicated that the distance education provided was inadequate for students with ASD as follows, "*Unfortunately, the distance education provided does not include all students. I think it is inadequate, especially for students with special needs... The program is created as if all students were equal and under the same conditions. Unfortunately, I think this is wrong because not students are equal. (Zafer's teacher).*" Likewise, another teacher participant indicated his views by saying, "*The fact that the ministry does not organize live lessons can also be regarded as a mistake. The live lessons broadcast on TRT were also not intended for all students (Burak's teacher).*" Two teacher participants also emphasized the inadequacies caused by the limited technological opportunities of parents in the distance education process. One of these teacher participants mentioned the inadequacies caused by limited technological opportunities with the following sentences, "*Interruptions in the Internet caused students with ASD to repeatedly turn their attention to the lesson and prevented their understanding of what was told (Ozgur's teacher).*" Another teacher participant indicated the inadequacies caused by the inability to use effective strategies and not including the family in the process as follows, "*Not being able to provide immediate feedback to individuals with ASD, not being able to present reinforcement, not being able to maintain the student's motivation, not being able to perform an appropriate intervention with the child, and the difficulty of guiding families remotely. Moreover, it is a problem that the family factor, which is important even in face-to-face education for children with ASD, is not included in education during the pandemic (Burak's teacher).*"

Difficulties in Distance Education

In this category, the difficulties faced by the participants in the distance education process were mentioned. All of the parent participants said that they experienced technological difficulties in the distance education process. A parent participant expressed the technological difficulties in the following words, "*We don't have a computer. Thus, we usually try to handle educational activities from a tablet computer or phone. However, some games and lessons are not supported by the phone or tablet computer. Some seem to be supported, but then a code error arises, for example. Sometimes you can't drag with your finger. I mean, we couldn't use some things (Gokhan's mother).*" Four student participants mentioned the difficulties they experienced in the distance education process. One of these student participants expressed the technological difficulties he experienced in the following way, "*I am facing problems on the page (Kayra).*" Like all of the parent participants, all of the teacher participants drew attention to the difficulties experienced in distance education due to the characteristics of children with ASD; one of the teacher participants emphasized these difficulties with the following words, "*Since the main problem of children is social inadequacy, there were also problems in TV lessons. Therefore, children could not benefit from the process a lot (Burak's teacher).*"

Coping Strategies with Difficulties in Distance Education

Two parent participants said that they tried to cope with problems by making changes to the study environment of their children in the distance education process. A parent participant explained the arrangement of the environment they made for their child as follows, "*We provided the necessary environment in line with Kayra's needs. For example, the desk was too narrow for him, and there was not enough study environment. We changed it immediately to a more spacious, large, and organized one. The internet was not enough. He needed a printer in his room, so we installed it. When his teacher was sending the homework through WhatsApp, we were sending it to him via e-mail or to his WhatsApp account. He was getting the prints and doing his homework. After he was finishing his homework, we were checking it (Kayra's father).*" Another parent participant stated that they

coped with the difficulties in the distance education process by receiving support from the child's teacher in the following way, *"The teacher prepared a weekly program. He shared the activities supporting the weekly programs with us every day. For example, there were numbers, red color, and square in the program on Monday. On Monday, he sent us a picture game related to the square, an activity, game and coloring related to the red color, and a game, activity, etc. related to numbers. He shared these with the WhatsApp group. Apart from that, there were no live lessons for preschool (Gokhan's mother)."*

All student participants stated that they coped with the difficulties they had during the distance education process by receiving support from their parents. For example, a student participant said he received support from his parent by stating, *"My mother helps me a lot. I have homework, teachers give homework. I do my homework with my mother. Nobody else helps me (Burak)."*

All teacher participants indicated that they tried different ways to cope with the difficulties they encountered in the process of supporting their students in distance education. One of the teacher participants expressed what she did to cope with the difficulties encountered using the following words, *"I couldn't teach live lessons because the internet usage status in my class was insufficient. I usually sent videos with my own lectures or lectures of other teachers. I sent video lectures and worked on them (Ozgur's teacher)."* She stated that she not only offered support to her students to cope with the difficulties they encountered in this process but also tried to overcome the difficulties she encountered in this process.

Expectations and Recommendations for the Improvement of the Distance Education Process

This category included the participants' expectations and recommendations for the improvement and development of distance education. All parent participants suggested one-to-one lessons for their children with ASD due to their experiences with distance education. A parent participant expressed his views on this subject as follows, *"It would be better if one-to-one course hours were increased, interactive applications were also increased with the help of tools, and the hours spent on the tablet computer were more in this direction (Kayra's father)."* All parent participants also emphasized that educational content should be prepared according to children's level. A parent participant made recommendations for the content in the following words, *"It must have been an education for our children. So it would be better if there were a level. Actually, our child knows a lot of things, but there are always the same things on EBA TV. I think they must arrange this. Of course, they cannot do such a thing for everyone, but it would still be better if a little more care were taken."*

Four student participants expressed their expectations and recommendations for improving distance education. For example, a student participant expressed his expectation that distance education and face-to-face education should be conducted together in the following way, *"It would be better if there were both of them. Why? Because when you're at school, you miss your home. I wish education were both at home and at school (Kayra)."*

Two teacher participants expressed their expectations and recommendations for improving the distance education process in the following sentences, *"The content should be made more entertaining and rich. Children's attention must be definitely drawn. Something must also be done for families because they are the biggest supporters in the process at the moment. Families' conditions must be determined, what they need or not must be clarified and they must be supported accordingly (Zafer's teacher)."*, *"Live lessons could be via Zoom for students with ASD at a good level. Appointments could be made for students with special needs from counseling and research centers (CRCs). This can be made compulsory through the child's teacher, not through the CRC. Family guidance can also be made compulsory. Moreover, phone applications for individuals with ASD can be increased. Wireless internet and tablet computers can be provided to individuals with special needs. The content of lessons can be enriched (Burak's teacher)."*

DISCUSSIONS AND CONCLUSION

This study aimed to determine the reflections of the restrictions due to the COVID-19 pandemic and the distance education process on the daily lives of gifted students with ASD, especially their education. In line with this aim, the experiences of students, parents, and teachers were focused on. The study showed that the parent participants did not make a special effort to explain the pandemic process and rules to their children,

but the gifted student participants with ASD knew about COVID-19 causing the pandemic, they were aware of what they should do to protect themselves from the virus and they tried to do this, and they even produced ideas about the possible causes of the pandemic. Therefore, the study's findings are not consistent with the view that gifted students with ASD have difficulties adapting to a new situation (Andaria et al., 2009; Rutter and Schopler, 1987), which is thought to originate from the fact that the student participants in the study had developed cognitive profiles and reasoning skills. Hence, it is also emphasized in the literature that gifted students with ASD display normal or above-normal performance in cognitive skills and have high verbal intelligence scores (Ehlers and Gillberg, 1993; Reis et al., 2014).

In parallel to the research on the negative impacts of being away from school for a long time and having to stay at home continuously on children's physical and mental health (Brazendale et al., 2017; Brooks et al., 2020), the student, parent, and teacher participants in this study also stated that gifted students with ASD were bored at home in the process, their routines were disrupted, and regression was observed. Moreover, the research findings demonstrated that not only the student participants but also the parent participants' routines were disrupted, they were bored in this process and were worried about returning to the new order even if this process was over; the teacher participants were especially concerned about the possible regression in gifted students with ASD. However, despite the mentioned negativities, the fact that gifted children with ASD and their parents adapt better to quarantine than expected is among the findings of both this study and other studies (Cahapay, 2020; Hornstra et al., 2022; Majoko and Dudu, 2020; Mumbardo-Adam et al., 2021).

One of the important findings of the study is that the student, parent, and teacher participants experienced both positive and negative changes during the COVID-19 process. The study findings also showed that the parent participants increased their independent learning efforts during the pandemic and were satisfied with distance education applications, although they were insufficient; the student participants enjoyed being with their parents, receiving education at home, and trying new things in addition to their areas of interest. It is known that gifted students with ASD can spend quality time when opportunities related to their areas of interest are provided and can manage their lives when they are supported in their areas of strength (Neihart, 2008; Wu, Lo and Tsai, 2019). It is thought that this situation positively affected the development of gifted individuals with ASD during the quarantine period. Another positive impact of the pandemic process was the increase in the social communication and interaction of the student participants with their family members and close environment. Thus, studies on this subject (Mumbardo-Adam, Barnet-Lopez, and Balboni, 2021) have emphasized that parents spend more quality time with their children during the quarantine. Furthermore, it is stated in the literature that the behaviors of gifted students with ASD are shaped by the provision of quality educational opportunities and the relations of their environment with them (Magiaati and Howlin, 2019; Sakar et al., 2019). The increased desire for social interaction and communication with the acceptance of Burak, one of the participants, by his peers during the pandemic can be shown as an example of this situation. It is seen that the understanding that all stakeholders, especially parents and teachers, should work effectively in cooperation during the COVID-19 pandemic and the distance education process initiated accordingly, is a positive change brought about by the process. This change supports the research findings focusing on the importance of family involvement during the pandemic (Aliyyah et al., 2020) and the literature focusing on the significance of cooperation between teachers, families, and other stakeholders in the education of gifted students with ASD in the structuring of teaching settings (Pereles et al., 2009). It was observed that, in addition to the said experiences, the student, parent, and teacher participants also had some negative experiences during the COVID-19 pandemic. During the quarantine, the student participants tended to devices such as television, tablet computers, and computers more than before and distanced themselves from their peers; the responsibilities of the parent participants increased; the teacher participants had more difficulties providing qualified support to their students in the limitation areas required by ASD. Due to the limitations of gifted children with ASD in their skills of planning, organizing, and managing their environment (Omur, 2019), it is expected that they cannot manage time during the quarantine in a quality manner and spend more time in front of the television, tablet computer, or computer due to being at home continuously. The fact that the parent participants both continued to work from home and took on the responsibility of teaching at home, in addition to their parental responsibilities, may have caused them to be adversely affected by this process. The situation expressed by the teacher participants is very important in that it shows that social skill deficiencies, which are the main symptom area for gifted

students with ASD, were ignored in this process (Andanson et al., 2011; Andaria et al., 2009). Meanwhile, the literature demonstrates that it is critical to support the social skills of individuals with ASD, whether they are gifted or not (Andanson et al., 2011; Andaria et al., 2009; Landa, 2007). The literature also shows that these problems in face-to-face education are experienced more intensely in the online learning process (Putri et al., 2020) and reveals the need for distance education applications that will support gifted students with ASD in all areas required. Considering the status of being twice-exceptional, in which masking is frequently observed, it is inevitable that the distance education to be provided should be intended for the areas where gifted students with ASD both exhibit limitations and display superior performance (Sakar et al., 2020).

On the other hand, both students and their parents frequently emphasized that distance education applications did not provide sufficient support to gifted children with ASD during the pandemic. Although the teacher participants said they were satisfied with the increase in the active use of technology in education, they indicated that distance education applications did not cover all students and gifted students with ASD received insufficient education during the pandemic. This situation was associated with the fact that the education was not individualized by the participants, the content compatible with students' characteristics and the use of effective strategies were not included in the process, insufficient technological equipment was used, and technical problems were experienced in the use of distance education applications. In other words, the study findings revealed that the distance education process initiated during the pandemic caused inequality, and it was thought that MoNE-based applications did not sufficiently support the cognitive profiles of gifted children with ASD if students, parents, and teachers did not make additional efforts. It is seen that gifted children with ASD experience diagnostic confusion due to their ASD diagnosis and giftedness, their cognitive profiles are ignored, and their cognitive skills are not supported even in the face-to-face education process (Omur, 2019). In this regard, it is thought that the quality of the education provided should be increased, regardless of whether it is remote or face-to-face. A possible reason for the fact that gifted students do not benefit from quality education may be that teachers had difficulties using technology, they could not create an inclusive curriculum in the distance education process and did not offer differentiated education, as observed in different research findings (Aliyyah et al., 2020; Putri et al., 2020). In particular, differentiated instruction is a strategy that must be used in educating gifted students with ASD so that they can make the most of the education provided to them (Beghin, 2021). The lack of differentiation in content, process, and evaluation processes according to the needs, interests, and motivations of gifted students with ASD may have adversely affected their access to quality distance education (Levy, 2008; Tomlinson, 2001). Ozgur's teacher also stressed this situation and stated that she did not perform a separate study for Ozgur. This clearly shows that distance education applications should be rearranged according to the characteristics and needs of these students to support gifted children with ASD in a qualified way in the distance education process.

The study participants stated that they developed various strategies to cope with the changes caused by the pandemic in daily life and distance education. The student participants said they took measures to protect themselves from COVID-19 in daily life and received support from their parents to cope with the difficulties they encountered in the distance education process. Considering the cognitive profiles of gifted students with ASD, it is an expected situation that they develop effective coping strategies (Rimm et al., 2018). The parent participants stated that they coped with the difficulties created by the process by arranging the environment and program, supporting their children academically, and asking for help from their children's teachers when necessary. To cope with the process, parents were in close communication with their children and their children's teachers. Hence, it would not be wrong to say that parents played the biggest role in supporting the student participants during the pandemic and overcoming this process in a healthy way. The study showed that siblings, as well as parents, created positive effects on the lives of gifted students with ASD. This finding is compatible with the research emphasizing that every family member plays an active role in the education of children with special needs during the pandemic (Cahapay, 2020; Majoko and Dudu, 2020). All teacher participants in the study emphasized the necessity of enriching the educational content, diversifying the ways of providing education, and providing the infrastructure and opportunities for parents without sufficient infrastructure for distance education. The emphasis on the fact that parents encounter simple contents not suitable for students' cognitive profiles and the content should be arranged in this respect is consistent with the teachers' suggestion to enrich the contents prepared centrally. Both parents and teachers suggested that the applications for gifted students with ASD should be more intensive

and one-to-one, if necessary. Enriching the education of gifted students and individualizing the education of students with ASD are the most frequently recommended strategies in the literature (Kim, 2016; Tekin-Iftar and Degirmenci, 2018; Tomlinson, 2001). Hence, recommending all these strategies for gifted students with ASD in the study is in line with the literature and is an expected situation. Students experiencing both face-to-face and distance education suggested that education should be carried out as hybrid and mentioned the necessity of using technology in the subsequent process. They emphasized the place and importance of distance education. The suggestions of students with ASD, who like to engage in technology, regarding distance education were consistent with their characteristics.

As a result, it is considered that collecting data from both gifted children with ASD and their parents and teachers sharing their experiences is essential in terms of revealing holistic and multiple perspectives. However, it is the study's limitation that data were collected only from 13 participants through interviews and data could not be collected from the teachers of some students. Further studies can be conducted to evaluate the effectiveness of distance education services provided to gifted children with ASD in this process, and it can be ensured that especially gifted children with ASD can access services related to their performance and characteristics in application settings. To this end, the content of the general education programs to be presented in the distance education process for gifted children with ASD can be provided using enrichment and acceleration strategies. Furthermore, as can be understood from the data acquired from this study, parents and teachers also faced various difficulties during the pandemic. Therefore, remote support lines or web-based parent and teacher training portals can be created, which parents and teachers can reach when necessary. While providing support to parents without sufficient technical infrastructure, professional development can be offered to teachers to acquire the skills of creating and presenting the content in distance education. The study is limited to gifted male students with ASD. Research can be done to investigate the experiences of gifted female students with ASD during the pandemic.

BIODATA and CONTACT ADDRESSES of AUTHORS



Neslisah SIKICIKOGLU graduated from Department of Special Education “Teaching Gifted Students”, Istanbul University in 2014. She worked as a creativity and thinking skills teacher in Istanbul between 2014-2016. She started postgraduate program in education gifted children at Anadolu University in 2016. In her master's thesis, she worked on determining the characteristics, behaviors, and educational needs of gifted students with autism spectrum disorder. She started his doctoral program in education of gifted children at Anadolu University in 2019 and continues her PhD. During her PhD, she participated in many congresses related to the field and continues to present papers in many congresses. Her ongoing interests include; evaluation and diagnosis of twice-exceptional children, especially gifted children with autism spectrum disorder, executive function skills, measurement of intelligence, evaluation of cognitive skills and ethics in special education. She has been working as a research assistant at Anadolu University Special Education Department since 2016.

Neslisah SIKICIKOGLU

Address: Anadolu University, Faculty of Education, Department of Education of Special Education, Yunus Emre Campus 26470, Tepebasi, Eskisehir, Turkiye

Phone: +90 222 3350580/ +905062773500

E-mail: omurneslisah@gmail.com / neslisahomur@anadolu.edu.tr



Muharrem KOC is an academician at Hacettepe University, Department of Psychological Counseling and Guidance in Turkiye. Currently, he is a PhD student at the Department of Psychological Counseling and Guidance. He graduated from the Department of Psychological Counseling and Guidance at Ankara University in 2012. He has two years of experience as a school counselor between 2012 and 2014. He received his master's degree in 2017 in counseling and guidance (Predicting psychological well-being levels of research assistants working at Hacettepe University).

His main research interests include gender, psychological well-being, mobbing, special education, career counseling, and school counseling. Also, he is interested in brief intensive emergency psychotherapy and creative drama. Up to this time, he worked as a scholarship student on the project of "Instruction of Students with Special Needs in Inclusive Settings: The Effects of Professional Development on Students and Teachers' Outcomes" and "School adjustment of primary school students: a model test," supported by TUBITAK. Her interests continue to include school dropout, special education, child abuse, brief intensive emergency psychotherapy, gender, career counseling, and school counseling.

Muharrem KOC

Address: Hacettepe University, Department of Guidance and Psychological Counseling,
Faculty of Education 06800, Ankara, Turkiye
Phone: +312 2978550
E-mail: muharrem.koc@hacettepe.edu.tr



Dr. Seray OLCAY graduated from Department of Psychology, Ankara University in 2004. She started Joint PhD program at the Department of Special Education at Anadolu University in 2005. She worked as a psychologist or a manager at various special education and rehabilitation centers while in the doctoral program. She has had researcher, educator, expert, and scholar roles on various projects: UNICEF, European Union, Scientific Research, TUBITAK, Ministry of Family, Labour and Social Services, and received her PhD in 2012. She conducted research as a visiting scholar at the University of North Carolina, Charlotte for six months in 2016. She received her associate's degree in 2018. Dr. Olcay's continuing interests are on teaching

individuals with intellectual disabilities and autism spectrum disorder, applied behavior analysis, parent consultation and training, and single-subject research methodology. She has been in the Special Education department at Hacettepe University since 2015. There are many numbers of published papers of hers in various journals worldwide, and presentations at different congresses.

Seray OLCAY

Address: Hacettepe University, Faculty of Education,
Department of Special Education, 06800, Ankara, Turkiye
Phone: +312 2976570
E-mail: serayolcaygul@hacettepe.edu.tr



Dr. Sezgin VURAN completed her undergraduate education at Anadolu University, Department of Educational Sciences, Special Education Teacher Education Program in 1987. In the same year, she started to work as a research assistant in the same department. In 1990, she received his master's degree and in 1997 his doctorate degree from Anadolu University, Institute of Social Sciences, Education of the Intellectually Disabled Program. In 1998, she received the title of Assistant Professor. In the same year, at the invitation of the German Ministry of Foreign Affairs, she worked with the families of Turkish individuals staying at the Epilepzie Centrum in Germany. Between 1999-2001, she worked as the Head of the Department of Special Education and Vice Dean of the Faculty of Education at Mustafa Kemal University. In 2001, she

returned to Anadolu University as a faculty member. In 2010, she became Associate Professor. In 2011, she assumed the duties of Head of the Department of Education of the Intellectually Disabled and Head

of the Department of Special Education. In 2013, she was a guest lecturer at the University of Wisconsin-Madison. In 2016, she received the title of professor in the same department. In 2017, she established the Department of Autism Spectrum Disorder Education within the Department of Special Education at Anadolu University. She is currently the Head of the Department of ASD Education. In addition to the undergraduate and graduate programs of Anadolu University, she taught courses such as special education, Applied Behavior Analysis, Individualized Education Programs, Qualitative Research Methods, Evaluation of Special Education Research, Positive Behavior Support, Behavior She worked as an executive and researcher in projects within the scope of Government Planning Organization, European Union, TUBITAK and Anadolu University scientific research projects. She has articles published in national and international journals, papers presented at national and international conferences and co-authored books.

Sezgin VURAN

Address: Anadolu University, Faculty of Education, Department of Education of Special Education, Yunus Emre Campus 26470, Tepebasi, Eskisehir, Turkiye
Phone: +90 222 3350580/ Int.1917
E-mail: svuran@anadolu.edu.tr

REFERENCES

- Aliyyah, R. R., Rachmadtullah, R., Samsudin, A., Syaodih, E., Nurtanto, M., & Tambunan, A. R. S. (2020). The perceptions of primary school teachers of online learning during the COVID-19 pandemic period: A case study in Indonesia. *Journal of Ethnic and Cultural Studies*, 7(2), 90-109. <http://dx.doi.org/10.29333/ejecs/388>
- American Psychiatric Association (APA). (2013). *DSM-V: Diagnostic and statistical manual of mental disorders*. Washington (DC): American Psychiatric Association.
- Amorim, R., Catarino, S., Miragaia, P., Ferreras, C., Viana, V., & Guardiano, M. (2020). The impact of COVID-19 on children with autism spectrum disorder. *Rev Neurol*, 71(8), 285-291. <http://dx.doi.org/10.33588/rn.7108.2020381>
- Arici-Dogan, D. & Gorgu, E. (2022). Otizm spektrum bozuklugu olan cocuklarin annelerinin covid-19 pandemi surecinde ozel egitime ara vermeye yonelik goruslerinin incelenmesi. *Journal of Qualitative Research in Education*, 30, 107-131. <https://doi.org/10.14689/enad.30.5>
- Andanson, J., Pourre, F., Maffre, T., & Raynaud, J. P. (2011). Les groupes d'entrainement aux habiletessociales pour enfantset adolescents avec syndrome d'Asperger: revue de la litterature. *Archives de Pediatrie*, 18(5), 589-596. <https://doi.org/10.1016/j.arcped.2011.02.019>
- Andaria, E., Duhamela, J. R., Zallab, T., Herbrechtb, E., Leboyerb, M. & Sirigua, A. (2009). Promoting social behavior with oxytocin in high functioning autism spectrum Disorders. *PNAS*, 107(9), 4389-4394. <https://doi.org/10.1073/pnas.0910249107>
- Aydin, I. (2016). *Akademik etik [Academic ethics]*. Ankara: Pegem Akademi.
- Brazendale, K., Beets, M. W., Weaver, R. G., Pate, R. R., Turner-McGrievy, G. M., Kaczynski, A. T., ... & von Hippel, P. T. (2017). Understanding differences between summer vs. school obesogenic behaviors of children: The structured days hypothesis. *International Journal of Behavioral Nutrition and Physical Activity*, 14(1), 1-14. <http://dx.doi.org/10.1186/s12966-017-0555-2>
- Brooks, S. K., Webster, R. K., Smith, L. E., Woodland, L., Wessely, S., Greenberg, N., & Rubin, G. J. (2020). The psychological impact of quarantine and how to reduce it: rapid review of the evidence. *The Lancet*, 395(10227), 912-920. [https://doi.org/10.1016/S0140-6736\(20\)30460-8](https://doi.org/10.1016/S0140-6736(20)30460-8)
- Cahapay, M. B. (2020). How Filipino parents home educate their children with autism during COVID-19 period. *International Journal of Developmental Disabilities*, 1-4. <https://doi.org/10.1080/20473869.2020.1780554>
- Creswell, J. W. (2007). *Qualitative inquiry and research design: Choosing among five approaches* (2nd ed.). Thousand Oaks: Sage Publications.

- Creswell, J. W. (2013). *Bes yaklasima gore nitel arastirma ve arastirma deseni* (Cev: M. Butun ve S. B. Demir) [*Qualitative research and research design according to five approaches* (Transl.: M. Butun and S. B. Demir)]. Ankara: Siyasal Kitapevi.
- Cetin, S., & Ercan, T. (2021). Otizme sahip ergen ogrencilerin uzaktan egitim deneyimlerinin ebeveyn araciligi ile incelenmesi. *Anadolu Akademi Sosyal Bilimler Dergisi*, 3(1), 105-121.
- Gorgun, B., & Balikci, O. (2021). COVID-19 salgininda ozel ogrenme guclugu olan bireylere, ailelerine ve ogretmenlerine sunulan destekler. *Inonu Universitesi Egitim Fakultesi Dergisi*, 22(2), 988-1014.
- Guba, E. G., & Lincoln, Y. S. (1982). Epistemological and methodological bases of naturalistic inquiry. *ECTJ*, 30(4), 233-252.
- Guler, S., Halicioglu, M. B. & Tasgin, S. (2015). *Sosyal bilimlerde nitel arastirma* [*Qualitative research in social sciences*]. Ankara: Seckin Yayınevi.
- Hornstra, L., van den Bergh, L., Denissen, J. J., Diepstraten, I., & Bakx, A. (2022). Parents' perceptions of secondary school students' motivation and well-being before and during the COVID-19 lockdown: the moderating role of student characteristics. *Journal of Research in Special Educational Needs*, 22(3), 209-220. <https://doi.org/10.1111/1471-3802.12551>
- Hume, K., Waters, V., Sam, A., Steinbrenner, J., Perkins, Y., Dees, B., Tomaszewski, B., Rentschler, L., Szendrey, S., McIntyre, N., White, M., Nowell, S., & Odom, S. (2020). *Supporting individuals with autism through uncertain times*. Chapel Hill, NC: School of Education and Frank Porter Graham Child Development Institute, University of North Carolina at Chapel Hill
- Kim, M. (2016). A meta analysis of the effect of enrichment programs on gifted students. *Gifted Child Quarterly*, 60(2), 102-116. <https://doi.org/10.1177/0016986216630607>
- Landa, R. (2007). Early communication development and intervention for children with autism. *Mental Retardation and Developmental Disabilities Research Reviews*, 13, 16- 25. <https://doi.org/10.1002/mrdd.20134>
- Majoko, T., & Dudu, A. (2020). Parents' strategies for home educating their children with Autism Spectrum Disorder during the COVID-19 period in Zimbabwe. *International Journal of Developmental Disabilities*, 1-5. <https://doi.org/10.1080/20473869.2020.1803025>
- Magiaati, I., & Howlin, P. (2019). Adult life for people with autism spectrum disorder. In F. R. Volkmar (Ed.), *Autism and pervasive developmental disorder* (pp. 218-246). Cambridge: Cambridge University Press.
- Marshall, C., & Rossman, G. B. (2014). *Designing qualitative research*. London: Sage publications.
- Miller, S., & Fredericks, M. (2003). The nature of "evidence" in qualitative research methods. *International Journal of Qualitative Methods*, 2(1), 39-51.
- Mumbardo-Adam, C., Barnet-Lopez, S., & Balboni, G. (2021). How have youth with Autism Spectrum Disorder managed quarantine derived from COVID-19 pandemic? An approach to families perspectives. *Research In Developmental Disabilities*, 103860, 1-8. <https://doi.org/10.1016/j.ridd.2021.103860>
- Neihart, M. (2008). Identifying and providing services to twice exceptional children. S. In Pfeiffer (Ed.), *Handbook of Giftedness in Children* (pp. 115-137). Boston, MA: Springer.
- Omur, N. & Vuran, S. (2019). *Ustun zekâli otizm spektrum bozuklugu (OSB) olan ogrencilerin ozellikleri, davranislari ve egitim gereksinimlerinin temellendirilmis teoriyle belirlenmesi* [*Determination of the characteristics, behaviors, and educational needs of gifted children with autism spectrum disorder (ASD) with grounded theory*]. Master's Thesis. Eskisehir: Anadolu Universitesi, Egitim Bilimleri Enstitüsü.
- Pereles, D. A., Omdal, S., & Baldwin, L. (2009). Response to intervention and twice exceptional learners: A promising fit. *Gifted Child Today*, 32(3), 40-51.
- Putri, R. S., Purwanto, A., Pramono, R., Asbari, M., Wijayanti, L. M., & Hyun, C. C. (2020). Impact of the COVID-19 pandemic on online home learning: An explorative study of primary schools in Indonesia. *International Journal of Advanced Science and Technology*, 29(5), 4809-4818.

- Rimm, S. B., Siegle, D., & Davis, G. A. (2018). *Education of the gifted and talented* (Seventh edition). Boston, MA: Pearson.
- Rutter, M., & Schopler, E. (1987). Autism and pervasive developmental disorders: Concepts and diagnostic issues. *Journal of Autism and Developmental Disorders*, 17(2), 159-186.
- Sani-Bozkurt, S., Bozkus-Genc, G., & Yildiz, G. (2021). Reflections of COVID-19 Pandemic on Autism Spectrum Disorder: A Descriptive Case Study. *Egitimde Nitel Arastirmalar Dergisi*, 9(1), 28-50. <https://doi.org/10.14689/enad.25.2>
- Sani-Bozkurt, S., Bozkus-Genc, G., Vuran, S., Yildiz, G., Celik, S., Diken H. I. ... (2022). COVID-19 salgininda Turkiye'deki ozel gereksinimi olan ogrenciler ve ailelerine yonelik uzaktan ozel egitim uygulamalarina iliskin uzman bakis acisi [An expert perspective on distance special education practices for students with special needs and their families in Turkey during the COVID-19 pandemic]. *Ankara Universitesi Egitim Bilimleri Fakultesi Ozel Egitim Dergisi*, 23(1), 133-164.
- Smith, J. A. & Osborn, M. (2008). Interpretative phenomenological analysis, In J. A. Smith (Ed.). *Qualitative psychology: A practical guide to methods* (pp. 53-81). Londra: Sage.
- Stenhoff, D. M., Pennington, R. C., & Tapp, M. C. (2020). Distance education support for students with autism spectrum disorder and complex needs during COVID-19 and school closures. *Rural Special Education Quarterly*, 39(4), 211-219.
- Sakar, S., Saral, D., & Olcay, S. (2020). Iki kere farkli bireyler. M. S. Koksâl (Ed.), *Ustun zekâlilerin (Ozel yeteneklilerin) egitimi icinde* (s. 159-179). Nobel Yayincilik.
- Yakut, A. D. (2021). Educators' experiences in special education institutions during the COVID-19 outbreak. *Journal of Research in Special Educational Needs*, 21(4), 345-354.
- Yildirim, A. & Simsek, H. (2016). *Sosyal bilimlerde nitel arastirma yontemleri [Qualitative research methods in the social sciences]*. Ankara: Seckin Yayınevi.
- Yilmaz, E. A., & Aysegul, A. (2020). Otizm spektrum bozuklugu olan bireylerde Covid-19 pandemisinde uyulmasi gereken kuralların video modelle ogretilmesi. *International Journal of Social Sciences and Education Research*, 6(2), 282-293.
- Wu, C., Lo, C., O., & Tsai, K. (2019). Learning experiences of highly able learners with ASD: Using a success case method. *Journal for the Education of the Gifted*, 42(2), 1-27. <https://doi.org/10.1177/0162353219855681>

TECHNOLOGY-BASED SELF-REGULATED LEARNING STRATEGIES AND ENGLISH SELF-EFFICACY IN ONLINE LEARNING ENVIRONMENTS

Esra KARAN AYNAGOZ

ORCID: 0000-0002-8774-9166

Department of Foreign Languages and Turkish Education
Turkish National Police Academy
Ankara, TURKIYE

Dr. Burcu UNAL

ORCID: 0000-0002-6345-6430

Foreign Language Education Department
Yildiz Technical University
Istanbul, TURKIYE

Received: 08/10/2022 **Accepted:** 18/03/2023

ABSTRACT

Technology-enhanced learning environments (TELEs) have provided language learners with various opportunities to promote their self-sufficient learning outside the classroom lately. Thus, language learners are no longer passive recipients of language; in contrast, they are autonomous learners who apply self-regulated learning strategies through the medium of technology during their English learning process, which in turn can be associated with their English self-efficacy perceptions. Therefore, the current study aimed to present an investigation into the relationship between preparatory school students' use of technology-based self-regulated English learning strategies and their perceived English self-efficacy as well as the predictability of employing the strategies on their self-efficacy beliefs. Applying a quantitative research design, the data were collected through the Technology-based Self-Regulated English Learning Strategies Questionnaire (TSRLSQ) developed by An et al. (2020) and the Questionnaire of English Self-Efficacy (QESE) developed by Wang (2004). A statistically significant positive relationship was found between students' use of technology-assisted English learning strategies and their perceived English self-efficacy beliefs. In addition, regression analysis results showed that goal setting and learner evaluation, motivational regulation, and technology-based song-movie learning strategies were strong predictors explaining the change in students' self-efficacy in four language skills.

Keywords: Self-regulated English learning, technology-based self-regulated learning, English self-efficacy.

INTRODUCTION

Learning English outside the classroom environment has turned into an obligation rather than an option because of the unexpected Corona Virus Disease (Covid-19). In order to prevent the harmful spread, many measurements have been taken in higher education. Higher education institutions have had to continue the education, including foreign language education, with distance learning (Maican & Cocorada, 2021). As a type of distance learning, online learning involves technology-based systems together with the use of ICT, which requires learners to have agency over their learning because instructors have limited control during learning process (Efriana, 2021). This unforeseeable transition from face-to-face language learning to online learning has decreased student-teacher interaction. To this end, language learners have been almost obliged to manage their learning process and be more self-regulated than usual.

Technology-enhanced learning environments (TELEs) present various opportunities to language learners to promote their learning outside the traditional borders of language classrooms with practical learning tools (An et al., 2020). Language learners are more independent and autonomous thanks to almost unlimited

access to language learning sources (Alhafidh & Marcelo, 2020). The remarkable power of TELEs to foster students' use of self-regulation strategies is impressive (Lai, 2013; Zimmerman, 2008). Students who benefit from language learning opportunities in technology-based settings are more willing to take responsibility for managing and self-regulate their language learning process (Lai, 2013). Given the enormous potential of technology-assisted learning environments, it is important to understand how learners benefit from technology to self-regulate their language learning (Lai & Gu, 2011).

There have been numerous studies on technology-use in language classrooms (Garcia et al., 2018; Lai et al., 2018; Lee et al., 2016); however, these studies primarily focused on the effectiveness of specific ICT tools or learners' decontextualized skills in using technology for language learning purposes. Self-regulated learning (SRL) strategies have attracted researchers' attention in also traditional EFL settings (Bai & Guo, 2019; Bai & Wang, 2020; Kim et al., 2015; Shi, 2018; Wang et al., 2013). Still, research specifically focusing on students' strategic self-regulated use of technology for learning English is limited (An et al., 2020, 2021; Lai & Gu, 2011; Su et al., 2018; Wang & Chen, 2020). The number of studies conducted in the Turkish EFL context to examine learners' technology-enhanced SRL strategies in learning English is also sparse. Among this sporadic selection, Bekleyen and Hayta (2015) examined students' language learning strategies through the medium of mobile phones. Similarly, Kizil and Savran (2016) focused on using ICT tools for self-regulation in learning English. Having conducted a quantitative study with 777 EFL preparatory students at a state university in Turkiye, they found out that EFL learners were willing to use ICT tools to self-regulate their language learning. As a result, they stated that explicit instruction on using ICT tools for self-regulated language learning purposes ought to be provided in classroom.

Self-regulated language learning positively affects language learning performance and achievements (Bai & Wang, 2020; Chen & Hsu, 2020; Sun & Wang, 2020; Wang et al., 2013). Moreover, using self-regulation strategies during language learning experience increases learners' English self-efficacy (Magogwe & Oliver, 2007; Saito, 2020; Yusuf, 2011; Zimmerman 2002). In Bandura's (1997) framework, self-efficacy is an individual's beliefs in their capacity to plan and carry out the actions required to accomplish specific goals. According to Bandura (1997), self-efficacious learners believe in their own capabilities. They try hard until they succeed with a high motivation level as their self-efficacy shapes the way they overcome challenges. Learners with low self-efficacy beliefs, on the other hand, do not tend to persist longer when faced with difficulties. As learners' beliefs shape their actions and experiences, self-efficacy is an important construct in language learning (Williams & Burden, 1997). Brown (2007) states that it is crucial to increase learners' self-efficacy during language learning which is a long journey with many challenges. Although studies on students' English self-efficacy have been conducted around the world (Gan, 2019; Kim et al., 2015; Wang et al., 2013) and in the Turkish EFL context among preparatory students (Hol & Guc, 2020; Ilbegi & Celikoz, 2020; Karafil & Ari, 2016; Sener & Erol, 2017), there has not been any research that examined Turkish preparatory students' English self-efficacy beliefs during Covid-19 period when they have primarily online lessons away from conventional classrooms.

Self-efficacy has a vital role in students' using self-regulation strategies during language learning (Balaman, 2021; Chung, 2015; Kim et al., 2015; Lee et al., 2021; Teng, et al., 2018; Wang & Bai, 2017; Wang et al., 2013). As a result, understanding language learners' self-efficacy beliefs and their use of self-regulated English learning strategies could contribute to language learners' achievements (Wang et al., 2013; Zimmerman, 2006). Pintrich's model, which is based on socio-cultural theory, is widely recognized as one of the most influential SRL models in the field of education (Schunk, 2005). Pintrich (2000) developed this framework by taking into account the perspectives of other theorists, including Zimmerman and Schunk's (2001) cognitive information processing approach. The model emphasizes that learners are active agents who have control over their learning activities and self-regulatory processes. Furthermore, Pintrich (2000) stresses the importance of learners' ability to adjust the relationship between personal factors and learning outcomes.

For incorporating self-regulation into English language learning, Oxford (2011) developed the Strategic Self-Regulation (S2R) Model of Language Learning. According to the S2R Model, language learning is facilitated through the interplay between strategies and metastrategies. Learners are active participants who use strategies to manage their own learning. The S2R Model categorizes strategies into three groups: cognitive, affective, and sociocultural-interactive. Cognitive strategies enable learners to manipulate and apply L2 information, while affective strategies help them stay positive and motivated. Sociocultural-interactive strategies aid

them in negotiating communication and identity. Oxford (2011) argues that learners require sub-skills of metaknowledge, namely self-awareness, planning and using sources, organizing, implementing plans, understanding how learning strategies and metastrategies function, and monitoring and evaluating, to apply the strategies and metastrategies in language learning. Oxford's (2011) S2R Model is taken as the framework of this study in an attempt to investigate language learners' self-regulation capacity and behaviors.

A number of studies in the related literature demonstrated a positive correlation between self-regulated English learning and English self-efficacy (Bai & Guo, 2018; Megogwe & Oliver, 2007; Saito, 2020; Shi, 2018; Teng & Zhang, 2020; Wong, 2005). On the other hand, the number of studies focusing on the relationship between technology-assisted self-regulated English learning strategies and English self-efficacy is limited (An et al. 2020, 2021; Lai & Gu, 2011; Su et al., 2018; Wang & Chen, 2020) What is more, these studies only investigated the correlation between the two concepts. Given the results of the related studies which showed a positive strong correlation between two concepts, there was a need to examine the predictor effect of technology-assisted self-regulated English learning strategies on English self-efficacy beliefs of students for four main skills to contribute to the existing literature.

With the breakout of the Covid-19 pandemic, online teaching and learning has replaced face-to-face education to a great extent in higher education worldwide. This situation has left the learners with a great necessity to take responsibility of their own learning, in other words, to self-regulate their learning processes (Hung, 2022). In order to adjust themselves to technology-enhanced learning environments (TELEs), students need to know how to manage their learning processes by applying technology-based learning strategies. However, students at preparatory schools are not aware of their capabilities to be autonomous in technology-using settings. They mostly rely on their instructors to guide them, motivate them, and evaluate their progress. Despite being defined as "Digital Natives" (Prensky, 2001), who are the natural users of digital technologies, they do not employ SRL strategies effectively (Alhafidh & Marcelo, 2020). In addition, classes at preparatory schools in Turkiye do not usually go beyond being only "technologized" classrooms (Shen et al., 2015). To state it clearly, students are not equipped with strategy instruction on exploiting technology to set goals, manage their language learning efforts, and self-evaluate the whole process on their own for future experiences. SRL is an essential 21st century competence (European Council, 2002) that is needed in every domain of education, including language learning, and it is "in the same line with lifelong learning" (Karatas et al., 2021, p. 57). Therefore, the problem the current study aims to solve is to demonstrate the current status of preparatory students in relation to this concept to suggest pedagogical implications on what could be brought to language classes to develop autonomous and self-efficacious students. Within this context, this study aims to investigate:

1. the average uses and types of Turkish preparatory students' technology-based self-regulated English learning strategies and their average English self-efficacy levels,
2. whether by a) gender b) high school type or c) level of English affects Turkish preparatory students' use of technology-based self-regulated English learning strategies and their English self-efficacy beliefs,
3. if there is a statistically significant relationship between preparatory students' technology-based self-regulated English strategies and their English self-efficacy beliefs in all four skills.
4. whether Turkish preparatory students' use of technology-based self-regulated English strategies predicts their English self-efficacy beliefs in all four skills.

METHOD

To be able to address the research questions, a quantitative research method was adopted in this study. 216 preparatory school students studying at a foundation university in Istanbul, Turkiye participated in this study. Purposive, convenient sampling technique, which falls under the non-probability sampling category was used for the inclusion of participants. The sampling method was purposive because the preparatory school students were chosen as they were in a hybrid educational system due to the ongoing Covid19 pandemic. The students had 24 hours of English classes every week during the module. However, all the lessons were not face-to-face. The students had 14 face-to-face lessons, and 10 online lessons which took place on Zoom. This was the reason why English preparatory students were chosen for the study as they were more likely to be exposed to technology and benefit from it more than students with full-time face-to-face classes which could give more insights related to students' experiences about using technology-based English learning

strategies while they were learning English. The sampling method was also convenient since the participants were readily available since one of the researchers was already working at the institution and had easy access to the participants. There were five modules in an academic year, each of which lasts nearly 8 weeks, and the study took place in the first semester of the academic year during the first module from mid-October to the end of November. At the beginning of the year, students took the Oxford Placement Exam, and they were placed according to their placement exam scores ranging from A1 level to B2 level. Therefore, students at all levels were competent enough to understand and complete the questionnaires given in English.

Table 1. Demographic characteristics of the participants

	<i>Groups</i>	<i>N</i>	<i>%</i>
Gender	Female	118	54.6
	Male	98	45.4
	Total	216	100.0
Level of English	A2	183	84.7
	B1	29	13.4
	B2	4	1.9
	Total	216	100.0
Type of High School	Private High School	97	44.9
	State High School	119	55.1
	Total	216	100.0

Instruments

Two self-report questionnaires, namely, the Technology-based Self-Regulated English Learning Strategies Questionnaire (TSRLSQ) developed by An et al. (2020) and the Questionnaire of English Self-Efficacy (QESE) developed by Wang (2004) were used in the study. The scales were administered via an online Google form. Within the online form, items about participants' demographic characteristics (gender, age, level of English) were also included to the introduction part.

The TSRLSQ has 26 items consisting of five subdomains, namely motivational regulation strategies (9 items, $\alpha = .81$), goal setting and learner evaluation (5 items, $\alpha = .78$), social strategies (4 items, $\alpha = .66$), technology-based English song and movie learning (5 items, $\alpha = .76$) and technology-based vocabulary learning (3 items, $\alpha = .63$). The Cronbach's alpha reliability coefficient for the whole scale was 0.89, which confirmed the solidity of the questionnaire's reliability. In the questionnaire, there were Likert type answers ranging from 1 (not at all true of me) to 7 (very true of me) points. Skewness and kurtosis coefficients are between + 1.5 and - 1.5 for all the subscales, so the distribution can be accepted as normal (Tabachnick et al., 2011).

For QESE, the reliability and validity of were reported to be high (Wang et al., 2013). It had an internal consistency of .96, test-retest reliability of .82, concurrent validity of .55, and predictive validity of .41. The scale is comprised of four areas to be measured: self-efficacy for listening (8 items, $\alpha = .9$), self-efficacy for reading (8 items, $\alpha = .89$), self-efficacy for speaking (8 items, $\alpha = .89$) and self-efficacy for writing (8 items, $\alpha = .87$). In total, there are 32 items in the questionnaire graded on a seven-point scale ranging from 1 (I am totally unable to do this) to 7 (I am able to do this well). Each item requires students to assess their abilities to perform certain tasks in English in all four skills, and the overall reliability of the scale for the current study was .97. Descriptive statistics for the total scale and the subscales showed that skewness and kurtosis values are between -1.5 to +1.5. Therefore, the data was normally distributed and parametric tests were applied.

Data Collection and Analysis

In order to collect the quantitative data, the questionnaires were prepared on Google Forms. Then, an online link (<https://forms.gle/ExXg1LrVmXtYribG8>) and a QR code for the questionnaire (Figure 1) were created so that it would be distributed to the participants easily. Upon creating the link and QR code for the questionnaire, the researchers asked for help from the colleagues to share the link and the QR code with the students in their

classes. The participants were informed about the aim of the study. They were ensured that the participation was on a voluntary basis upon taking their informed consents. They were also told that their responses to the questionnaire and their personal information would be kept confidential. Data collection lasted for approximately five weeks.

For the analysis of the descriptive data of the scales, percentage and frequency analyses were used, which included the minimum and maximum values, mean, standard deviation, skewness and kurtosis values of the sample population. With regard to the analysis of the role of gender and high school type on the use of technology-based self-regulated English learning strategies and English self-efficacy beliefs, Independent Samples T-test were conducted. However, Kruskal Wallis H test was conducted to explore whether level of English had an effect on students' use of technology-based self-regulated English learning strategies and their English self-efficacy beliefs because there were less than 30 students in B1 and B2 levels which required the conduct of a non-parametric test.

In order to investigate the relationship between students' technology-based self-regulated English learning strategies and their English self-efficacy beliefs, Pearson's Product-Moment Correlation was conducted. As the normality assumptions of both scales are met (see above) and as a linear relationship was observed in the scatterplots, correlation and regression analyses were run. Previous studies (e.g. Bai & Guo, 2018; Saito, 2020; Shi, 2018; Teng & Zhang, 2020) already found both variables to be related to each other, thus in order to find out if technology-based self-regulated English learning strategy use predicted preparatory students' English self-efficacy beliefs, Multiple Linear Regression Analysis tests were applied. Based upon the studies which investigated the predictor effects of technology-based self-regulated English strategies on self-efficacy perceptions, TSRLSQ was set as the predictor variable within the current model. In line with this, it was hypothesized that technology-based self-regulated English learning strategies scores would predict the listening, reading, speaking, writing and overall self-efficacy levels of the participants. While constructing the regression model, the 'Stepwise' method was preferred. As a result of the analysis, a single model was obtained.



Figure 1. QR Code for the Questionnaire

FINDINGS

To start with the descriptive statistics, the results show that students' technology-based self-regulated English learning strategy use was medium, and the technology-based vocabulary learning was the most frequently used strategy by the participants.

Table 2. Means and Standard Deviation Scores for TSRLSQ and QESE Scales

<i>Scales</i>	<i>Min</i>	<i>Max</i>	\bar{x}	<i>SD</i>
Motivational Regulation Strategies	1.44	7.00	5.00	1.00
Goal Setting and Learner Evaluation	1.00	7.00	4.26	1.36
Social Strategies	1.50	7.00	4.56	1.18
Technology-based English Song- Movie Learning	1.00	4.20	3.19	.75
Technology- based Vocabulary Learning	1.67	7.00	5.32	1.26
TSRLSQ	1.92	6.46	4.48	.83
Listening	2.25	7.00	4.81	1.20
Reading	1.63	7.00	4.76	1.17
Speaking	1.63	7.00	4.99	1.13
Writing	1.75	7.00	4.76	1.14
QESE	2.03	7.00	4.83	1.09

Guo and Wei (2019) stated that for a 7-point Likert scale, a mean score in the range of 4.9–7.0 is regarded as high level, 3.5–4.89 medium level, and 1.0–3.4 low level. Hence, with regard to English self-efficacy scores, it was found that students' overall English self-efficacy is at a medium level, and students reported to be the most self-efficacious in speaking skill, followed by listening, reading and writing skills.

Table 3. Independent Samples t-Test Results for Comparison of the TSRLSQ and QESE Scales by Gender

<i>Scales</i>	<i>Groups</i>	\bar{x}	<i>Sd</i>	<i>t</i>	<i>p</i>	<i>Groups</i>	\bar{x}	<i>Sd</i>	<i>T</i>	<i>p</i>
Motivational Regulation Strategies	Female	45.81	8.35	1.498	.135	Private High School	46.19	8.72	1.797	.074
	Male	43.96	9.75			State High School	43.97	9.21		
Goal Setting and Learner Evaluation	Female	21.94	6.79	.806	.214	Private High School	22.61	6.60	2.621	.009**
	Male	20.49	6.77			State High School	20.20	6.80		
Social Strategies	Female	18.64	4.71	1.362	.175	Private High School	18.77	5.06	1.509	.133
	Male	17.76	4.75			State High School	17.80	4.43		
Technology-based English Song- Movie Learning	Female	28.64	5.24	2.289	.023**	Private High School	28.06	5.39	.486	.628
	Male	26.91	5.89			State High School	27.69	5.79		
Technology-based Vocabulary Learning	Female	16.50	3.46	2.342	.020**	Private High School	16.26	3.26	1.080	.281
	Male	15.31	4.03			State High School	15.71	4.13		
TSRLSQ- Total	Female	119.38	20.56	2.246	.026**	Private High School	120.08	21.57	2.284	.023*
	Male	112.82	22.34			State High School	113.40	21.22		
Listening	Female	39.70	9.71	2.033	.043*	Private High School	39.63	9.89	1.563	.119
	Male	37.05	9.34			State High School	37.58	9.33		
Reading	Female	39.16	9.38	1.821	.070	Private School	38.91	8.97	1.131	.259
	Male	36.85	9.20			State High School	37.46	9.64		
Speaking	Female	40.52	9.25	1.081	.281	Private High School	40.79	8.88	1.298	.196
	Male	39.18	8.74			State High School	39.19	9.13		
Writing	Female	38.95	9.22	1.608	.109	Private High School	38.45	8.66	.594	.553
	Male	36.96	8.85			State High School	37.71	9.44		
QESE-Total Score	Female	158.33	35.50	1.750	.082	Private High School	157.78	33.74	1.226	.222
	Male	150.04	33.62			State High School	151.95	35.62		

Pairwise comparison test results showed that female participants had higher TSRLSQ total scores, Technology-based English Song- Movie Learning and Technology-based Vocabulary Learning scores than male participants. As for the findings from the QESE scale, pairwise comparison tests depicted those female participants had significantly higher listening self-efficacy scores than male participants. Regarding the effect of high school type, it was found that participants who graduated from a private high school had higher TSRLSQ total scores, and goal setting and learner evaluation scores than students who graduated from public high schools.

Table 4. Kruskal Wallis H Test Results for Comparison of The Questionnaire of Technology-based Self-regulated English learning Strategies Scores by Level of English

<i>Scales</i>	<i>Groups</i>	<i>Mean Rank</i>	<i>H</i>	<i>df</i>	<i>p</i>	<i>Difference</i>
Motivational Regulation Strategies	Step-2 (A2)(1)	103.25	8.845	2	.012*	2>1
	Step-3 (B1)(2)	135.10				
	Step-4 (B2)(3)	155.75				
Goal Setting and Learner Evaluation	Step-2 (A2)(1)	103.67	7.403		.025*	ND
	Step-3 (B1)(2)	133.31				
	Step-4 (B2)(3)	149.50				
Social Strategies	Step-2 (A2)(1)	103.95	6.399		.041*	2>1
	Step-3 (B1)(2)	134.40				
	Step-4 (B2)(3)	128.75				
Technology-based English Song- Movie Learning	Step-2 (A2)(1)	103.00	9.431		.009**	2>1
	Step-3 (B1)(2)	140.36				
	Step-4 (B2)(3)	129.13				
Technology-based Vocabulary Learning	Step-2 (A2)(1)	105.66	4.680		.096	-
	Step-3 (B1)(2)	130.21				
	Step-4 (B2)(3)	81.25				
TSRLSQ-Total	Step-2 (A2)(1)	103.01	9.258		.010*	2>1
	Step-3 (B1)(2)	139.24				
	Step-4 (B2)(3)	136.88				
Listening	A2(1)	99.79	23.537		.000**	2>1
	B1(2)	154.91				
	B2(3)	170.63				
Reading	A2(1)	100.83	19.177		.000**	2>1
	B1(2)	146.81				
	B2(3)	181.75				
Speaking	A2(1)	102.01	15.206		.000**	2>1
	B1(2)	138.43				
	B2(3)	188.50				
Writing	A2(1)	103.00	10.117		.006**	2>1
	B1(2)	135.36				
	B2(3)	165.50				
QESE-Total Score	A2(1)	100.94	18.723		.000**	2>1
	B1(2)	146.05				
	B2(3)	182.25				

Note. *<0.05; **<0.01; NA2= 183, NB1=29, NB2= 4

Pairwise comparison test results showed that TSRLSQ-Total scores, Motivational Regulation Strategies, Social Strategies and Technology-based English Song- Movie Learning subscale scores of the participants at B1 level were higher than the participants at A2 level. On the other hand, no statistically significant difference was found among Technology-based Vocabulary Learning subscale scores according to level of English ($p>.05$). As for the self-efficacy, listening and writing self-efficacy scores of the participants at the B1 level were higher than the participants at the A2 level. Also, reading and speaking self-efficacy scores and QESE-Total scores of the participants at the B1 and B2 levels were higher than the participants at the A2 level.

The Relationship between Technology-based Self-regulated English Learning Strategies and English Self-efficacy

Statistically significant positive relationships were found among and across all the scales of two questionnaires (see Table 5). More specifically, all subgroups under the TSRLSQ questionnaire moderately correlated with the overall English self-efficacy of students except for technology-based vocabulary learning strategies. Interestingly, among five groups of technology-based SRL strategies, technology-based vocabulary learning was the least correlated with overall English self-efficacy, although they were reported to be used the most frequently by the students.

Table 5. The Pearson Correlation Analysis between Students' Technology-Based Self-Regulated English Learning Strategies and their English Self-Efficacy

Scales	1	2	3	4	5	6	7	8	9	10
MRS	1									
GSLE	.636**	1								
SS	.547**	.526**	1							
TBESML	.499**	.465**	.467**	1						
TBVL	.320**	.265**	.404**	.449**	1					
TSRLSQ Total Score	.851**	.790**	.755**	.615**	.655**	1				
Listening	.530**	.586**	.460**	.581**	.266**	.600**	1			
Reading	.584**	.627**	.497**	.597**	.332**	.667**	.895**	1		
Speaking	.460**	.433**	.487**	.561**	.284**	.535**	.809**	.810**	1	
Writing	.506**	.526**	.451**	.573**	.295**	.580**	.793**	.878**	.871**	1
QESE*	.555**	.580**	.504**	.616**	.313**	.635**	.933**	.955**	.927**	.942**

Note. * $<.05$; ** $<.01$ MRS: Motivational Regulation Strategies, GSLE: Goal Setting and Learner Evaluation, SS: Social Strategies, TBESML: Technology-based. English Song- Movie Learning, TBVL: Technology-based Vocabulary Learning

Table 6. Regression Analyses for Predicting QESE Subscales by TSRLSQ Scores

Dependent Variable	Independent Variable	B	Standard Error B	Beta	t	p
Listening	Constant	4.715	2.807		1.680	.094
	GSLE	.466	.093	.330	4.992	.000**
	TBESML	.613	.101	.357	6.073	.000**
	MRS	.151	.072	.142	2.106	.036**
R= .690 R ² = .476 df: 3/212 F: 64.237 p=.000						
Reading	Constant	3.148	2.577		1.222	.223
	GSLE	.474	.086	.345	5.525	.000**
	TBESML	.567	.093	.340	6.119	.000**
	MRS	.202	.066	.196	3.069	.002**
R= .730 R ² = .533 df: 3/212 F: 80.705 p=.000						
Speaking	Constant	8.312	2.834		2.933	.004
	TBESML	.615	.103	.382	5.952	.000**
	SS	.438	.126	.230	3.461	.001**
	MRS	.144	.068	.144	2.132	.034**
R= .626 R ² = .392 df: 3/212 F: 45.614 p=.000						

	Constant	6.696	2.772		2.415	.017
Writing	TBESML	.612	.100	.377	6.142	.000**
	GSLE	.332	.092	.249	3.601	.000**
	MRS	.161	.071	.160	2.268	.024**
R= .654 R2= .428 df: 3/212 F: 52.851 p=.000						
	Constant	24.510	9.874		2.482	.014
QESE- Total Score	TBESML	2.460	.355	.396	6.932	.000**
	GSLE	1.449	.328	.283	4.411	.000**
	MRS	.683	.253	.177	2.703	.007**
R= .654 R2= .428 df: 3/212 F: 72.377 p=.000						

Note. GSLE: Goal Setting and Learner Evaluation; TBESML: Technology-based English Song- Movie Learning, MRS: Motivational Regulation Strategies

When the results are evaluated, goal setting and learner evaluation, technology-based English song- movie learning and motivational regulation strategies subscale scores were found as predictors of the QESE listening, reading and writing subscales (see Table 6). However, for speaking and writing subscales of the QESE, social strategies instead of goal setting and learner evaluation acted as the predictor.

DISCUSSIONS AND CONCLUSION

Considering the TSRLSQ and QESE levels of the students, the results showed that students had a medium-level use of strategies and medium-level English self-efficacy beliefs. The mean scores for subscales of TSRLSQ demonstrated that students used lexical applications, online dictionaries, and vocabulary applications to learn English vocabulary the most frequently. This finding aligns with An et al.'s (2021) study in which students preferred technology-based vocabulary learning strategies more than others. It was also found that the students did not use technology-assisted social strategies at a high level. This finding is congruent with related previous research findings, which either reported social strategies to be the least frequently used among others (An et al., 2020, 2021; Bekleyen & Hayta, 2015) or to be seldom preferred (Lai & Gu, 2011; Wang & Chen, 2020). One possible explanation might be related to students' low proficiency levels as %84,7 of the them were A2 level learners. Hence, they may not feel confident enough to use technology to create interactions with native speakers. This lack of confidence may also cause them to seek help face-to-face and in their L1 rather than through technology.

Regarding the perceived English self-efficacy levels, the results indicated that students did not consider themselves highly self-efficacious in English. This result is in accordance with studies that investigated preparatory students' English self-efficacy levels at universities in Turkiye (e.g. Hol & Guc, 2020; Ilbegi & Celikoz, 2020; Karanfil & Ari, 2016; Sener & Erol, 2017) all showing that preparatory students had moderate levels of English self-efficacy. One possible reason why students had medium-level overall English self-efficacy in the current study might be the lack of vicarious experiences, one of the primary sources of creating self-efficacy (Bandura, 1997). Due to the Covid-19 pandemic, students do not have full-time face-to-face lessons. They do not have the opportunity of working in groups in class; therefore, they usually study individually. They may feel isolated, which could decrease their self-belief in what they can do. In terms of the specific skills areas, students' writing self-efficacy level was found to be the lowest among all skills confirming prior research findings (Ilbegi & Celikoz, 2020; Karanfil & Ari, 2016). Considering that Turkish preparatory students do not usually practice academic English writing before they enter university, this finding could be explained by the lack of mastery experiences which is one of the main sources of self-efficacy.

Another aim of the study was to reveal the effects of demographic variables (i.e. gender, high school type, and level of English) on the TSRLSQ and QESE levels of the students. In general, females were found to be more self-regulated in using English learning strategies assisted by technology. Similarly, Kizil and Savran (2016) showed that female students tend to have greater use of ICT for self-regulated English learning than males. Furthermore, the quantitative study of Schwam et al. (2021) revealed that females had higher uses of online SRL strategies than males. In a similar vein, female students' listening self-efficacy was significantly higher than male students. Likewise, Bozkurt and Eksioglu (2018) also found a statistical difference between genders regarding listening skills in favour of females. Besides, females' use of technology-based song-movie and vocabulary-learning strategies was significantly higher than males. Since they use more technology-based self-regulated strategies in general, this might help them adopt some strategies specifically targeting listening skill, which in turn increased their self-efficacy perceptions.

In relation to the effect of level, the findings showed that B1 level students used technology-based SRL strategies more than students at A2 level, implying that the higher the level of English is, the more technology-based SRL English strategies students use. This finding is in line with the study conducted by Nikoopour and Khoshroudi (2021) in Iranian context, which demonstrated that language proficiency level affects EFL learners' self-regulation. Similarly, in terms of the effect of level of English on self-efficacy perceptions it was observed that the higher the students' levels are, the more efficacious they feel in English. This finding lends credence to Ilbegi and Celikoz (2020) who observed that B2 level students had higher self-efficacy perceptions than B1 level students, and B1 level students, in turn, reported firmer self-efficacy beliefs than A2 level students.

As an answer to the third research question, a statistically significant positive relationship between students' use of technology-assisted English learning strategies and their perceived English self-efficacy beliefs was detected. This result depicts that the more learning strategies students employ, the more self-efficacious they feel. Likewise, students with high self-efficacy levels tend to use effective learning strategies more than students who feel less self-efficacious (Schunk, 1994). This result is in line with the results of previous studies that presented a positive correlation between the two concepts, showing that self-efficacy beliefs help students become more motivated to use language learning strategies (Lee et al., 2021; Shi, 2018). The finding is also in line with studies that demonstrated a significant positive relationship between technology-based English SRL strategies and English self-efficacy (An et al., 2021; Chung, 2015; Su et al., 2018). One intriguing result of this part was the weak correlation between the overall English self-efficacy of students and technology-based vocabulary learning strategies. Despite the high frequency of use reported by the students, it did not seem to increase the self-efficacy perceptions of learners. This finding lends support to An et al. (2020), who showed a weak correlation between technology-based vocabulary learning strategies and the self-efficacy perceptions of the participants. Likewise, An et al. (2021) found that although students used technology-based vocabulary learning strategies the most, it did not positively influence students' English self-efficacy and their learning outcomes. The reason behind this finding might be that preparatory students employ technology-enhanced strategies primarily for their immediate needs in terms of vocabulary learning, such as looking up a new word's meaning in L1 when they need. Therefore, as An et al. (2020, p. 12) states, students have "a surface vocabulary learning strategy" which may lack long-term benefits to increase their English self-efficacy.

Apart from examining the relationship between technology-based SRL English learning strategies and students' English self-efficacy beliefs, the current study also explored whether employing these strategies predicts students' self-efficacy beliefs. Regression analysis results showed that goal setting and learner evaluation, motivational regulation, and technology-based song-movie learning strategies were strong variables in explaining the change in students' overall English self-efficacy. This finding that the use of strategies on goal setting and learning evaluation was a strong predictor of English self-efficacy supports Su et al.'s (2018) study, where goal setting had a strong effect on participants' self-efficacy in an online self-regulated English learning environment. It was also found in the current study that if students use more technology-assisted strategies to regulate their motivation levels, they can increase their self-efficacy in all four skills. This finding lends strong support to the belief that motivational regulation is a prominent

aspect of self-regulated learning (Teng & Zhang, 2018). Technology-based song-movie learning strategies were the strongest predictor of self-efficacy in overall English, writing, and speaking self-efficacy. In addition, using self-regulated social strategies was a predictor of only speaking self-efficacy. This might be explained with the positive influence of applying social strategies on speaking English. Abbasi et al. (2021) also found that online social strategy instruction had a meaningful effect on improving students' speaking ability. Similarly, Muin and Aswati (2019) reported that using socio-affective strategies can improve students' self-confidence in speaking English.

Pedagogical Implications

Based on the finding that employing technology-based SRL English strategies influences students' English self-efficacy positively, incorporating these strategies in the classroom setting can help students develop higher self-efficacy in English. Self-regulated learning is teachable (Boekaerts, 1997); therefore, EFL instructors can create inspiring learning environments to stimulate the use of technology-based SRL English strategies where students are taught these strategies explicitly. Furthermore, it was found out that use of technology-assisted English learning strategies and perceived English self-efficacy beliefs are related to each other. Hence, enhancing students' English self-efficacy beliefs can help them become more self-regulated in language learning. Preparatory school directors should consider redesigning how online lessons are delivered. Rather than focusing on individual performances, more collaborative projects can be integrated into lessons where students can increase their self-efficacy by observing others' use of technology to self-regulate their English learning. Thirdly, building upon the predictory effects of goal setting and learner evaluation, motivational regulation, and technology-based song-movie learning strategies on self-efficacy beliefs, creating learning environments/activities that increase learner motivation and self-directed learning can be suggested. Overall, it is important for currently working EFL teachers to be aware of technology-based SRL English strategies themselves and have the knowledge and skills of how to stimulate their use. In order to address this need, professional teacher training programs can be designed to provide teachers specifically with the knowledge of using technology-based strategies to self-regulate English learning. When EFL instructors experiment with technology-enhanced SRL, this can impact their pedagogy of strategy instruction.

Limitations and Future Research Directions

When interpreting the outcomes of this research, it is important to keep in mind that there are certain restrictions in this study that need to be addressed in future research. To begin with, the study included only 216 preparatory students from one foundation university in Türkiye, and the distribution of participants was not equal across all levels. While there were 183 participants from the A2 level, the number was 29 for B1 level. Expanding the sample size by equal sampling from each proficiency level and conducting research in different settings, such as state universities, would increase the applicability of the findings. Hence, future studies can be applied to a broader sample size representative enough for each proficiency level which would enhance the validity of the findings for getting more insight into the dynamic relationship between technology-based SRL and English self-efficacy perceptions. Furthermore, the data was collected using self-reported surveys, which are prone to bias. Therefore, to reduce the drawbacks of self-reported data, it is necessary to obtain qualitative data to support the statistical findings presented in this study. Lastly, a longitudinal study focusing on the students' development of technology-based SRL English strategies can be conducted and a training model can be presented as a product to train students how to apply these strategies.

Authors' Note: A part of this research was presented at the Canakkale Onsekiz Mart University International Social Sciences Conference, Canakkale, Türkiye.

BIODATA and CONTACT ADDRESSES of AUTHORS



Esra KARAN AYNAGOZ is an instructor of English at the Department of Foreign Languages, Turkish National Police Academy. She received her B.A from Middle East Technical University in English Language Teaching (ELT). She also gained her M.A in the same department from Yildiz Technical University in 2022. Her academic interests include learner autonomy in ELT, technology-based language education and 21st century skills in language learning.

Esra KARAN AYNAGOZ

Department of Foreign Languages and Turkish Education

Address: Turkish National Police Academy, 06834, Ankara, Turkiye

Phone: +90 312 462 86 49

E-mail: esra.karanaynagoz@pa.edu.tr



Dr. Burcu UNAL is an Associate Professor of Applied Linguistics at the Faculty of Education, Yildiz Technical University. Dr. Unal gained her Ph.D. in Foreign Languages Education in July, 2017 from Bogazici University. Her academic interest areas are learning and teaching of second language skills, computer-assisted language learning, artificial intelligence and language teaching, cognition and language learning, and foreign language teacher education. She has several articles published in international indexes, international book chapters and other national and international articles, papers submitted to international meetings. She is presently instructing both undergraduate and graduate-level courses while concurrently providing guidance for graduate students' master's theses.

Burcu UNAL

Foreign Languages Education Department, Faculty of Education

Address: Yildiz Technical University, 34165, Istanbul, Turkiye

Phone: +90 212 383 55 63

E-mail: bvarol@yildiz.edu.tr

REFERENCES

- Abbasi, S., Chalak, A., & Heidari Tabrizi, H. (2021). Effect of online strategies-based instruction on Iranian EFL learners' speaking scores: a case of affective and social strategies instruction. *Journal of Modern Research in English Language Studies*, 8(3), 51-71. 10.30479/JMRELS.2020.11916.1478.
- Alhafidh, F. K. Y., & Marcelo, C. (2020). Examining the differences of self-regulated learning strategies (SRL)--cognitive and metacognitive--for university ESL/FSL courses in Canada, Chile, Turkey and Iran. *Turkish Online Journal of Educational Technology-TOJET*, 19(3), 18-30.
- An, Z., Gan, Z., & Wang, C. (2020). Profiling Chinese EFL students' technology-based self-regulated English learning strategies. *Plos one*, 15(10). 10.1371/journal.pone.0240094.
- An, Z., Wang, C., Li, S., Gan, Z., & Li, H. (2021). Technology-assisted self-regulated English language learning: Associations with English language self-efficacy, English enjoyment, and learning outcomes. *Frontiers in Psychology*, 11, 558466. <https://doi.org/10.3389/fpsyg.2020.558466>.
- Bai, B., & Guo, W. (2018). Influences of self-regulated learning strategy use on self-efficacy in primary school students' English writing in Hong Kong. *Reading & Writing Quarterly*, 34(6), 523-536. <https://doi.org/10.1080/10573569.2018.1499058>.
- Bai, B., Guo, W., & Wang, C. (2022). Relationships between struggling EFL writers' motivation, self-regulated learning (SRL), and writing competence in Hong Kong primary schools. *Applied Linguistics Review*. <https://doi.org/10.1515/applirev-2020-0131>.

- Bai, B., & Wang, J. (2020). The role of growth mindset, self-efficacy and intrinsic value in self-regulated learning and English language learning achievements. *Language Teaching Research*, 1362168820933190.
- Balaman, S. (2021). Investigating the relationship between the perception of self-efficacy and the use of self-regulated learning strategies in the English writing skill. *RumeliDE Dil ve Edebiyat Arastirmalari Dergisi* 23, 768-796. 10.29000/rumelide.949696.
- Bandura, A. (1997). *Self-Efficacy: The Exercise of Control*. New York: Freeman.
- Bekleyen, N., & Hayta, F. (2015). Language learning in new era: Do mobile phones help? In *The practice of foreign language teaching: Theories and applications*, edited by A. Akbarov, 434-445. New Castle, UK: Cambridge Scholars Publishing.
- Boekaerts, M. (1997). Self-regulated learning: A new concept embraced by researchers, policy makers, educators, teachers, and students. *Learning and Instruction*, 7(2), 161-186. [https://doi.org/10.1016/S0959-4752\(96\)00015-1](https://doi.org/10.1016/S0959-4752(96)00015-1).
- Bozkurt, M. A., & Eksioğlu, S. (2018). Lise öğrencilerinin İngilizce ozyeterlik düzeyleri. *Abi Evran Üniversitesi Kirsehir Eğitim Fakültesi Dergisi*, 19(1), 440-452.
- Brown, H. D. (2007). *Principles of Language Learning and Teaching*. 5th ed. Pearson Education Inc.
- Chen, Y. L., & Hsu, C. C. (2020). Self-regulated mobile game-based English learning in a virtual reality environment. *Computers & Education*, 154, 103910. <https://doi.org/10.1016/j.compedu.2020.103910>.
- Chung, L-Y. (2015). Exploring the effectiveness of self-regulated learning in massive open online courses on non-native English speakers. *International Journal of Distance Education Technologies (IJDET)*, 13(3), 61-73. 10.4018/IJDET.2015070105.
- Efriana, L. (2021). Problems of online learning during COVID-19 pandemic in EFL classroom and the solution. *Jelita*, 38-37.
- European Council (2002). Council Resolution of 27 June 2002 on Lifelong Learning. *Official J. Eur. Communities*, 9, 1-3.
- Gan, X. (2019). A survey on self-efficacy of English majors: Exploring its correlation with time management and strategy use. *Theory and Practice in Language Studies*. 9, 16-24. <http://dx.doi.org/10.17507/tpls.0912.20>.
- Garcia Botero, G., Questier, F., Cincinato, S., He, T., & Zhu, C. (2018). Acceptance and usage of mobile assisted language learning by higher education students. *Journal of Computing in Higher Education*, 30(3), 426-451. <https://doi.org/10.1007/s12528-018-9177-1>.
- Guo, W. & Wei, J. (2019). Teacher feedback and students' self-regulated learning in mathematics: A study of Chinese secondary students. *The Asia-Pacific Education Researcher*, 28, 165–175. <https://doi.org/10.1007/s40299-019-00434-8>.
- Hol, D. & Guc, F. (2020). Discovering self-efficacy beliefs of EFL learners and the relationship between self-efficacy and academic achievement. *Avrasya Uluslararası Arastirmalar Dergisi*, 8(24), 425-448. <https://doi.org/10.33692/avrasyad.834142>.
- Hung, D. M. (2022). EFL students' self-regulated learning strategies during the Covid19 pandemic. *Arab World English Journal*, 2, 22-34. <https://dx.doi.org/10.24093/awej/covid2.2>.
- İlbeği, A. & Celikoz, M. (2020). İngilizce hazırlık programına devam eden üniversite öğrencilerinin İngilizce ozyeterlik inanclarinin incelenmesi. *IBAD Sosyal Bilimler Dergisi* 8, 14-34. <https://doi.org/10.21733/ibad.706057>.
- Karafil, B. & Ari, A. (2016). Examining the power-sharing level in a higher education classroom. *Journal of International Scientific Publications: Educational Alternatives* 14, 170-180.
- Karatas, K., Senturk, C., & Teke, A. (2021). The mediating role of self-directed learning readiness in the relationship between teaching-learning conceptions and lifelong learning tendencies. *Australian Journal of Teacher Education* 46(6), 54-77. 10.14221/ajte.2021v46n6.4.

- Kizil, A. & Savran, Z. (2016). Self-regulated learning in the digital age: An EFL perspective. *Novitas-Royal (Research on Youth and Language)* 10 (2), 147-158.
- Kim, D. H., Wang, C., Ahn, H. S., & Bong, M. (2015). English language learners' self-efficacy profiles and relationship with self-regulated learning strategies. *Learning and Individual Differences* 38, 136-142. <https://doi.org/10.1016/j.lindif.2015.01.016>.
- Lai, C. (2013). A Framework for developing self-directed technology use for language learning. *Language Learning and Technology*, 17(2), 100-122
- Lai, C. & Gu, M. (2011). Self-regulated out-of-class language learning with technology. *Computer Assisted Language Learning* 24 (4), 317-335.
- Lai, C. L., Hwang, G. J., & Tu, Y. H. (2018). The effects of computer-supported self-regulation in science inquiry on learning outcomes, learning processes, and self-efficacy. *Educational Technology Research and Development* 66(4), 863-892. <https://doi.org/10.1080/09588221.2011.568417>.
- Lee, C., Yeung, A. S., & Ip, T. (2016). Use of computer technology for English language learning: do learning styles, gender, and age matter? *Computer Assisted Language Learning*, 29(5), 1035-1051. <https://doi.org/10.1080/09588221.2016.1140655>.
- Lee, D., Allen, M., Cheng, L., Watson, S., & Watson, W. (2021). Exploring relationships between self-efficacy and self-regulated learning strategies of english language learners in a college setting. *Journal of International Students*, 11(3), 567-585. <https://doi.org/10.32674/jis.v11i3.2145>
- Magogwe, J. M., & Oliver, R. (2007). The relationship between language learning strategies, proficiency, age and self-efficacy beliefs: A study of language learners in Botswana. *System*, 35(3), 338-352. <https://doi.org/10.1016/j.system.2007.01.003>.
- Maican, M. A., & Cocoradă, E. (2021). Online foreign language learning in higher education and its correlates during the COVID-19 pandemic. *Sustainability*, 13(2), 781. <https://doi.org/10.3390/su13020781>.
- Muin, A., & Aswati, A. (2019). Effects of socio-affective strategies on students' self-confidence in classroom speaking activities. *Loquen: English Studies Journal* 12(2), 91-98. 10.32678/loquen.v12i2.2178.
- Nikoopour, J., & Khoshroudi, M. S. (2021). EFL learners' learning styles and self-regulated learning: Do gender and proficiency level matter? *Journal of Language Teaching and Research*, 12(4), 616-623. 10.17507/jltr.1204.13.
- Prensky, M. (2001). Digital natives, digital immigrants part 2: do they really think differently? *On The Horizon* 9 (6), 1-6. <https://doi.org/10.1108/10748120110424843>.
- Saito, A. (2020). Strategic use, self-efficacy beliefs, and self-regulatedness in adult foreign language learning. *Australian Journal of Applied Linguistics* 3(2), 152-167. 10.29140/ajal.v3n2.282.
- Schwam, D., Greenberg, D., & Li, H. (2021). Individual differences in self-regulated learning of college students enrolled in online college courses. *American Journal of Distance Education*, 35(2), 133-151. <https://doi.org/10.1080/08923647.2020.1829255>.
- Shen, H., Yuan, Y., & Ewing, R. (2015). English learning websites and digital resources from the perspective of Chinese university EFL practitioners. *ReCALL*, 27(2), 156-176. 10.1017/S0958344014000263.
- Schunk, D. H. (1994). Self-regulation of self-efficacy and attributions in academic settings. In *Self-regulation of learning and performance: Issues and educational applications* edited by D. H. Schunk & B. J. Zimmerman, 75-99. Lawrence Erlbaum Associates, Inc.
- Shi, H. (2018). English language learners' strategy use and self-efficacy beliefs in English language learning. *Journal of International Students* 8(2), 724-741. <https://doi.org/10.32674/jis.v8i2.101>.
- Su, Y., Zheng, C., Liang, J. C., & Tsai, C. C. (2018). Examining the relationship between English language learners' online self-regulation and their self-efficacy. *Australasian Journal of Educational Technology*, 34(3). <https://doi.org/10.14742/ajet.3548>
- Sun, T. & Wang, C. (2020). College students' writing self-efficacy and writing self-regulated learning strategies in learning English as a foreign language. *System* 90 (3). <https://doi.org/10.1016/j.system.2020.102221>

- Sener, S. & Erol, I. K. (2017). Motivational orientations and self-efficacy beliefs of Turkish students towards EFL learning. *Eurasian Journal of Educational Research* 67: 251-267. 10.14689/ejer.2017.67.15.
- Tabachnick, B. G., Fidell, L. S., Ullman, J. B. (2011). *Using multivariate statistics*. 5. Boston, MA: Pearson: 481-498.
- Teng, L. S., Sun, P. P., & Xu, L. (2018.) Conceptualizing writing self-efficacy in English as a foreign language contexts: Scale validation through structural equation modeling. *Tesol Quarterly*, 52(4), 911-942. 10.1002/tesq.432.
- Teng, L. S., & Zhang, L. J. (2018). Effects of motivational regulation strategies on writing performance: A mediation model of self-regulated learning of writing in English as a second/foreign language. *Metacognition and Learning*, 13(2) 213-240. <https://doi.org/10.1007/s11409-017-9171-4>.
- Teng, L. S., & Zhang, L. J. (2020). Empowering learners in the second/foreign language classroom: Can self-regulated learning strategies-based writing instruction make a difference? *Journal of Second Language Writing*, 48, 100701.
- Wang, C. (2004). Self-regulated learning strategies and self-efficacy beliefs of children learning English as a second language. *Doctoral Dissertation*. The Ohio State University.
- Wang, C. & Bai, B. (2017). Validating the instruments to measure ESL/EFL learners' self-efficacy beliefs and self-regulated learning strategies. *TESOL Quarterly* 51(4), 931-947. <https://doi.org/10.1002/tesq.355>
- Wang, C., Schwab, G., Fenn, P., & Chang, M. (2013). Self-efficacy and self-regulated learning strategies for English language learners: Comparison between Chinese and German college students. *Journal of Educational and Developmental Psychology*, 3(1), 173-191. 10.5539/jedp.v3n1p173.
- Wang, H. C., & Chen, C. W. Y. (2020). Learning English from YouTubers: English L2 learners' self-regulated language learning on YouTube. *Innovation in Language Learning and Teaching*, 14(4), 333-346. <https://doi.org/10.1080/17501229.2019.1607356>
- Wong, M. S-L. (2005). Language learning strategies and language self-efficacy: Investigating the relationship in Malaysia. *RELC Journal* 36(3), 245-269. <https://doi.org/10.1177/0033688205060050>.
- Williams, M. & Burden, R. (1997). Motivation in language learning: A social constructivist approach. *Cahiers de l'APLIUT* 16(3), 19-27. 10.3406/APLIU.1997.1201.
- Yusuf, M. (2011). The impact of self-efficacy, achievement motivation, and self-regulated learning strategies on students' academic achievement. *Procedia-Social and Behavioral Sciences* 15, 2623-2626. <https://doi.org/10.1016/j.sbspro.2011.04.158>.
- Zimmerman, B. J. (2002). Becoming a self-regulated learner: An overview. *Theory into practice* 41(2), 64-70. 10.1207/s15430421tip4102_2.
- Zimmerman, B. J. (2006). Development and adaptation of expertise: The role of self-regulatory processes and beliefs. In *Cambridge handbook of expertise and expert performance* edited by Ericsson, K.A, Charness, N, Feltovich P, Hoffman, R., 705-722. New York: Cambridge University Press.
- Zimmerman, B. J. (2008). Investigating self-regulation and motivation: Historical background, methodological developments, and future prospects. *American Educational Research Journal*, 45 (1), 166-183. 10.3102/0002831207312909.

PSYCHOLOGICAL IMPACT OF THE COVID-19 PANDEMIC ON GRADUATE STUDENTS IN THE PHILIPPINES

Calyd T. CERIO

ORCID: 0000-0002-7142-6055
College of Business and Management
Partido State University
Goa, Camarines Sur, PHILIPPINES

Lielanie O. BARRION

ORCID: 0000-0002-2160-6517
Department of Teacher Education
City College of Calamba
Calamba City, Laguna, PHILIPPINES

Dr. Evelie P. SERRANO

ORCID: 0000-0002-9093-0687
College of Public Affairs and Development
University of the Philippines Los Baños
College, Laguna, PHILIPPINES

Received: 06/01/2023 **Accepted:** 02/05/2023

ABSTRACT

The advent of the COVID-19 pandemic has had a huge impact on everyone's lives. To prevent the spread of the coronavirus, people were ordered to stay at home, whether or not they were infected. Due to psychological issues such as stress, anxiety, and depression, these lockdowns had major consequences to one's mental health. The study aimed to assess the level of anxiety and examine the factors that cause it among graduate students. The study employed a mixed method following an embedded design. Data were collected through an online survey administered to 116 graduate students of the College of Public Affairs and Development at the University of the Philippines, Los Baños. Using the Generalized Anxiety Disorder (GAD-7), the study found that almost three-fourths of the graduate students had anxiety. Unstable internet connection, online academic requirements, and learning loss were among the major factors that contribute to their anxiety. Accordingly, policies and interventions should be crafted to ensure that graduate students thrive in this "new normal" of teaching and learning.

Keywords: Mental health, learning loss, anxiety, stressors, academic delay, generalized anxiety disorder, adult anxiety.

INTRODUCTION

The COVID-19 pandemic has caught everyone off guard, putting millions of people's lives in danger all around the world. Long months of lockdown harmed the economy, with the education sector absorbing a substantial share of the burden (Townsend, 2020). Following the closure of a number of schools and universities, there was an urgent and compelling need to transform the mode of instruction from a physical setting to an online digital world of teaching and learning (Kapasias et al., 2020). At the time, it was deemed that online education was the most viable choice.

According to Aucejo et al. (2020), online learning is far more effective than traditional learning, and various government agencies require educational institutions to follow guidelines and recommendations in order to encourage students to continue learning remotely in this challenging learning environment in order to

improve the e-learning setup. On a broader scale, this rapid educational advancement has had a profound influence on learners of all ages (Hassan et al., 2022). Changes in travel restrictions and the closure of educational institutions worldwide would have a significant influence on students' education, personal relationships, and psychological well-being (Odriozola-Gonzalez et al., 2020).

Several studies conducted among university students demonstrated an increase in anxiety or depression, as well as financial instability, as a result of the global pandemic (Aucejo et al., 2020; Dhar et al., 2020; Eloff, 2021; Esteves et al., 2021; Garvey et al., 2021; Firang, 2020; Fornili et al., 2021; Jones et al., 2021; Marelli et al., 2021; Pokhrel & Chhetri, 2021; Tee et al., 2021; Wang et al., 2022). However, very few studies focus on graduate student anxiety.

Petry (2002) classified graduate students as young adults (ages 18 to 35), middle adults (ages 36 to 55), and older adults (ages 56 and up). Batterham et al. (2021) reported that adults have experienced psychological symptoms as a result of the pandemic, including COVID-19-related financial stress, social impairment, and work impairment. On the other hand, Hawes et al. (2021) found that greater COVID-19 school worries were uniquely related to an increase in depressive symptoms. Given this condition, it is projected that many students' university experiences would lead in a more difficult scenario. As a result, this perceived stress would have a long-term impact on their emotions, thinking and learning processes, and mental health. According to dela Fuente (2020) and Karaman et al. (2017), a variety of elements associated with the teaching-learning process contribute to academic stress.

In this research, we studied and analyzed the potential effects of the COVID-19 pandemic on the lives of graduate students. Specifically, we examined the factors that influence the anxiety level and its relationship to COVID-19 stressors among graduate students. The purpose of the study is to provide administrators with policy recommendations for developing effective mental health program interventions for graduate students. The results of the study may contribute to the growing literature on the impact of pandemic-related anxiety among students, particularly graduate students.

METHOD

Study Design

The study employed a mixed method following an embedded design. Creswell and Plano Clark (2007) explain this strategy in which one data collection plays a secondary, supporting role in the study based on the other type. In the context of this research, qualitative data provides substantial support for the quantitative findings, notably regarding the factors that affect graduate student anxiety and stress. The research noted that a single dataset is insufficient, that a variety of questions must be addressed, and that each kind of question requires a distinct set of data. The quantitative portion of the study was heavily patterned on the study of Cao et al. (2020).

Study Instrument

Data were collected using an online survey instrument via Google Form with informed consent and distributed to all graduate students of the College of Public Affairs and Development, University of the Philippines Los Baños. It was composed of three parts: profile, anxiety severity, and COVID-19 stressors.

The profile inquired about the basic information of graduate students, such as sex, age, marital status, degree enrolled, country of origin, stability of income, type of student, COVID-19 inoculation, and internet connection.

A seven-item Generalized Anxiety Disorder Scale (GAD-7) was used to assess the anxiety severity. Each of the seven questions on the GAD-7 was based on one of seven core symptoms of generalized anxiety disorder, and inquired about the frequency with which the symptoms have been present during the previous two weeks (Toussaint et al., 2020, as cited in Cao et al., 2020). With a total score between 0 and 21, respondents rated how often they experience each symptom on a 4-point Likert scale ranging from 0 (not at all) to 3 (nearly every day). The GAD-7 is a well-validated screening instrument, and it has demonstrated good internal consistency (Cronbach's $\alpha = 0.880$).

Meanwhile, the study also used a researcher-made instrument on COVID-19 stressors that included constructs on academic delay, academic requirements, learning losses, gradual reopening of classes, impact on daily living, and economic impact. Respondents reported their agreement using a 5-point scale, from 1 strongly disagree to 5 strongly agree. The instrument has demonstrated acceptable internal consistency (Cronbach's $\alpha = 0.735$). Also embedded in the survey are open-ended questions on the causes of anxiety and academic-related worries.

Study Sample

The researcher has no access to the list of graduate students due to a data privacy policy. Hence, the study used non-probability sampling, particularly convenience sampling. For the sample size, the study employed the statistical power analysis of Cohen (1992), a quantitative method typically used in the behavioral sciences. Using Cohen's table of power analysis, the study has arrived at a minimum number of respondents of 97 ($\alpha=.05, f^2=.15, 7$). A total of 116 responses was collected, which is beyond the minimum required samples for the number of independent variables.

Data Analysis

The quantitative data was analyzed using SPSS Version 23. The demographics of graduate students were analyzed using descriptive statistics. The study employed a univariate analysis, a nonparametric test, to look for correlations between characteristics and anxiety levels in graduate students (Abdellatif et al., 2020, as cited in Cao et al., 2020). The Spearman's correlation coefficient, r_s , was used to examine the relationships between COVID-19-related stressors such as academic delay, online academic requirements, learning loss, class reopening, impact on daily living, economic impact, and anxiety level. A two-tailed $p < .05$ was considered statistically significant. Variables with statistical significance were identified and included in multivariate logistic regression analyses. The odds ratio (OR) with a 95 percent confidence interval was used to estimate the strength of associations.

Furthermore, the qualitative data was subjected to content analysis. This tool was used to subjectively analyze the substance of text data from open-ended survey questionnaires through a systematic, precise, and careful coding process and the identification of themes or patterns (Neuendorf, 2018).

FINDINGS

The survey was completed by 116 graduate students of the College of Public Affairs and Development at the University of the Philippines Los Baños. Almost three-fourths (74%) of the respondents were female, and nearly half (48%) were single. The average age of the respondents was 36 years old. Moreover, majority (73%) of them were part-time students who were mainly taking master's degree programs (56%), living in the Philippines (96%), and with a stable income (93%) and internet connection (81%). On the status of COVID-19 vaccination, a large majority (95%) of the respondents were fully inoculated. Table 2 shows the demographic and other characteristics of the respondents.

Level of Anxiety of Graduate Students during the Pandemic

The survey was administered from December 22, 2021, to January 10, 2022. It was the end of the first semester wherein students were likely preoccupied with fulfilling course requirements. It has also been nearly two years since the World Health Organization declared COVID-19 a pandemic. At the time of the survey, countries aimed to achieve herd immunity through vaccination, but they were also concerned about the virus's new variants. Table 1 shows that the graduate students have varied levels of anxiety. Most of them have mild anxiety (40.5%). More than a quarter of them have minimal or normal levels of anxiety (27.6%). Almost one-third have either moderate (14.7%) or severe anxiety (17.2%).

Table 1. Number of students with different levels of anxiety ($n=116$)

Anxiety Level	Frequency	Percentage
Minimal Anxiety	32	27.6
Mild Anxiety	47	40.5
Moderate Anxiety	17	14.7
Severe Anxiety	20	17.2

Factors Affecting Graduate Student's Anxiety during the Pandemic

Univariate Analysis

In Table 2, the relationship between the demographic variables of graduate students and their level of anxiety is shown. Among the seven variables, internet stability is the only variable with a significant effect on anxiety ($p < .05$). This means that the anxiety levels of graduate students are significantly different between those with stable and unstable internet connections. All other variables have no significant effect on anxiety ($p > .05$). Noticeably, half (50%) of the students who had no stable income (50%) and more than half (54%) who had no stable internet (54%) had symptoms of moderate to severe anxiety.

Table 2. Univariate analysis of graduate students' anxiety caused by the pandemic.

Variable	Total	Anxiety Level				Statistics	P value
		Minimal	Mild	Moderate	Severe		
Sex						-.259 ^a	.796
Male	30	10(33%)	10(33%)	4(13%)	6(20%)		
Female	86	22(26%)	37(43%)	13(15%)	14(16%)		
Degree Enrolled						-1.065 ^a	.287
Master's	65	26(40%)	16(25%)	10(15%)	13(20%)		
Doctorate	51	21(41%)	16(31%)	7(14%)	7(14%)		
Country of Origin						-1.265 ^a	.206
Local	111	32(29%)	44(40%)	17(15%)	18(16%)		
Foreign	5	-	3(60%)	-	2(40%)		
Stable Income						-1.209 ^a	.227
No	8	1(13%)	3(38%)	2(25%)	2(25%)		
Yes	108	31(29%)	44(41%)	15(14%)	18(17%)		
Type of Student						-1.345 ^a	.179
Part time	85	25(29%)	37(44%)	9(11%)	14(16%)		
Full time	31	7(23%)	10(32%)	8(26%)	6(19%)		
COVID-19 Vax						3.867 ^b	.145
No	4	-	3(75%)	-	1(25%)		
Partially vax	2	2(100%)	-	-	-		
Fully vax	110	30(27%)	44(40%)	17(15%)	19(17%)		
Internet Stability						-2.008 ^a	.037
No	22	4(18%)	6(27%)	6(27%)	6(27%)		
Yes	94	28(30%)	41(44%)	11(12%)	14(15%)		

^a Mann-Whitney test

^b Kruskal-Wallis test

Correlation between COVID-19 Related Stressors and Anxiety Level

Table 3 shows the weighted mean of COVID-19 related stressors and the correlation between graduate students' stressors and anxiety. The study found that the respondents generally agreed with the six statements that describe their worries due to the COVID-19 stressors. When asked which of the six stressors they were experiencing most, students cited online academic requirements (31.9%), economic impact (21.6%), and the gradual reopening of classes (14.7%) as the most troubling.

Table 3. Correlation between COVID-19 related stressors and anxiety level.

COVID-19 Related Stressors	W e i g h t e d Mean	Respondents' Primary Stressor	Anxiety Level	value
Academic delay	3.72	10(8.6%)	.373	<.001
Online Academic Requirements	3.96	37(31.9%)	.474	<.001
Learning Losses	3.78	3(2.6%)	.456	<.001
Gradual reopening of classes	3.67	17(14.7%)	.308	.001
Influence on daily living	3.91	16(13.8%)	.487	<.001
Economic impact	3.99	25(21.6%)	.409	<.001

r Correlation coefficient.

All COVID-19-related stressors are significantly correlated with students' levels of anxiety. Online academic requirements, learning losses, influence on daily living, and economic impact have significant strong relationships with anxiety ($p < .001$). Academic delay ($p < .001$) and gradual reopening of classes ($p < .01$) have a significant moderate relationship with anxiety.

Ordinal Regression Analysis

The result of the ordinal multivariate analysis of factors associated with anxiety is presented in Table 4. Significant variables for the univariate (Table 2) and correlation analysis (Table 3) were included in the ordered logistic regression. In the model test, a significant improvement in the fit of the final model over the null model [$\chi^2(7) = 53.877, p < .001$]. Three significant factors were found in the ordinal regression analysis, the internet stability (OR = 2.198, 95% CI = .864 - 5.595), online academic requirements (OR = 1.886, 95% CI = 1.138 - 3.060), and learning loss (OR = 1.883, 95% CI = 1.245 - 2.848). The odds ratio of >1 suggests an increasing probability of being at a higher level on the dependent variable as values on the independent variable increase. Hence, when the graduate student's internet connection becomes unstable, there is 2.198 times increase in the level of anxiety ($p = .099$), holding all other variables constant. Moreover, for every one unit increase in worries about online academic requirements ($p = .013$) and learning loss ($p = .003$), there is 1.886 times, and 1.883 times increase in anxiety, respectively.

Table 4. Ordinal regression analysis result

Factors	SE	OR	P	OR(%CI)
Internet Stability	.4767	2.198	.099	(.864, 5.595)
Academic Delay	.2282	.803	.337	(.513, 1.256)
Online Academic Requirements	.2522	1.886	.013	(1.138, 3.060)
Learning Loss	.2110	1.883	.003	(1.245, 2.848)
Gradual Reopening of Classes	.1899	.975	.894	(.672, 1.415)
Influence on daily living	.2672	1.506	.126	(.892, 2.543)
Economic Impact	.2701	1.394	.219	(.821, 2.306)

SE Std. Error, OR Odds Ratio, CI Confidence Interval

DISCUSSIONS

Indubitably, the COVID-19 pandemic has had a psychological impact on students at various levels. Results of the study indicate that almost three-fourths (72.4%) of the survey participants exhibited anxiety, 14.7% of them had moderate anxiety, and 17.2% had severe anxiety. Similar studies across the world have also found varying but alarming cases of anxiety among students due to the pandemic (Baloran, 2020; Cao et al., 2020; Islam et al., 2020; Lasheras et al., 2020; Lee, 2020; Rakhmanov & Dane; Savitsky et al., 2020; Wang et al., 2020).

Graduate students, like undergraduates, are facing the effects of the pandemic. According to the reported cases in the Philippines for 2021, the prevalence of infection is highest among adults. In the study, the average age of the respondents was 36 (Min = 23, Max = 63). The average age of the responders falls within Stage 7 of Erik Erikson's phases of psychological development (Generativity vs. Stagnation). Adults attempt to develop or cultivate things that will outlive them during this period, frequently through raising children or contributing to favorable improvements that benefit others (Ehlman & Ligon, 2012). This is probably why the respondents are anxious about their daily lives and the economic impact of the pandemic, aside from their academic concerns. According to Respondent No. 21, "*Due to the pandemic, prices and basic needs of my family, such as medicine, electricity, water supply, and food, among others, have started to increase.*"

Meanwhile, a 2020 nationwide survey conducted throughout the United States found that 27 percent of parents reported worsening mental health for themselves, and 14 percent reported worsening behavioral health for their children (Faisal et al., 2021). In the study of Parczewska (2021) in Poland, she also found anxiety among parents about issues related to homeschooling and the future of their children. Similarly, one of the respondents in this study stated: "*I find it hard to manage and complete all the requirements while assisting my kids who are also doing their requirements online*" (Respondent No. 6). In addition, Ehlman and Ligon (2012) claim that contributing to society and doing things for the benefit of future generations are essential desires during the generativity versus stagnation stage of development. This has been one of the worries of graduate students; as one pens, "*I worry more for my countrymen who live on a per-day wage. The instability the pandemic brings aggravates the health, nutritional, and educational considerations of our countrymen on the fringes of society*" (Respondent No. 73).

Aside from the impact of the pandemic on daily life and the economy, graduate students are also anxious about academic-related concerns such as academic delay ($r = .373$, $p < .001$), online academic requirements ($r = .474$, $p < .001$), learning loss ($r = .456$, $p < .001$), and gradual reopening of classes ($r = .308$, $p < .01$). Fear of academic delay (FAD) has been one of the causes of anxiety and other psychological distress among students (Cao et al., 2020; Dhar et al., 2020; Hossain et al., 2021). Ten, or 9%, of the respondents find this factor the primary cause of their anxiety. Most of the responses are linked to the writing of their papers, such as theses, dissertations, and feasibility studies. Respondent No. 32 shared: "*The conduct of data-gathering for my dissertation might be severely affected due to the pandemic.*"

Online academic requirements are the primary cause of anxiety among graduate students. As the pandemic continued to pose a threat on public health and safety, higher educational institutions (HEIs) and teachers in the Philippines shifted from traditional face-to-face instruction to remote learning (Tolidong & Toquero, 2020). The sudden shift has impacted all the school stakeholders, particularly the students. In Indonesia, Nihayah et al. (2021) found an anxiety disorder among university students due to online lectures. Their study also found a significant association between worries about online academic requirements and the level of anxiety among graduate students. Generally, in this study, the responses of the students to an open-ended question provide three major themes: work life and school balance, heavy requirements, and mental health issues. According to Respondent No. 103, "*I am also supervising the remote learning of my two children on top of my full-time work. It is challenging to provide enough time for academic requirements as well.*" The pandemic has changed the way people live and work (Iriwanto et al., 2021). During the pandemic, graduate students tend to play different roles at home, including being parent-teachers, employees on work from home arrangements, and students at the same time. Garbe et al. (2020) claimed that parents found difficulties in balancing responsibilities, learning motivation, accessibility, and learning outcomes. Respondents also consider heavy requirements one of the causes of anxiety. As Respondent No. 75 penned, "*I worry about the online academic requirements this semester. Most requirements are so many that they pile up at once. I am always*

afraid of not meeting the standards.” Lastly, the respondents were also concerned with their mental health, which was heavily affecting their time in meeting their academic requirements. Respondent No. 87 said, *“It worries and bothers me a lot when I’m thinking of other problems too. I cannot focus and do them properly.”*

Learning loss is also one of the significant stressors for graduate students. The term “learning loss” is often used in the academic literature to indicate student knowledge and ability losses. Learning loss happens when educational progress is not made at the same pace as it has traditionally been made in comparison to prior years (Pier et al., 2021). Learning loss has been a new emerging topic due to the pandemic (Donnelly & Patrinos, 2021). For graduate students, *“nothing can beat interpersonal interaction and the exchange of ideas personally”* (Respondent No. 5). Most graduate students still prefer face-to-face classes to the current set up. As respondent 114 stated,

“I did wish to have in-person classes for better learning absorption and focus, but this online learning mode works for me now, albeit its limitations; often I juggle 3 shifts (paid work, care work at home, and online learning). It’s only in the past 2 weeks that I’ve availed myself of personal leave from work, but it’s also the time for writing school-related papers. And I still felt like I was so slow.”

Another academic stressor is the gradual reopening of classes. After two years of remote classes, higher educational institutions in the Philippines are planning to conduct a gradual reopening of classes. Some respondents were alarmed and anxious about the plan. Respondent No. 46, for instance, is anxious about being infected if the reopening is pursued. *“I worry about the gradual reopening of classes next semester because even if I am fully vaccinated, it makes me very anxious about traveling by PUV since I don’t have any private vehicles to use to go to the UP campus.”* Some are also anxious about the new surges caused by new variants. *“I am anxious about the gradual reopening of classes next semester, because most students might be exposed, especially now that there is a new variant, and there is a possibility that they might bring the disease back home to their families. Like me, for instance, I have a newborn baby at home”* (Respondent 115).

Lastly, unstable internet connection serves as one of the main sources of anxiety among the graduate students. The level of anxiety of students with an unstable internet connection is twice that of students with a stable internet connection. This finding supports the earlier findings of Paul et al. (2020), Islam et al. (2020), Muslimin and Harintama (2020), Hoque et al. (2021), Sifat (2020), and Lee et al. (2021).

CONCLUSION AND RECOMMENDATIONS

Graduate students of the College of Public Affairs and Development, University of the Philippines Los Baños have exhibited anxiety during the pandemic. The anxiety of the graduate students has a positive significant relationship with their worries on academic delay, online academic requirements, learning loss, gradual reopening of classes, impact on daily living, and economic impact. On the other hand, unstable internet connections, worries about online academic requirements, and worries about learning loss are the three factors associated with their anxiety. With the foregoing findings, the study recommends that the college design a mental health program for graduate students while considering the following: (1) Create a program that will motivate and guide the graduate students who are working on their dissertation, thesis, or feasibility report; (2) recognize that some graduate students are having difficulty with unstable internet connections; (3) professors must be mindful when assigning course requirements, but they must also ensure that students acquire the necessary competencies for the course; (4) professors should design flexible or online learning environments in which the students can interact in the same way they would in a face-to-face setting; and (5) the physical infrastructure should not only be the main consideration of the administration in the reopening of classes but also the safety of the students in public transportation and the status of COVID-19 cases.

One limitation of this study is that it was conducted in a specific context and population, limiting the generalizability of the findings to other contexts or populations. The study was only focused on graduate students at a particular university in the Philippines, which may not be representative of the experiences and anxiety levels of other student populations. In addition, the study was conducted during a specific time period, which may not reflect the ongoing and evolving effects of the COVID-19 pandemic on the anxiety levels of students. Lastly, the study did not investigate potential protective factors or coping mechanisms that could mitigate anxiety levels among graduate students during the pandemic. Future research may therefore focus on these limitations.

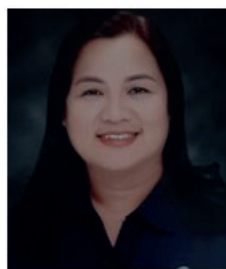
Acknowledgements: The researchers would like to acknowledge all the research participants of the study. We are also grateful for the administrative staff of the Institute for Governance and Rural Development of the College of Public Affairs and Development, University of the Philippines Los Baños who assisted us in the distribution of our online questionnaire.

BIODATA and CONTACT ADDRESSES of AUTHORS



Calyd T. CERIO is an Associate Professor and the Director of the Center for Bioresource-based Enterprise Development, College of Business and Management, Partido State University. He completed his Master of Science in Rural Sociology at the University of the Philippines Los Baños in 2018 and his Master in Business Administration at Partido State University in 2014. Currently, he is pursuing his Doctor of Philosophy in Development Studies at UPLB. Mr. Cerio has authored and co-authored journal articles on rural studies focusing on rural poverty, rural tourism, the agribusiness value chain, and cultural studies.

Calyd T. CERIO
Center for Bioresource-based Enterprise Development
College of Business and Management, Partido State University
Phone: +639218469867
E-mail: calyd.cerio@parsu.edu.ph



Lielanie M. Olanosa-BARRION is an experienced communication and education professor. She also held positions in governance and administration, including Vice President for Administration and College Registrar. She earned her Master of Arts in Communication Arts with a major in Speech from the University of the Philippines in Los Baños, where she also taught key speech courses to Communication Arts majors. She is now pursuing her Doctor of Philosophy in Development Studies with a focus on Education and Development at UPLB. She travelled to Southeast Asian countries to attend international conferences and visit higher education institutions. She has also written a number of research papers in the fields of education, communication, psychology, and community outreach. She is still a professional teacher and a teacher educator.

Lielanie O. BARRION
Department of Teacher Education, City College of Calamba
Phone: +639176237534
E-mail: lobarrion@ccc.edu.ph



Dr. Evelie P. SERRANO is an Associate Professor and the Director of the Institute for Governance and Rural Development, College of Public Affairs and Development, University of the Philippines Los Baños. She completed her PhD in Extension Education at the University of the Philippines Los Baños in 2013. Dr. Serrano has authored and co-authored journal articles on education, extension, and development. Her research interests include indigenous knowledge systems, education management and governance, extension education, teaching and learning, gender and development, and rural development.

Evelie P. SERRANO
Institute for Governance and Rural Development
College of Public Affairs and Development, University of the Philippines Los Baños
Phone: +639177240608
E-mail: epserrano2@up.edu.ph

REFERENCES

- Aucejo E.M., French J., Ugalde Araya M.P., Zafar B. (2020) The impact of COVID-19 on student experiences and expectations: Evidence from a survey. *Journal of Public Economics*, 191, 104271. <https://doi.org/10.1016/j.jpubeco.2020.104271>
- Baloran, E (2020) Knowledge, Attitudes, Anxiety, and Coping Strategies of Students during COVID-19 Pandemic. *Journal of Loss and Trauma*, 25(8), 635-642, <https://doi.org/10.1080/15325024.2020.1769300>
- Batterham, P. J., Calear, A. L., McCallum, S. M., Morse, A. R., Banfield, M., Farrer, L. M., ... & Dawel, A. (2021). Trajectories of depression and anxiety symptoms during the COVID-19 pandemic in a representative Australian adult cohort. *Medical Journal of Australia*, 214(10), 462-468. <https://doi.org/10.5694/mja2.51043>
- Cao W, Fang Z, Hou G, Han M, Xu X, Dong J, et al. (2020). The psychological impact of the COVID-19 epidemic on college students in China. *Psychiatry Research*, 287,112934. <https://doi.org/10.1016/j.psychres.2020.112934>
- Cohen J. (1992) A Power Primer. *Psychological Bulletin* 112(1), 155-159.
- Creswell, J. W., & Plano Clark, V. L. (2007). Designing and conducting mixed methods research. Thousand Oaks, CA: Sage
- de la Fuente, J., Amate, J., Gonzalez-Torres, M. C., Artuch, R., Garcia-Torrecillas, J. M., and Fadda, S. (2020). Effects of levels of self-regulation and regulatory teaching on strategies for coping with academic stress in undergraduate students. *Frontier Psychology*, 11(22). <https://doi.org/10.3389/fpsyg.2020.00022>
- Dhar, B. K., Ayithey, F. K., & Sarkar, S. M. (2020). Impact of COVID-19 on Psychology among the University Students. *Global Challenges*, 4(11), 2000038. <https://doi.org/10.1002/gch2.202000038>
- Donnelly, R., Patrinos, H.A. (2021). Learning loss during Covid-19: An early systematic review. *Prospects*. <https://doi.org/10.1007/s11125-021-09582-6>
- Ehlman K & Ligon M (2012) The application of generativity model for older adults. *International Aging Hum Development*, 74(4), 331-44. <https://doi.org/10.2190/AG.74.4.d>
- Eloff, I. (2021). College students' well-being during the COVID-19 pandemic: An exploratory study. *Journal of Psychology in Africa*, 31(3), 254-260. <https://doi.org/10.1080/14330237.2021.1939055>
- Esteves, C. S., Oliveira, C. R. D., & Argimon, I. I. D. L. (2021). Social distancing: prevalence of depressive, anxiety, and stress symptoms among Brazilian students during the COVID-19 pandemic. *Frontiers in Public Health*, 8, 923. <https://doi.org/10.3389/fpubh.2020.589966>
- Faisal, R.A., Jobe, M.C., Ahmed, O. & Sharker T. (2021) Mental Health Status, Anxiety, and Depression Levels of Bangladeshi University Students During the COVID-19 Pandemic. *International Journal of Mental Health Addiction*. <https://doi.org/10.1007/s11469-020-00458-y>
- Firang, D. (2020). The impact of COVID-19 pandemic on international students in Canada. *International Social Work*, 63(6), 820-824. <https://doi.org/10.1177/0020872820940030>
- Fornili, M., Petri, D., Berrocal, C., Fiorentino, G., Ricceri, F., Macciotta, A., Bruno, A., Farinella, D., Baccini, M., Severi, G., & Baglietto, L. (2021). Psychological distress in the academic population and its association with socio-demographic and lifestyle characteristics during COVID-19 pandemic lockdown: results from a large multicenter Italian study. *PLoS ONE*, 16(3), e0248370. <https://doi.org/10.1371/journal.pone.0248370>
- Garbe A., Ogurlu U., Logan N., & Cook P. (2020). COVID-19 and Remote Learning: Experiences of Parents with Children during the Pandemic. *American Journal of Qualitative Research*, 4(3), 45-65 <https://doi.org/10.29333/ajqr/8471>

- Garvey, A. M., Garcia, I. J., Ortal Franco, S. H., & Fernandez, C. M. (2021). The psychological impact of strict and prolonged confinement on business students during the COVID-19 pandemic at a Spanish university. *International Journal of Environmental Research and Public Health*, 18(4), 1710. <https://doi.org/10.3390/ijerph18041710>
- Hassan, B. A. R., Mohammed, A. H., Wayyes, A. M., Farhan, S. S., Al-Ani, O. A., Blebil, A., & Dujaili, J. (2022). Exploring the level of lockdown fatigue and effect of personal resilience and coping behaviours on university students during the covid-19 pandemic: a cross-sectional analysis from Iraq. *Current Psychology*, 1-9. <https://doi.org/10.1007/s12144-022-02779-8>
- Hawes, M. T., Szenczy, A. K., Klein, D. N., Hajcak, G., & Nelson, B. D. (2021). Increases in depression and anxiety symptoms in adolescents and young adults during the COVID-19 pandemic. *Psychological Medicine*, 1-9. <https://doi.org/10.1017/S0033291720005358>
- Hoque, M. N., Hannan, A., Imran, S., Alam, M. A., Matubber, B., & Saha, S. M. (2021). Anxiety and its determinants among undergraduate students during E-learning in Bangladesh amid covid-19. *Journal of Affective Disorders Reports*, 6, 100241. <https://doi.org/10.1016/j.jadr.2021.100241>
- Hossain, M. J., Ahmmmed, F., Rahman, S. A., Sanam, S., Emran, T. B., & Mitra, S. (2021). Impact of online education on fear of academic delay and psychological distress among university students following one year of COVID-19 outbreak in Bangladesh. *Heliyon*, 7(6), e07388. <https://doi.org/10.1016/j.heliyon.2021.e07388>
- Irawanto DW, Novianti KR, & Roz K. (2021). Work from Home: Measuring Satisfaction between Work–Life Balance and Work Stress during the COVID-19 Pandemic in Indonesia. *Economies*, 9(3),96. <https://doi.org/10.3390/economies9030096>
- Islam MA, Barna SD, Raihan H, Khan MNA, Hossain MT (2020) Depression and anxiety among university students during the COVID-19 pandemic in Bangladesh: A web-based cross-sectional survey. *PLoS ONE* 15(8): e0238162. <https://doi.org/10.1371/journal.pone.0238162>
- Jones, H. E., Manze, M., Ngo, V., Lamberson, P., & Freudenberg, N. (2021). The impact of the COVID-19 pandemic on college students' health and financial stability in New York City: findings from a population-based sample of City University of New York (CUNY) students. *Journal of Urban Health*, 98(2), 187–196. <https://doi.org/10.1007/s11524-020-00506-x>
- Kapasia, P. Paul, A. Roy, et al. (2020) Impact of lockdown on learning status of undergraduate and postgraduate students during COVID-19 pandemic in West Bengal, India. *Children and Youth Services Review*, 116, 105194. <https://doi.org/10.1016/j.childyouth.2020.105194>
- Karaman, M. A., Lerma, E., Cavazos, J., and Watson, J. C. (2017). Predictors of academic stress among college students. *Journal of College Counseling*, 22, 41–55. <https://doi.org/10.1002/jocc.12113>
- Lasheras I, Gracia-Garcia P, Lipnicki DM, Bueno-Notivol J, Lopez-Anton R, de la Camara C, Lobo A, Santabarbara J. (2020). Prevalence of Anxiety in Medical Students during the COVID-19 Pandemic: A Rapid Systematic Review with Meta-Analysis. *International Journal of Environmental Research and Public Health*, 17(18),6603. <https://doi.org/10.3390/ijerph17186603>
- Lee, J., Jeong, H. J., & Kim, S. (2021). Stress, anxiety, and depression among undergraduate students during the COVID-19 pandemic and their use of mental health services. *Innovative higher education*, 1-20. <https://doi.org/10.1007/s10755-021-09552-y>
- Lee, J. (2020). Mental health effects of school closures during COVID-19. *The Lancet*. Advance online publication. [https://doi.org/10.1016/S2352-4642\(20\)30109-7](https://doi.org/10.1016/S2352-4642(20)30109-7)
- Marelli, S., Castelnuovo, A., Somma, A., Castronovo, V., Mombelli, S., Bottoni, D., ... & Ferini-Strambi, L. (2021). Impact of COVID-19 lockdown on sleep quality in university students and administration staff. *Journal of neurology*, 268(1), 8-15. <https://doi.org/10.1007/s00415-020-10056-6>
- Muslimin, A. I., & Harintama, F. (2020). Online learning during pandemic: Students' motivation, challenges, and alternatives. *Loquen: English Studies Journal*, 13(2), 60-68. <http://doi.org/10.32678/loquen.v13i2.3558>

- Neuendorf, K. A. (2018). Content analysis and thematic analysis. In *Advanced research methods for applied psychology* (pp. 211-223). Routledge.
- Nihayah, U., Sadnawi, A. S. A., Naillaturrafidah, N. (2021). The academic anxiety of students in pandemic era. *Journal of Advanced Guidance and Counseling*, 2(1), 39-55. <https://doi.org/10.21580/jagc.2020.2.1.6986>.
- Odrizola-gonzalez P, Planchuelo-gomez A., Jesus, R. De Luis-garcia M. (2020). Psychological effects of the COVID-19 outbreak and lockdown among students and workers of a Spanish University. *Psychiatry Research*, 290, 113108. <https://doi.org/10.1016/j.psychres.2020.113108>
- Parczewska, T. (2021). Difficult situations and ways of coping with them in the experiences of parents homeschooling their children during the COVID-19 pandemic in Poland, *Education*, 49:7, 889-900. <https://doi.org/10.1080/03004279.2020.1812689>
- Paul, P., Roy, A., Saha, J., Zaveri, A., Mallick, R., ... & Chouhan, P. (2020). Impact of lockdown on learning status of undergraduate and postgraduate students during COVID-19 pandemic in West Bengal, India. *Children and Youth Services Review*, 116, 105194. <https://doi.org/10.1016/j.childyouth.2020.105194>
- Petry, N. M. (2002). A comparison of young, middle-aged, and older adult treatment-seeking pathological gamblers. *The gerontologist*, 42(1), 92-99. <https://doi.org/10.1093/geront/42.1.92>
- Pier, L., Hough, H. J., Christian, M., Bookman, N., Wilkenfeld, B., & Miller, R. (2021). Covid-19 and the educational equity crisis: Evidence on learning loss from the CORE data collaborative. *Policy Analysis for California Education*. <https://edpolicyinca.org/newsroom/covid-19-and-educational-equity-crisis>
- Pokhrel, S., & Chhetri, R. (2021). A literature review on impact of COVID-19 pandemic on teaching and learning. *Higher Education for the Future*, 8(1), 133-141. <https://doi.org/10.1177/2347631120983481>
- Rakhmanov O. & Dane S. (2020). Knowledge and Anxiety Levels of African University Students Against COVID-19 During the Pandemic Outbreak by an Online Survey. *Journal of Research in Medical and Dental Science*, 8(3), 53-56. <https://www.jrmds.in/articles/knowledge-and-anxiety-levels-of-african-university-students-against-covid19-during-the-pandemic-outbreak-by-an-online-su.pdf>
- Savitsky B., Findling Y., Erel A., & Hendel T. (2020). Anxiety and coping strategies among nursing students during the covid-19 pandemic. *Nurse Education in Practice*, 46, 102809. <https://doi.org/10.1016/j.nepr.2020.102809>.
- Sifat, R. I. (2020). COVID-19 pandemic: Mental stress, depression, anxiety among the university students in Bangladesh. *Social Psychiatry*, 1(2). <https://doi.org/10.1177/0020764020965995>
- Talidong, K. J. B., & Toquero, C. M. D. (2020). Philippine teachers' practices to deal with anxiety amid COVID-19. *Journal of Loss and Trauma*. Advance online publication. <https://doi.org/10.1080/15325024.2020.1759225>
- Tee, M. L., Tee, C. A., Anlacan, J. P., Aligam, K. J. G., Reyes, P. W. C., Kuruchittham, V., & Ho, R. C. (2020). Psychological impact of COVID-19 pandemic in the Philippines. *Journal of affective disorders*, 277, 379-391. <https://doi.org/10.1016/j.jad.2020.08.043>
- Townsend, E. (2020). Debate: the impact of school closures and lockdown on mental health in young people. *Child and adolescent mental health*, 25(4), 265-266. <https://doi.org/10.1111/camh.12428>
- Wang X, Hegde S, Son C, Keller B, Smith A, Sasangohar F. (2020). Investigating Mental Health of US College Students During the COVID-19 Pandemic: Cross-Sectional Survey Study. *Journal of Medical Internet Research*, 22(9):e22817. <https://doi.org/10.2196/22817>
- Wang, J., Liang, Z., Zhang, M., Kang, D., & Zeng, Q. (2022). Effects of the COVID-19 Pandemic on Chinese Graduate Students' Learning Activities: A Latent Class Analysis. *Frontiers in Psychology*, 13, 877106-877106. <https://doi.org/10.3389/fpsyg.2022.877106>

THE EFFECTIVE USE OF VIRTUAL COMMUNICATION IN AN ONLINE PROFESSIONAL DEVELOPMENT PROGRAM: INVESTIGATING TEACHERS' ATTITUDES

Dr. Areej ELSAYARY

ORCID:0000-0002-5554-0069
College of Interdisciplinary Studies
Zayed University
Abu Dhabi, UNITED ARAB EMIRATES

Dr. Lawrence MEDA

ORCID: 0000-0002-9496-9132
Sharjah Education Academy
Sharjah, UNITED ARAB EMIRATES

Dr. Suha KARAKI

ORCID: 0000-0002-9762-3081
College of Interdisciplinary Studies
Zayed University
Dubai, UNITED ARAB EMIRATES

Dr. Laila MOHEBI

ORCID: 0000-0002-2640-4532
College of Humanities and Social Sciences
Zayed University
Dubai, UNITED ARAB EMIRATES

Received: 03/01/2023 **Accepted:** 18/05/2023

ABSTRACT

The coronavirus (COVID-19) is considered to be an external factor that affects teachers' attitudes toward online professional development. Therefore, this study investigates the use of virtual communication in an online professional development program through the lens of teachers' attitudes toward technology. This study was conducted in 15 schools across the United Arab Emirates (UAE) during the COVID-19 pandemic. A teacher training program called The Ta'alouf Inclusion Special Education, one of the initiatives of the Al Jalila Foundation (AJL), aimed to train teachers, promote inclusion, and support children with special educational needs and disabilities. Participants (teachers, school leaders, learning support assistants, social workers, and department heads) received 24 hours of virtual training sessions on numerous topics related to inclusive education and special educational needs and disabilities.

A concurrent mixed-method approach was utilized to collect quantitative data from participants using an online survey and qualitative data using interviews. The study results reveal that the quarantine of COVID-19 did not affect teachers' continued professional development. On the contrary, teachers felt the ease of using technology and the usefulness of the topics mentioned, which formed their positive attitudes toward using technology and led to their engagement and continuation of developing professionally either during or after the pandemic.

Keywords: Virtual communication, professional development, online program.

INTRODUCTION

One of the main focuses of the United Arab Emirates (UAE) National Agenda 2030 is shifting the focus from dependence on oil to a knowledge-based economy (UAE Vision, 2021, 2009). UAE's 2030 Agenda stated that one of the key performance indicators for sustainable development is to have high-quality teachers (UAE National Committee on SDGs, 2017). As a result of the lockdown of COVID-19, schools and universities globally shifted toward e-learning. Although it was tough for all educators and students, some important lessons were learned from this experience (Pokhrel & Chhetri, 2021). Many tasks were shifted to online and relied more on virtual communication, such as conducting online conferences, meetings, professional development, and other tasks. The worldview toward these tasks has changed to save time and money using technology to enhance the workflow. These days, individuals prefer to communicate virtually to solve the challenges of time savings and reduce the virus's contagiousness. However, there is still a gap in online teaching and learning in schools. Consequently, teachers' professional development became another issue as teachers suffer to teach students and continue developing professionally due to being unskilled in using technology effectively.

Virtual communication is a way where communication has become computer-mediated using videoconferencing, which is used as a substitution for face-to-face communication (Anderson, 2007). Due to the forced situation of COVID-19, many different aspects of society have adopted different virtual communication tools (Valverde-Macias & Llerena-Izquierdo, 2022). Mobile learning as a teaching and coaching methodology became useful for private and public organizations (Bondarenko et al., 2018; Llerena & Ayala-Carabajo, 2020). It has been used to conduct professional development for educators, allowing them to virtually fulfill their roles as educators (Llerena-Izquierdo & Atiaja-Balseca, 2021). Online professional development allows teachers to continue learning via information communication media (Tuong & Murray, 2020).

Online interaction spaces require the use of resources, applications, and meaningful activities (Llerena & Ayala-Carabajo, 2020). In order to successfully implement online professional development, instructors should be skillful in using technology, enhancing participants' engagement, and ensuring their presence online. The virtual communication tools used in this study are Edmodo, Zoom, WhatsApp, and emails. It has been stated that these tools allow greater accessibility to participants from anywhere using their devices to create an effective learning experience through mobile learning (Agarwal et al., 2021; Llerena-Izquierdo, 2021).

The study aims to examine the effectiveness of virtual communication used in the engagement of participants in a professional development training program and their perceptions. The following question and sub-questions guide this study: To what extent do the usefulness of topics presented and the ease of using virtual communication impact participants' attitudes and engagement in an online professional development program?

1. What are the educators' attitudes toward virtual communication in an online professional development program?
2. How do using technology and the usefulness of topics influence participants' engagement in an online professional development program?

The paper begins with this first introduction section and background to the study. This is followed by a literature review focusing on virtual communication and recent research about its importance in education. The theoretical framework and context of the study are presented after that. This is followed by methodology, results, and discussion sections. Finally, the paper ends with a succinct conclusion and some implications for future research.

LITERATURE

Online Professional Development via Virtual Communication

Bodalev (2011) defines virtual communication as a computer-based and remote interaction between two or more people. In the last two decades, this has become a widespread phenomenon that individuals rely on and integrate with different aspects of everyday life. Its presence has also made its way into the realm of education (Baeva, 2016). Furthermore, virtual communication has facilitated the transmission of knowledge in a digital mode, uniting participants from different places in one area (Loode, 2021).

Online training has gained more popularity in the last decade as it presents easier access, gives trainers larger outreach, provides a flexible milieu for learning, and also provides participants with a chance to network and collaborate with other individuals in the field (Lay et al., 2020; Kummel et al., 2020). This online teacher training trend has become more evident during the COVID-19 pandemic, as these virtual sessions have transformed from an option to a necessity (Hartshorne et al., 2020). As a result, there is now “an entirely new level of urgency” for planning and participating in such sessions based on virtual platforms and communication (Lay et al., 2020, p. 2).

To that end, today’s teacher professional development has no longer become solely reliant on face-to-face interactions and has been extended to online platforms, where teachers can be together in a virtual environment, share insights and receive training from other professionals (Truong & Murray, 2020). This does not only impact teachers and help them enhance their skills; it also affects overall school practices and the community as a whole as educators discuss problems and find practical solutions (Al-Qahtani, 2019).

The virtual communicative interactions between the trainer and learners can be conducted synchronously (meeting virtually in real-time using live online sessions, active web cameras, online discussions, feedback, and interactive presentations) (Biase, 2020) or asynchronously (not meeting at the same time but communicated at different points of time according to each one’s availability) (ElSayary, 2023a; Tuong & Murray, 2020). The importance of professional development in education is highlighted when the teacher’s role in such an environment is more challenging and requires adequate skills to assist students and lead to better academic achievement (Chitiyo et al., 2019). Effective virtual communication led to teachers’ acceptance and engagement in online professional development, where they exhibited positive attitudes and motivation (Wasserman & Migdal, 2019). Some advantages of online engagement in professional development are learners’ determination of time, place, and pace of learning (Johnson & Palmer, 2015). The National Research Council (NRC) (2007) also mentioned the advantages of online professional development, including flexibility and versatility, a community of professionals, accountability, and retention.

Despite these advantages, problems occur, such as the lack of social interactions in online settings and unskilled participants using technology. Truong and Murray (2020) mentioned obstacles to online professional development that may make some teachers prefer face-to-face training, such as feeling isolated and disconnected from the world around them. Although virtual communication can reduce social anxiety, many learners feel demotivated by the lack of personalized feedback in online courses (Tuong & Murray, 2019). In addition, the NRC (2007) stated that the obstacles to online teacher professional development include lack of knowledge, support from administrators, access to technologies, time, financial and parental support, materials, support from higher education, and changes in teachers’ beliefs and practices.

Virtual training creates an opportunity for teachers to continue receiving the development they need, and this is particularly vital in specific professional development programs. Teachers need to feel more competent and have more self-efficacy, thus supporting students, enhancing their engagement, and providing suitable practices (Stadler-Heer, 2019). Making online training accessible to teachers leads to academic reform and ensures all learners receive the support they need (Wasserman & Migdal, 2019). Truong and Murray (2020) identified obstacles to online professional development to include: course features (heavy dependence on technology, isolation, lack of constructive feedback), individual differences (technology self-efficacy and self-regulation skills), and socio-cultural factors (well-established value of a model teacher). Effective communication not only enhances participants’ cognitive, social/emotional, and behavioral engagements (Borup et al., 2020) but also leads to a positive attitude towards using technology, usefulness, and ease of use (Truong & Murray, 2020). When teachers are given the right guidance on educating learners, the more experienced and trained they are, the better student learning and the more successful the classroom experience (Hills & Sessoms-Penny, 2021).

Attitudes Toward Online Professional Development

Online professional development is a mode of learning that allows participants to continue their learning via information communication media without the need to meet their instructors in person (Rogers, 2001). Positive attitudes toward using technology greatly influence the continuation of online professional development (PD). Attitude is defined as an individual’s feeling (ranging from a positive value to negative

prejudice) toward a person, group, object, or concept (Kazdin, 2000). Teachers' attitudes are considered a factor in their participation and engagement in professional development (ElSayary, 2023b; Torff, 2018). Previous studies categorized teachers' attitudes into four main aspects: importance and usefulness, benefits, enjoyment, and behavior engagement (Stan et al., 2013; Torff & Byrnes, 2011; Truong & Murray, 2020). It was stated that the more experienced teachers, mainly those who teach higher grades, are not highly engaged in PD (Truong & Murray, 2020).

Although few studies mention the teachers' attitudes and engagement in online professional development, none measured external factors such as COVID-19. Some studies reported positive results in measuring teachers' attitudes toward technology-assisted PD, such as ease of use, behavioral engagement, usefulness, anxiety, and affection (Kao et al., 2014; Wasserman & Migdal, 2019). Other positive results were reported in a previous study that measured teachers' evaluation components of online PD to include course effectiveness, learning environment, attitudes toward technology use, and course assignments (Wasserman & Migdal, 2019). Another study stated that the role of technology is essential in online PD (Truong & Murray, 2020). Furthermore, it was highlighted that teachers' confidence in technology significantly affects their attitudes toward continuing online PD (Kao et al., 2014). Conversely, some studies stated the challenges and obstacles of online PD that negatively affect teachers' attitudes. A study by Truong and Murray (2020) stated that course features, individual differences, and socio-cultural factors could negatively affect teachers' isolation, heavy dependence on technology, self-efficacy, and self-regulation. Although these studies mentioned the positives and negatives of teachers' attitudes and engagement in online PD, none of them studied the impact of COVID-19 as an external factor that might significantly influence teachers.

Theoretical Framework

The Technology Acceptance Model (TAM) proposed by Davis (1989) is a theoretical framework to explain how users accept and use technology effectively. The model suggests that users' decision to use or reject a particular technological application may be influenced by other factors such as attitudes toward technology use, usefulness, and ease of use (Davis, 1989). The model acknowledges the role of environment and external variables that led to the users' beliefs and attitudes, which indirectly influence their acceptance and engagement of using technology (Truong & Murray, 2020). The effective use of virtual communication during and after the pandemic of COVID-19 in online PD is considered an external factor that might lead to positive attitudes and engagements. As shown in Figure 1, the usefulness and ease of using technology due to external factors can lead to a positive attitude toward using technology that enhances participants' engagement.

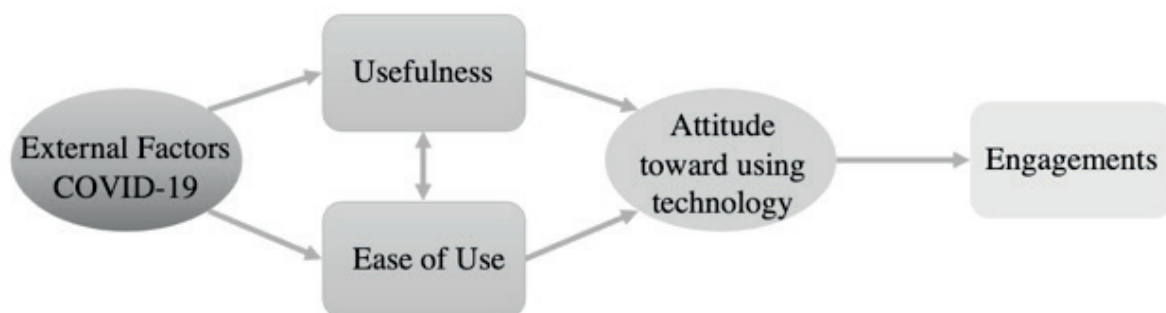


Figure 1. The developed framework used to guide the study was adapted from Technology Acceptance Model (TAM) by Davis (1989)

Other frameworks that enhance learners' engagement are also introduced. For instance, Moore's (1989) interactions (student-content, student-teacher, and student-student) were introduced to influence learners' environment in online learning. After paying attention to student-student interaction and collaboration in online learning, the Community of Inquiry (CoI) framework was introduced (Garrison et al., 2000). The

CoI framework has a significant positive impact on students within online learning. However, it has been criticized for being efficient in online learning only and not for the blended learning approach (Archer, 2010). The ACE framework is an effective framework that explains the role and interaction of relationships and personal communities in online and blended learning (Borup et al., 2020). Learners' affective, cognitive, and psychomotor engagements increase when supported by others within their zone of proximal development (Vygotsky, 1978).

Although all the previous theories were developed and used by different researchers, no framework focuses on technology acceptance by users due to the challenges and external factors faced. This study is guided by the developed framework adapted from the TAM model for the following reasons: it targets technology usage and usefulness, investigates the influence on participants' attitudes, and studies the reasons behind being engaged or disengaged from using technology, especially in online PD.

Context of the Study

Al Jalila Foundation (AJF) is a non-profit organization founded in 2013. One of its main initiatives is the Ta'alouf Inclusion Special Education Teacher Training Program which aims to train teachers, promote inclusion, and support children with special educational needs and disabilities and their parents. Sixty-three participants were drawn from 15 schools across the UAE, including teachers, school leaders, learning support assistants, social workers, and department heads.

Different virtual communication modes were conducted to enhance participants' online PD and ensure successful implementation. Participants received 24 hours of virtual training sessions on numerous topics related to inclusive education and special educational needs and disabilities, such as inclusion laws, the gifted and talented, learning difficulties, physical disabilities, intellectual disabilities, Attention Deficit Hyperactivity Disorder (ADHD), hearing/sight impairment, and Autism Spectrum Disorder (ASD).

Furthermore, AJF partnered with one of the federal higher education institutions in the country to provide each participant with three hours of virtual mentoring, and 13 faculty members from this university took part in this endeavor. Central to mentoring is keeping mentees on track with the portfolio, goal setting, confidence building, and giving participants a safe space to consider their teaching practice.

In order to attain the program certificate, participants had to present e-portfolios that included assignments related to topics covered in the training sessions. In those e-portfolios, participants were to apply what they learned within their schools, documenting their reflections and applications, and the aforementioned faculty then marked their work according to a preset rubric.

In addition, participants were to attend three 90-minute online Professional Learning Community (PLC) meetings, and the aim was to help these educators understand what research discusses about inclusion and how this research can be used as a problem-solving tool in inclusive settings. Participants were asked to set up their PLCs, discuss what they believe about inclusion and children of determination, and set realistic goals for inclusion. Finally, participants were to present a work plan for inclusive education that can be suggested and applied in their schools.

Due to the pandemic, all these aspects of the program were based on Zoom calls, Edmodo, WhatsApp, and emails; thus, all communication with the training lead, mentors, and PLC facilitator was purely virtual.

METHODS

This study employed a concurrent mixed-method approach to extend the breadth and depth of different inquiry methods (Creswell, 2014). It was suggested to collect multiple data (quantitative and qualitative) to integrate the results in order to understand the phenomenon (Johnson & Christensen, 2014). The rationale for using quantitative and qualitative data is to seek clarification of the results from one method with the results of another.

Participants

The study participants are educators with different specializations: teachers, social workers, and learning support educators working in private and governmental schools. Around 63 educators participated in the AJF program. The criteria set for the sample to participate in the study were defined as: (i) should attend the online inclusive professional development, (ii) should be in direct contact with students of determination, and (iii) should be willing to participate in the study. Accordingly, the sample size selected is n=23 from participants who met the criteria from different emirates across UAE. Table 1 mentioned the description of participants to present the gender, age group, years of experience, and current positions. Of the participants, 8.7% (2) were males and 91.3% (21) were females. For the age group, 4.35% (1) were 20-25 years, 17.39% (4) were 26-30 years, 47.38% (11) were 31-40 years, and 30.43% (7) were 41-50 years old. Regarding the years of experience, 8.7% (2) had 0-2 years, 30.43% (7) had 3-5 years, 43.48% (7) had 6-10 years, and 4.35% (1) had 16+ years of experience. Finally, it was reported that 4.35% (1) was social worker, 86.96% (20) were teachers, and 8.7% (2) were learning support educators.

Table 1. Description of the sample

Description of the sample (n=23)	Data Presented
Sample Gender	Male (8.7%; 2) Female (91.3%; 21)
Age Group	20-25 years (4.35%; 1) 26-30 years (17.39%; 4) 31-40 years (47.38%; 11) 41-50 years (30.43%; 7)
Years of Experience	0-2 years (8.7%; 2) 3-5 years (30.43%; 7) 6-10 years (43.48%; 7) 16+ years (4.35%; 1)
Positions	Social workers (4.35%; 1) Teachers (86.96%; 20) Learning support Educator (8.7%; 2)

After completing the survey, an email was sent to participants to thank them for their participation and to ask if they were willing to participate in the interview. The final sample selected for the interview was 14 participants.

Instrumentation

Teachers' Survey

A survey is used to collect quantitative data from the participants about their perceptions of virtual communication in an online inclusive professional development program. The survey consisted of two sections: demographic information and closed-ended items asking participants about their perceptions. The second section featured the following responses: 5=Strongly agree, 4=Agree, 3=Neutral, 2=Disagree, and 1=Strongly disagree. The items were distributed with codes for each type of engagement (i) cognitive (4 items), (ii) social/emotional (4 items), and (iii) behavioral (4 items) to form 12 items in total.

The survey was sent to two educational specialists in inclusion, technology, and education for content validity. They were asked to give their opinions on (i) the alignment of the instrument with the study's purpose, (ii) whether the items are appropriate to each section, (iii) the accuracy of the language used and the translation. Suggestions received from the experts were about rewording some items and removing three items. Accordingly, the final version of the survey in this study consisted of 12 items and four demographic information questions. The internal consistency coefficient (Cronbach's Alpha) was used for the reliability

test. The reliability coefficient for the sub-sections was between 0.70 and 0.88, which is considered suitable for the study. After assuring the instrument's reliability, the survey was administered to the educators through a web survey. The cognitive engagement is calculated to be $\alpha = 0.7$, social/emotional engagement ($\alpha = 0.72$), behavioral engagement ($\alpha = 0.88$), and the total items' Cronbach's Alpha is 0.90. Descriptive statistics were used to analyze the survey results, including mean and standard deviation.

Semi-structured Interview

The researchers developed the interview protocol, which comprises five semi-structured questions. The interview was conducted with open-ended questions to understand the phenomenon more deeply. The questions were sent to two educational technology and education experts to determine the face validity, clarity, and alignment with the study purpose. The experts agreed on the questions with slight changes in the language. Thus, a few changes in the language were applied accordingly, and two questions were canceled as they were not within the scope of the study. The final version of the instrument was piloted with other teachers and their positive comments were noted. According to the feedback, the total number of interview questions was three. No further changes were made to the final version. The questions aimed to explain how virtual communication impacted educators' attitudes toward usefulness and ease of using technology in an online professional development program.

Procedure

The researchers sent the consent forms to all participants at the beginning of the study, and a full explanation of the purpose was provided. The data was collected concurrently, with quantitative data from the survey and the qualitative data from the interview. The survey was designed to address the first question of the study: What are the educators' attitudes toward virtual communication in an online professional development program? The survey was sent through a web survey link. A descriptive statistic was used to present the mean and standard deviation. In addition, the researchers used the Handal et al. (2013) questionnaire score range of the means to explain the results.

Table 2. Questionnaire score range (Handal et al., 2013)

Score Range	Description
$1.0 < x < 1.5$	Very low
$1.5 < x < 2.0$	Low
$2.0 < x < 2.5$	Moderately low
$2.5 < x < 3.0$	Slightly below average
3.0	Average
$3.0 < x < 3.5$	Slightly above average
$3.5 < x < 4.0$	Moderately high
$4.0 < x < 4.5$	High
$4.5 < x < 5.0$	Very high

The semi-structured interview was conducted simultaneously to address the study's second question: How do using technology and the usefulness of topics influence participants' engagement in an online professional development program? Interviews were held for 30 – 40 minutes, with an average interview time of 35 minutes. The results were analyzed using the phenomenological approach to describe the teachers' experiences using virtual communication and how it impacted their learning.

The results of both data were represented separately and merged in the discussion section to fulfill the study's main purpose, which is to investigate the effective use of virtual communication in enhancing educators' engagement in an online inclusive professional development program.

RESULTS

Teachers' Survey Results

The survey was conducted at the end of the workshop to understand the educators' perceptions of using virtual communication in an online inclusive professional development program. The survey data is categorized based on the framework of the study to include cognitive, social/emotional, and behavioral engagements. Figure 2 shows a comparison between the means of the categories. The mean score for cognitive engagement (mean=4.66), social/emotional engagement (mean=4.63), and behavioral engagement (mean=4.60) are considered to be very high, according to the Handal et al. (2013) scale.

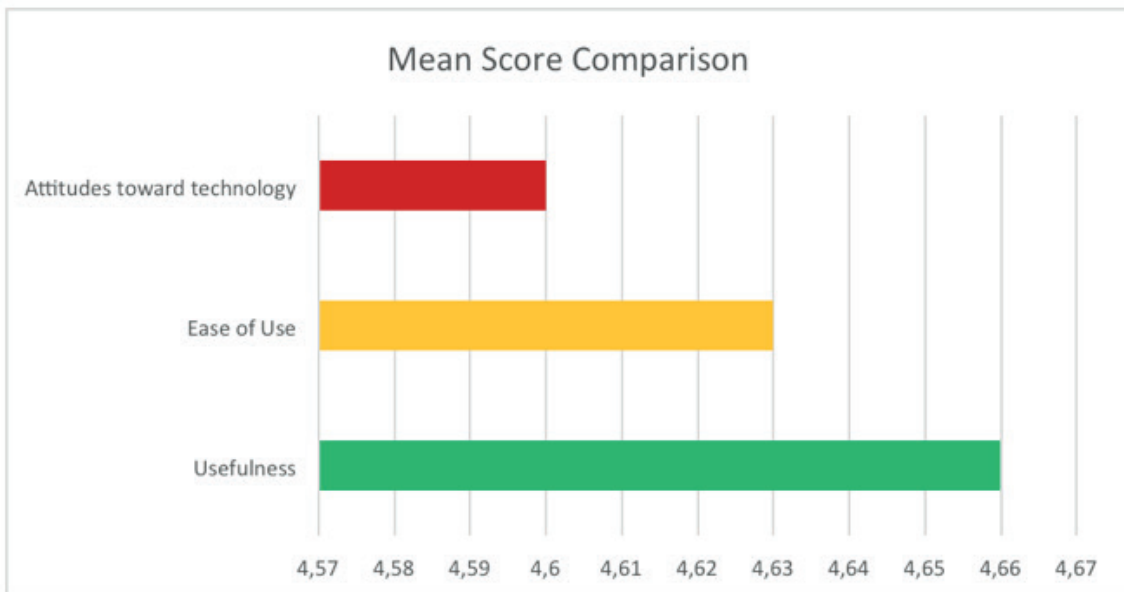


Figure 2. Comparison between the means of the Attitudes toward technology use, Usefulness, and Ease of use

The survey results are analyzed and categorized in Table 3 for the attitudes toward technology. The results show that the mean scores of all items are considered to be very high according to the Handal et al. (2013) questionnaire score range. However, the item related to teachers' confidence to teach (or manage) learners with learning difficulties and disabilities in their classes shows a mean=4.43 which is high but considered lower than other items. In addition, the same item shows 8.70% disagreement about it, with a high standard deviation of 0.662. Another item about their preparedness to support special education needs children shows a disagreement of 4.35% in educators' responses.

Table 3. The mean and standard deviation of the Attitudes toward technology

ATTITUDES TOWARD TECHNOLOGY	N	Mean	Std. Dev.
The platform provided online materials and resources that prepared me to support learners	23	4.60	.583
The virtual communication with my trainer supported me to enhance my teaching methods to accommodate all learners' needs	23	4.69	.470
The online PD helped me to teach (or manage) learners with learning difficulties and disabilities in my class	23	4.43	.662
Through my engagement in online PD, I am prepared to create a positive classroom environment for all learners either online, blended, or face-to-face	23	4.69	.470

The survey results are analyzed and categorized in Table 4 for usefulness. The results show that the mean scores of all items are considered to be very high according to the Handal et al. (2013) questionnaire score range. However, the highest standard deviation is shown in the second item about teachers' belief that all teachers are responsible for inclusive education in schools.

Table 4. The mean and standard deviation of the Usefulness

USEFULNESS	N	MEAN	STD. DEV.
I have learnt a lot from participating in the Al Jalila Foundation program on inclusive education	23	4.69	.470
I believe that all teachers are responsible for online professional development that include topics such as inclusive education in schools	23	4.60	.722
I think the Al Jalila Foundation project (online PD) helped me to professionally develop teaching strategies about diversity and inclusion is my professional responsibility	23	4.69	.470
The Al Jalila Foundation project (online PD) helped me learn more about inclusive and special education	23	4.69	.470

The survey results are analyzed and categorized in Table 5 for ease of use. The results show that the mean scores of all items are considered to be very high according to the Handal et al. (2013) questionnaire score range. However, the item related to teachers' belief about working collaboratively with other stakeholders to meet the diverse needs of learners shows a mean=4.43, which is high but considered lower than other items. In addition, the same item shows 4.35% disagreement about it with a high standard deviation of .589.

Table 5. The mean and standard deviation of the Ease of use

EASE OF USE	N	Mean	Std. Dev.
The Edmodo platform which was used is user friendly and appropriate for the project	23	4.78	.421
I believe I can work collaboratively with other stakeholders online to meet the diverse needs of learners	23	4.43	.589
I feel that I learnt a lot from my engagement (advising, support, meeting) with my mentor	23	4.69	.470
I had effective communication with my mentor using different ICT tools (WhatsApp, Zoom, email, phone calls)	23	4.65	.486

Educators' Interview Results

Q1: Comment on the Usefulness of Technology Used in the AJF Program, such as: Edmodo, Zoom Classes, Emails, Whatsapp, Etc) Used in the AJF Program

Mentees confirmed that sessions they had using Zoom were interactive in synchronous sessions because the program facilitator used breakout rooms and encouraged participants to have discussions. In addition, they commented on the importance of live discussion.

Mentee 1: "I found the live online sessions very beneficial. In addition, all of Dr X's lectures and self-seminars were very engaging."

Mentee 2: "We were meeting here on Zoom, which was really easy for all of us. It was easy, really, and Dr X used to encourage us to write on the chat. She used to put us in groups using Zoom, which was great. We met with mentees from other schools and discussed opinions and experiences; it was really good."

Mentee 3: "We had fantastic Zoom meetings. I never had any problem with WhatsApp communication, and I used to have discussions with my mentees in Zoom sessions that we had. The technology was spot on."

Mentee 4: "Being with us in the individual meetings, asking us and discussing with us. I mean you know when you discuss something is much better than you only giving information without talking or giving a chance for discussions. You know it is like when you give a student a huge amount of information while the students' brain had enough and won't understand anything new from you."

These views differ from another mentee who felt that the Edmodo platform could have been used more effectively.

Mentee 5: "There was a need to have more interactions rather than having Edmodo for uploading documents."

Q2: To what Extent has the Virtual Communication Experience in the AJF Program Prepared You to Teach and Manage Students with Learning Difficulties and Disabilities?

Mentees who participated in this study stated that they are well-prepared and have learned from each other during their experience in the AJF program. This allowed them to learn more about inclusive education topics. Most mentors created a WhatsApp group to help mentees communicate quickly and easily. One of the mentees pinpointed the importance of the WhatsApp group in sharing concerns, questions, and inquiries. Some of the responses are stated below:

Mentee 1: "As an educator, I have a practical experience in inclusive education. However, reading about inclusive education topics enabled me to learn more about these topics."

Mentee 2: "The WhatsApp group helped provide extra materials, especially when we post any question on the group. In addition, we received videos, and there are things that I benefited from as I was reading before our next session."

Other mentees supported these views and emphasized the important use of the WhatsApp group in reminding them of the due dates and responding to their questions and inquiries posted.

Mentee 3 added: "I am happy to be part of this program. The mentor made it easy for us because my experience in teaching is like only two years."

Another mentee mentioned the importance of understanding others' points of view.

Mentee 4: "The positive thing is the fact that I could hear from others' point of view about different challenges they faced in their classes."

Mentees assisted and supported each other whenever something related to the language or the template used for the portfolio.

Q3: What are Your Experiences (Challenges and Ease of Use) of Participating Virtually in the AJF Inclusive Education Professional Development Program?

Except for only two participants in this study, the rest confirmed that the learning platform used in the program, Edmodo, was very effective, easy to use, and user-friendly. They reported that it was effective mainly because it was easy for them to access the content. Some mentees reported no challenges using the platform, and one of the mentees explained why others might find it challenging.

Mentee 1: “The Edmodo, I have used it before in my previous schools. However, we used it on a bigger scale for the students and teacher interaction. So, I am well aware of the Edmodo platform, and it was not a problem at all. It was a cakewalk as I could access content easily.”

Mentee 2: “The technology was superb, I think. It was nice. Edmodo was straightforward to use. It was very easy to access; you knew where everything was. That one platform we were using was enough, and it was easily accessible; it was not a problem. Everything was there labelled and organized properly. So, it was not a problem regarding the technology.”

Mentee 3: “Edmodo is very easy to use and was excellent. I could download and print all the documents related to the program or, I could save all the information into a folder on my desktop. Whenever Dr X posted something new, I downloaded and kept in in a specific folder I made for the Program.”

Mentee 4: “Actually, I like the platform we used to send the messages and course materials. I was using it for the first time, but it was very easy for me to find everything there. I really liked it.”

Mentee 5 who used the platform for the first time said: “It was my first time that I used Edmodo. Edmodo is a very good platform and very useful I found it. Everything was categorized in a very proper manner, very easy to use, very user-friendly. Furthermore, I did not face any difficulties over there. We were being taught, not taught, but we were being briefed about how to use Edmodo and how to access the portfolios and the handouts and everything and uh, it was a very useful app, yes.”

Mentee 6: “It [Edmodo] is excellent and very user friendly. In the beginning, we did not have any idea because it was very new to us. The instructor explained in the beginning and showed us how to use it; we used it when she was teaching. We also used it to upload everything; it was excellent.”

DISCUSSION

The results show that cognitive engagement had the highest agreement in the mentees’ survey. Their agreement follows this in social/emotional engagement. On the other hand, behavioral engagement is considered the lowest in their agreements. This is supported by a study by Broup et al. (2020), who stated that cognitive engagement is considered the highest in students’ online learning. The following sections answer the study’s research questions, highlighting the three types of engagement within each category.

Educators’ Perceptions of Using Virtual Communication

All mentees felt that teaching about diversity and inclusion is their professional responsibility. However, mentees’ responses about their beliefs that all teachers are responsible for inclusive education in schools are inconsistent. This is supported by the interview results, where there was inconsistency in the mentees’ responses about whether or not Edmodo was used effectively, and if there was interactivity in using it. They added that it could have been utilized better as a learning platform, not only by sharing documents. A study by Baeva (2013) stated that virtual communication facilitated the transmission of knowledge in virtualized and digital forms. Conversely, mentees highlighted the importance of Zoom live sessions, allowing them to ask questions and discuss topics in more depth with their mentors. This is supported by the survey results, which mentioned that they had learned much in this program through the synchronous sessions. Previous researchers emphasized the importance of virtual communication, where educators can meet to share insights, discuss topics and problems, and find practical solutions (Matzat, 2013; Vrasidas & Zembylas, 2004).

All mentees believed the Edmodo platform was user-friendly and appropriate for the project. However, some mentees highlighted that it was used only for sharing documents without interactivity. They also believed that they could work collaboratively with other stakeholders to meet the diverse needs of learners through effective communication tools such as WhatsApp, Zoom, emails, and phone calls. However, a few mentees disagreed on the same point. During the interviews, the mentees emphasized that they were keen to understand others’ views about their experiences in inclusive education. This is emphasized by other researchers who pointed out that virtual communication provides a flexible milieu for learning and provides participants with a chance to network and collaborate with other individuals in the field (Darling-Hammond et al., 2017; Lay et al., 2020; Vrasidas & Zembylas, 2004). Some mentees mentioned that they

were new to teaching and had 0-2 years of teaching experience; they were satisfied with the support and coaching received from their mentors. Jørgensen and Orngreen (2017) emphasized that the online training accessible to teachers leads to academic reform and ensures that all learners receive the support they need.

Most mentees agreed that they are prepared to support children with special education needs. However, the minority disagreed about the same point. Also, most mentees felt confident in teaching or managing learners with learning difficulties and disabilities in their classes. Previous studies mentioned that virtual training in inclusive professional development programs allows teachers to be more competent, develop their self-efficacy, and provide special needs students with suitable practices (Marin, 2014; Stadler-Heer, 2019). However, it was mentioned in the interview that a minority of mentees felt that they were not prepared and did not feel confident to support and manage children with special education needs. It is important to understand that mentors should understand that teachers have diverse needs, exactly like students, and it is important to understand how to meet their needs while educating them. It was mentioned in previous studies that when teachers are given the right guidance on educating learners with special needs, the more experienced and trained they are, the better student learning is and the more successful the classroom experience becomes (Hills & Sessoms-Penny, 2021, Roberts & Simpson, 2016).

The Use of Virtual Communication in Enhancing Learners' Attitudes Toward Technology, Usefulness, and Ease of Use

Regarding attitudes toward technology use, all mentees agreed that they could change their teaching methods and accommodate learners with special education needs. They were also prepared to create a positive classroom environment for all learners. This is in agreement with a previous study that stated instructors could facilitate learners' positive attitudes and engagements through following up, monitoring who missed the class, announcements, reminders about due dates, and reaching out to help learners who do not submit their work on time (Meda & ElSayary, 2021). In the interviews, mentees emphasized the easy use and access of the Edmodo platform. Some mentees stated that they are prepared to support children with special education needs, while the minority disagreed with this statement. Various researchers emphasized that this impacts teachers, helps them enhance their skills, affects overall school practices, and the community as educators discuss problems and find practical solutions (Matzat, 2013; Vrasidas & Zembylas, 2004). Some teachers also mentioned that they were confident teaching (or managing) learners with learning difficulties and disabilities in class, while the minority disagreed. Kaur (2019) emphasized educators' commitment to understanding students' differences, sharing knowledge with peers, and pinpointing the right strategies to use with children with different needs. Educators have achieved this goal through their online professional development program training.

Regarding usefulness, all mentees agreed they had learned much from participating in the AJF program, where they engaged in synchronous discussion sessions. Baeva (2013) emphasized that virtual live communication has facilitated the transmission of knowledge in virtualized and digital forms. This is also highlighted in the interviews with them. All mentees believed that the AJF project taught them more about inclusive and special education, where they now felt responsible for inclusive education in their schools. As mentioned in the interview, this occurred due to their engagement with their mentors in live online sessions through Zoom. This is aligned with Borup et al. (2020), who emphasized the important role of instructors in providing appropriate scaffolding, using effective media, apps, and teaching resources, asking open-ended engaging questions that enhance students' curiosity, and raising expectations about students' engagement in discussions. The interactivity they received in these sessions was beneficial, as there were discussions between mentors and mentees. Many researchers highlighted that the diverse communication tools allow participants to have an effective learning experience using their devices regardless of location (Agarwal et al., 2021; ElSayary, 2023a; Llerena-Izquierdo & Valverde-Macias, 2021).

For ease of use, all mentees agreed they had learned much from their engagement with their mentors. Interesting results were highlighted during the interview with the mentees, where they mentioned that they have learned from each other and their mentors, especially while using the WhatsApp groups. A study by Hartshorne et al. (2020) pointed out that the online teacher training trend has become more evident during the COVID-19 pandemic, as these virtual sessions have transformed themselves from an option to a necessity. Furthermore, all mentees agreed that using different virtual communication tools such as

WhatsApp, Zoom, email, and phone calls was easy and effectively enhanced their learning. This agrees with previous studies highlighting that learners who do not receive adequate communication can feel isolated and disconnected from the course (Garrison et al., 2020; Symeonides & Childs, 2015). This is also supported by mentees' responses in the interview, where they highlighted that the tools used for communication were fast, easy, and effective, especially the use of WhatsApp groups created by mentors for their mentees. The different tools used allowed educators to be engaged in advising, support, and meeting sessions with their mentors and peers. This aligns with previous studies that stated that mobile learning as a teaching and coaching methodology became helpful for both private and public organizations (ElSayary, 2023b; Bondarenko et al., 2018; Llerena & Ayala-Carabajo, 2020).

CONCLUSION AND RECOMMENDATIONS

This study aims to investigate the impact of the effective use of virtual communication on an online professional development program through the lens of teachers' attitudes. The study results revealed teachers' positive attitudes toward using technology due to its ease of use and the usefulness of the topics presented. This led to being engaged and continuing to develop professionally. The online professional development program was conducted by the AJF during the quarantine of COVID-19 to present topics related to inclusive education. Educators felt that the program was useful by being involved in discussions, asking questions, watching real-life classroom videos, etc., through different tools such as Edmodo, WhatsApp, Zoom, emails, and phone calls. The ease of use was explained in communication with their mentors and peers through WhatsApp as a fast and quick tool. In addition, the synchronous and asynchronous sessions were where educators were involved in enhancing their engagement and learning. Finally, they had a positive attitude toward the use of technology in implementing what they had learned in their classrooms. They provided examples of their work as evidence of their positive attitudes, engagement, and active learning.

One of the limitations of this study is the need to interview mentors to gain in-depth insight into the effectiveness of the online inclusive program from mentors' perspectives. It is highly recommended to consider the mentors' perceptions and practices in future studies where data triangulation will clarify the way of mentoring and coaching. In addition, the mentees' portfolio analysis could be an additional tool that will add another lens to the study, which can be considered in future studies. It is also recommended to evaluate the mentees' reflections and try to understand the level of reflection they showed in their portfolio due to its positive impact on their learning and engagement. Another study limitation is the low number of participants, as the results cannot be generalized to the whole population. It is recommended to repeat the study with a large number of participants. In addition, it would also be preferable to include more male teachers in the study as this study had a limited number of male participants.

BIODATA AND CONTACT ADDRESSES OF AUTHORS



Dr. Areej ELSAYARY is an Assistant Professor at the College of Interdisciplinary Studies at Zayed University. Dr. Areej gained her Ph.D. in Educational Management, Leadership, and Policy in September 2018. Her academic interest areas are learning technology, STEM Education, Interdisciplinary Approaches, students' competence, open and distance learning, education innovation and sustainability, e-learning, cyber behaviors, and internet use in education. She has more than 17 journal articles published in international indexes, 1 edited book, eight international book chapters, and 10 national and international articles papers submitted to international meetings and conferences.

Areej ELSAYARY
College of Interdisciplinary Studies
Address: Zayed University, 144534, Abu Dhabi, United Arab Emirates
Phone: +971551139740
E-mail: areej.elsayary@zu.ac.ae



Dr. Lawrence MEDA holds a PhD in Curriculum Studies and is currently working as an Associate Professor and Director of Research at Sharjah Education Academy (SEA) in the United Arab Emirates. Prior to joining SEA, he worked as a Chair of the Education Studies Department at Zayed University in Dubai. He is a certified online instructor. He has numerous publications to his name and has experience of supervising Masters and Doctoral Students. He has externally examined more than 20 postgraduate theses and his research interests are in Curriculum Studies, Inclusive Education and Teacher Education.

Lawrence MEDA
Associate Professor and Director of Research.
Address: University City, 1655, Sharjah, United Arab Emirates
Phone: +97165062341
E-mail: lmeda@sea.ac.ae



Dr. Suha KARAKI is a Senior Instructor at the College of Interdisciplinary Studies, at Zayed University, Dubai. Dr. Karaki received her PhD in Special Education and Inclusion from the British University in Dubai, with thesis focus on positive education and students with special educational needs and disabilities in higher education. She also holds an MA in Education (TESOL) and a BA in Communication Arts (Journalism) from the Lebanese American University in Beirut, Lebanon. Suha is bilingual in Arabic and English and has 20 years of experience in the fields of: education, public speaking, public relations, Arabic, translation, and journalism.

Suha KARAKI
College of Interdisciplinary Studies
Address: Zayed University, 19282, Dubai, United Arab Emirates
Phone: +971557727393
E-mail: suha.karaki@zu.ac.ae



Dr. Laila MOHEBI holds a Ph.D. in Education Management, Leadership, and Policy from the British University in Dubai, 2018. She is currently working as an Assistant Professor in the Department of Education Studies at the College of Humanities and Social Sciences, Zayed University, UAE. Laila Mohebi's research interest is mostly related to teacher education, teacher candidate feedback after teaching, early childhood education, field experience and technology, pedagogy, and content knowledge (TPACK).

Laila MOHEBI
College of Humanities and Social Sciences
Address: Zayed University, 19282, Dubai, United Arab Emirates
Phone: +971544021566
E-mail: laila.mohebi@zu.ac.ae

REFERENCES

- Al-Qahtani, M. H. (2019). Teachers' and Students' Perceptions of Virtual Classes and the Effectiveness of Virtual Classes in Enhancing Communication Skills. *Arab World English Journal, Special Issue: The Dynamics of EFL in Saudi Arabia*, 223-240. <https://dx.doi.org/10.24093/awej/eff1.16>
- Agarwal, A., Sharma, S., Kumar, V., & Kaur, M. (2021). Effect of e-learning on public health and environment during COVID-19 lockdown. *Big Data Min. Anal.*, 4, 104-115. <https://doi.org/10.26599/bdma.2020.9020014>
- Anderson, A.H., McEwan, R., Bal, J., & Carletta J. (2007). Virtual team meetings: An analysis of communication and context. *Computers in Human Behavior*, 23(5), 2558-80.
- Archer, W. (2010). Beyond online discussions: Extending the community of inquiry framework to entire courses. *The Internet and Higher Education*, 13(1-2), 69. <https://doi.org/10.1016/j.iheduc.2009.10.005>
- Baeva, L. V. (2016). Virtual Communication. *International Journal of Technoethics*, 7(1), 51-61.
- Baeva, L. V. (2013). Electronic culture: Experience of philosophical analysis. *Issues of Philosophy*, 5, 75-83.
- Biase, A.D. (2021). Student engagement in distance learning environment: the experience of language certification preparation courses during the Coronavirus pandemic. Proceedings of the First Workshop on Technology Enhanced Learning Environments for Blended Education (teleXbe2021), January 21-22, 2021, Foggia, Italy.
- Bodalev, A. A. (Ed.). (2011). Psychology of communication. Encyclopedic dictionary. Moscow: Kogito-Centre.
- Bondarenko, O.V., Mantulenko, S.V., & Pikilnyak, A.V. (2018). Google classroom as a tool of support of blended learning for geography students. *CEUR Workshop Proc.*, 2257, 182-191. <https://doi.org/10.31812/pedag.v51i0.3671>
- Borup, J., Graham, C. R., West, R. E., Archambault, L., & Spring, K. (2020). Academic Communities of Engagement: An expansive lens for examining support structures in blended and online learning. *Educational Technology Research & Development*, 68(2), 807-832. <https://doi.org/10.1007/s11423-020-09744-x> [prepublication version: <https://www.academia.edu/42912983>]
- Chitiyo, M., Kumudzro, F. K., Hughes, E. M., & Ahmed, S. (2019). Teachers' professional development needs regarding inclusive education in Ghana. *International Journal of Whole Schooling*, 15(2), 53-79.
- Darling-Hammond, L., Hyler, M. E., & Gardner, M. (2017). Effective Teacher Professional Development. Palo Alto, CA: Learning Policy Institute.
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319-339.
- ElSayary, A. (2023a). Students' Active Engagement in Online Learning. In ElSayary, A. & Olowoselu, A. (Eds.). (2023). *Overcoming challenges in online learning : perspectives from asia and africa* (pp.97-106). Routledge. <https://doi.org/10.4324/9781003342335-12>
- ElSayary, A. (2023b). Using Interactive Technology to Enable Interactive E-learning Environment. In ElSayary, A. & Olowoselu, A. (Eds.). (2023). *Overcoming challenges in online learning : perspectives from asia and africa* (pp.145-150). Routledge. <https://doi.org/10.4324/9781003342335-17>
- Garrison, D. R., Anderson, T., & Archer, W. (2000). Critical inquiry in a text-based environment: Computer conferencing in higher education. *The Internet and Higher Education*, 2(2-3), 87-105. [https://doi.org/10.1016/S1096-7516\(00\)00016-6](https://doi.org/10.1016/S1096-7516(00)00016-6)
- Hartshorne, R., Baumgartner, E., Kaplan-Rakowski, R., Mouza, C., & Ferdig, R. E. (2020). Special issue editorial: Preservice and inservice professional development during the COVID-19 pandemic. *J. Technol. Teach. Educ.*, 28, 137-147.

- Hills, D.C., & Sessoms-Penny, S. (2021). Pre-service professional development for inclusion teachers. *Research in Higher Education*, 40, 1-17.
- Jørgensen, A. N., & Orngreen, R. (2017). The Organizational Implementation of Online Teacher Professional Development. In Congress of the Nordic Educational Research Association (NERA): Learning and education - material conditions and consequences, 1st ed., Vol. 1, p. 721. Copenhagen: Nordic Educational Research Association, NERA.
- Kao, C.-P., Tsai, C.-C., & Shih, M. (2014). Development of a survey to measure self-efficacy and attitudes toward web-based professional development among elementary school teachers. *Educational Technology & Society*, 17(4), 302-315.
- Kazdin, A. E. (2000). *Encyclopedia of Psychology*. Washington, D.C.: American Psychological Association.
- Lay, C., Allman, B., Cutri, R., & Kimmons, R. (2020). Examining a Decade of Research in Online Teacher Professional Development. *Frontiers in Education*, 5, 1-10.
- Llerena, J., & Ayala-Carabajo, R. (2020). Significant learning activities (ASA) in the modality of face-to-face studies with integration of virtual educational media in engineering careers. In Proceedings of the 15th Latin American Conference on Learning Technologies, LACLO, 2020, pp. 1-9. <https://doi.org/10.1109/LACLO50806.2020.9381134>
- Llerena-Izquierdo, J., & Valverde-Macias, A. (2021). Google Classroom as a blended learning and M-learning strategy for training representatives of the student federation of the Salesian Polytechnic University (Guayaquil, Ecuador). *Adv. Intell. Syst. Comput.*, 1273, 391-401. https://doi.org/10.1007/978-3-030-59194-6_32
- Meda, L., & ElSayary, A. (2021). Establishing Social, Cognitive and Teacher Presences During Emergency Remote Teaching: Reflections of Certified Online Instructors in the United Arab Emirates. *Contemporary Educational Technology*, 13(4), ep318. <https://doi.org/10.30935/cedtech/11073>
- Moore, M. G. (1989). Three types of interaction [Editorial]. *American Journal of Distance Education*, 3(2), 1-7. <https://doi.org/10.1080/08923648909526659>
- National Research Council. (2007). *Enhancing Professional Development for Teachers: Potential Uses of Information Technology: Report of a Workshop*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/11995>.
- Pokhrel, S., & Chhetri, R. (2021). A Literature Review on Impact of COVID-19 Pandemic on Teaching and Learning. *Higher Education for the Future*, 8(1), 133-141. <https://doi.org/10.1177/2347631120983481>
- Rogers, P. (2001). Traditions to transformations: The forced evolution of higher education. *Educational Technology Review*, 9(1), 47-60.
- Roberts, J., & Simpson, K. (2016). A review of research into stakeholder perspectives on inclusion of students with autism in mainstream schools. *International Journal of Inclusive Education*, 20(10), 1084-1096.
- Stadler-Heer, S. (2019). Inclusion. *ELT Journal*, 73(2), 219-222.
- Stan, S. A., Stancovici, V., & Palo, R. (2013). Teachers' attitude towards continuous professional training. *Procedia*, 84, 1722-1726.
- Symeonides, R., & Childs, C. (2015). The personal experience of online learning: An interpretative phenomenological analysis. *Computers in Human Behavior*, 51, 539-545. <https://doi.org/10.1016/j.chb.2015.05.015>
- Torff, B. (2018). Developmental changes in teachers' attitudes about professional development. In D. Polly, M. Putman, T. M. Petty, & A. J. Good (Eds.), *Innovative practices in teacher preparation and graduate-level teacher education programs* (pp. 450- 463). U.S: IGI Global.
- Torff, B., & Byrnes, K. (2011). Differences across academic subjects in teachers' attitudes about professional development. *The Educational Forum*, 75(1), 914-924.

- Truong, M.T., & Murray, J. (2020). Understanding Obstacles to Online Professional Development through the Lens of EFL Teachers' Attitudes: A Qualitative Study in Vietnam Context. *Computer-Assisted Language Learning Electronic Journal*, 21(3), 23-40.
- UAE Vision 2021. (2009). Vision 2021: United in Ambition and Determination. Abu Dhabi: United Arab Emirates. Available at: <http://www.vision2021.ae> [Accessed 11 January 2016].
- UAE National Committee on SDGs. (2017). UAE and the 2030 Agenda for Sustainable Development: Excellence In Implementation. Available at: https://sustainabledevelopment.un.org/content/documents/20161UAE_SDGs_Report_Full_English.pdf
- Vrasidas, C., & Zembylas, M. (2004). Online professional development: lessons from the field. *Education & Training*, 46(6/7), 326-334.
- Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.
- Wasserman, E., & Migdal, R. (2019). Professional development: Teachers' attitudes in online and traditional training course. *Online Learning*, 23(1), 132-143. doi: 10.24059/olj.v23i1.1299

HOW DO HIGHER EDUCATION INSTITUTIONS OFFER ONLINE COURSES FOR ON-CAMPUS STUDENTS? PULL AND PUSH FACTORS INFLUENCING THEIR DECISIONS

Dr. Aysin Gaye USTUN

ORCID: 0000-0001-9564-0761
Department of Computer Technology
Sinop University
Sinop, TURKIYE

Dr. Engin KURSUN

ORCID: 0000-0002-5649-8595
Department of Computer Education and Instructional Technology
Ataturk University
Erzurum, TURKIYE

Dr. Halil KAYADUMAN

ORCID:0000-0001-5316-1893
Distance Education Application and Research Center
Inonu University
Malatya, TURKIYE

Received: 15/09/2022 **Accepted:** 24/05/2023

ABSTRACT

The purpose of this study is to reveal the pull and push factors that influence the decisions of administrators and practitioners about online courses offered to students on campus in terms of teaching-learning, course content procurement, and assessment-evaluation dimensions. The study was carried out using nested multi-case studies as a qualitative research method. The sample of the study consisted of four Distance Education Centers (DEC) with at least five years of experience, selected by the snowball and maximum variation sampling methods. The data were obtained using individual semi-structured interviews, institution documents, and Learning Management Systems (LMS), with 24 people working as administrators, content development specialists, program coordinators, and IT specialists at these institutions. It was found that factors like the interaction between students and teachers, legislation, budget, human resources, and organized structuring helped the DECs decide which models to use in the teaching-learning, course content procurement, and assessment-evaluation dimensions.

Keywords: Blended learning, decision-making factors, online courses for on-campus students, distance education, administrative factors.

INTRODUCTION

Today, rapid developments in science and technology have affected the field of education and our daily lives, and education and training activities have started to be carried out via online media and in conventional classrooms. In recent years, educational institutions have become interested in incorporating the positive aspects of conventional and online classes into the teaching process. With this interest, Blended Learning (BL) has come to the fore in educational sciences (Rasheed et al., 2020). BL is an adaptive and dynamic system combining technology-mediated learning with face-to-face learning (Wang et al., 2015). There are different models of BL depending on the weight given to face-to-face and online practices in the teaching-

learning process. There are four different models under the BL approach among the face-to-face and online learning approaches: rotation, flex, a la carte, and enriched virtual models (Christensen et al., 2013).

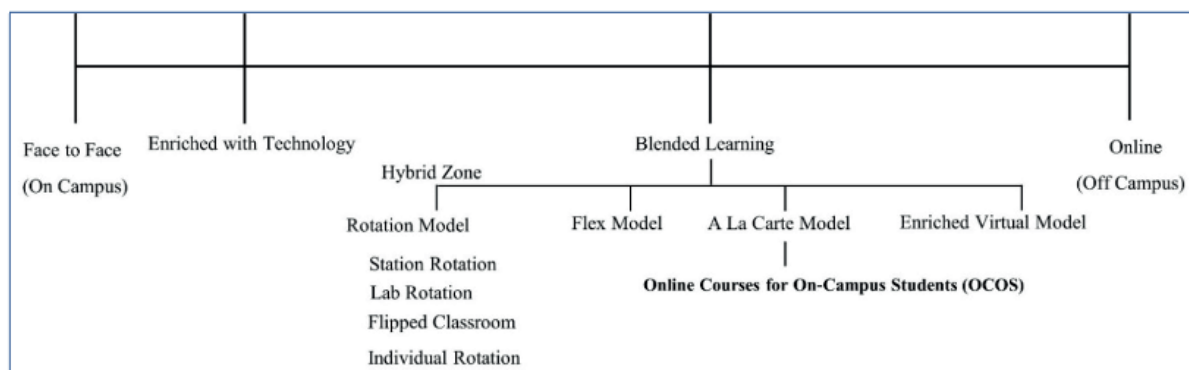


Figure 1. Blended Learning Models Spectrum (Adapted from Christensen et al. (2013) & Aydin (2019))

In the à la carte model, students take one or some of the courses online while taking the other courses in the program face-to-face. The legislation published by the Turkish Council of Higher Education (CHE) in 2013 has paved the way for the compulsory courses given under the name “Common Courses” in the curricula of all higher education institutions and delivered face-to-face (Ataturk’s Principles and History of Revolution, Turkish Philology, Foreign Language, and Basic Information Technologies) to be given with BL. These courses, which started to be taught via BL, are referred to as “Online Courses for On-Campus Students (OCOS)” by the researchers in this study. While students come together with instructors and other students taking the course online for OCOSs, they meet face-to-face for other courses. In this context, it is seen that OCOSs are suitable for the à la carte model of BL. To clarify the place of OCOSs in BL models further, the spectrum in Figure 1 was developed using Aydin’s (2019) spectrum on face-to-face and online education practices and the BL spectrum developed by Christensen et al. (2013). In the legislation developed by CHE, the distance education process has been standardized at higher education institutions. With this development, Distance Education Centers (DECs) have started to be established within higher education institutions. The task of these centers is to plan and conduct distance education activities supported by information technologies and focused on online learning. With the introduction of online courses given via BL, the number of higher education institutions with DEC in Türkiye has increased rapidly, rising to 123 in 2019 (Ustun, 2020). During the COVID-19 pandemic, DECs were established at all higher education institutions, and distance education practices became mandatory. After the onset of the pandemic, the importance of BL at higher education institutions was understood. In the legislation published by CHE, it is stated that 40% of the courses in the curricula could be given via BL (CHE, 2020).

This legislation encourages higher education institutions to offer OCOS. However, the lack of clarity in the legislation (Gunduz et al., 2020) has led institutions to implement different models. This study aims to identify the different models that DECs practice when offering OCOS and the factors that influence their decision-making processes. It is thought that these factors will guide DECs that will start offering OCOSs in choosing the most appropriate model and provide ideas to institutions currently implementing OCOSs to improve their processes. This study is especially important in terms of helping with the planning, development, and execution of BL, which is expected to become widespread in higher education institutions after the COVID-19 pandemic.

LITERATURE REVIEW

With technological advancements and an increase in individual learning orientation, the BL approach, which combines various face-to-face and online education models, has begun to be used extensively at higher education institutions. The characteristics of BL, such as providing flexible and individual learning, increasing motivation, offering various teaching approaches, accessibility of all content (Saltan, 2016), and

time savings (Warren et al., 2021), have made it preferable among students. However, in BL, students may run into problems like not being able to communicate well, not getting answers to their questions right away (Saltan, 2016), feeling alone, and not being able to manage their time (Siraj & Maskari, 2019). Another group affected by the intensive use of BL at higher education institutions has been instructors. Technical and pedagogical support provided to faculty members, adequate technical infrastructure, rewards, and incentives (Bokolo, 2022) facilitate their adaptation. On the other hand, faculty members who experienced a rapid transition from face-to-face education to BL are reluctant to learn new technology, show resistance (Hung & Chou, 2015), and display lack self-confidence (Lightner & Lightner-Laws, 2016). Factors such as the high number of students in classrooms, increasing workload, the inability to receive feedback from students, the inadequacy of support services, and the changing roles of instructors in BL (Gurer et al., 2016) are effective in increasing the resistance of the instructors to BL. Institutions paying attention to these factors while making strategic decisions can eliminate such problems.

It is thought that the prejudices and resistance of students and instructors against BL can be broken through administrative processes that are carried out in a planned manner. Accordingly, one of the greatest responsibilities falls upon the administrators of the institution. Therefore, the administrative process should start by raising awareness of the benefits and necessity of BL among students, faculty members, and other stakeholders (Garrison & Vaughan, 2013). The administrative staff, working with reliable experts on BL can effectively raise this awareness. Instructional designers, content development specialists, IT staff, curriculum coordinators, and administrative officers collaborate in many tasks throughout the process, such as designing courses and deciding on how they will be taught, purchasing and using the technologies needed, enrolling the students in the courses, providing support services to the students, and carrying out the assessment and evaluation processes (Williams, 2003). For this reason, the decision-making strategies of administrators and practitioners together in the process of the successful execution of BL may prevent many steps from being skipped.

The capacity of DEC's to have strategic planning at the administrative level might be related to the 'belief of the administrators that BL is beneficial. Administrators with this belief initiate policies that support the growth of the BL approach (Ghazal et al., 2018) by providing access to course content, flexible learning, and cost-effective online learning platforms (Dakduk et al., 2018). Factors such as decision-making strategies, institutional structure, culture, resource support, technology cost, human resources, and ethical considerations are effective in the policy development process (Bokolo et al., 2020; Tamim, 2018). It is thought that if administrators who want to make BL prevalent take these things into account, they can make sure DEC's meet certain quality standards.

Considering the literature on OCOS, it is clear that studies on this topic are primarily focused on students (Kirmaci & Acar, 2018; Oztas & Kilinc, 2017) and instructors (Gurer et al., 2016; Kapucu & Adnan, 2018). However, there is not enough focus on studies carried out at the administrative level. It is noteworthy that studies carried out at the administrative level (Bokolo et al., 2020; Tamim, 2018) within the scope of BL, which is a more advanced level of OCOS, have started to gain momentum recently. Quality concerns have arisen as a result of these administrative tasks, and administrators have begun to focus on quality studies.

Along with the increasing demand for accountability and cost-effectiveness in education in general, the quality of curricula and learning outcomes at institutions compared to those of conventional and non-profit organizations has been effective in forming concerns about quality. Hence, each institution has started to carry out quality studies within its body (Uysal & Kuzu, 2011). With the increasing importance of fields such as instructional design, technology, and assessment-evaluation over time, the need for common ideas has increased, and quality studies started to be carried out by accreditation bodies (Tonbuloglu & Aydin, 2015). Accreditation bodies are important stakeholders on the road to quality and provide consulting services for recommending appropriate models and tools for quality assurance depending on the institutional context (Toprak & Sakar, 2021). Many leading accreditation bodies, such as the American Association for Higher Education, the Sloan Consortium (Sloan-C), and the Institute for Higher Education Policy (IHEP), guide institutions in implementing and maintaining quality standards. IHEP (2000) considers the quality approach not in terms of the outcome but in terms of the process or the quality of the services and materials that are provided (Simsek, 2012). Thus, if IHEP provides a process-oriented approach, this can help institutions implementing the BL approach avoid skipping many steps in processes and lowering

quality (Ozdemir, 2002). The teaching-learning, course content procurement, and assessment-evaluation dimensions of IHEP guided the researchers in drawing the framework of this study and not overlooking the dimensions necessary in learning environments.

Answers to the following questions were sought to examine the factors affecting the decision-making process in model choices in line with the experiences of people working as administrators and practitioners in the OCOSs offered at higher education institutions in Turkiye:

1. What are the factors that affect the decisions of DEC's to choose the model they apply in teaching and learning?
2. What are the factors that affect the decisions of DEC's to choose the model they apply in terms of course content procurement?
3. What are the factors that affect the decisions of DEC's to choose the model they apply in terms of assessment-evaluation?

METHOD

A qualitative research approach was used to answer the “why” and “how” questions regarding the experiences of DEC administrators and practitioners with OCOS. Four DEC's that applied their models in the OCOS delivery process were examined, and three dimensions of IHEP (teaching-learning, course content procurement, assessment-evaluation) were used as the analysis units of the study. For this reason, the study adopted the nested multi-case design, which is a case study design reported by Yin (2003, pp. 39–41).

Cases and Participants

“Common Courses”, delivered compulsorily at higher education institutions in Turkiye, were examined. These courses, which used to be offered face-to-face, started to be given via BL with the legislation developed by CHE. These courses are referred to as “OCOS” throughout the study. To determine the institutions in the study, information on the methods of OCOS was obtained from the institution websites through a checklist prepared by one of the researchers and an expert. The researcher reached 17 institution administrators by phone with the snowball sampling method. As a result of the phone interviews, preliminary information about the model diversity of the institutions in terms of OCOS and their experiences in this process was gathered. Consequently, four institutions were determined by considering the maximum variation method. Table 1 presents information about the cases.

Table 1. Summary of Selected Cases

In-text expression	Total number of students at the university	Year of foundation of DEC's	First year of implementation of OCOS	Average number of students taking OCOS per year
Case-1 (C1)	70,000	2009	2012	33,000
Case-2 (C2)	57,000	2009	2012	20,000
Case-3 (C3)	61,000	2002	2010	16,000
Case-4 (C4)	32,000	2014	2014	14,000

C1 is one of the three universities in Turkiye that hosts more than 400,000 distance learning students. The inclusion of face-to-face implementations, the use of content prepared in an individual learning format for distance learning and BL, and the presence of exam centers were the main reasons for including C1 in the report. In C1 and C3, OCOSs are conducted through the open-source learning management system (LMS) Moodle, and only registered students can access the courses. In C2, OCOSs are published on the institution's website, and anyone can access the courses. The change in the exam model and the purchase of LMS from a private company were influential in the inclusion of C4 in the study. Their efforts to improve the OCOS process and their experiences in this process were significant in including C1, C2, C3, and C4 in the study.

Table 2. Roles and Experiences of Participants in the OCOS Process

Interviewee	Role	OCOS Experience
C1-M1	Assistant administrator	3 years
C1-M2	Exam coordinator	2,5 years
C1-M3	Program coordinator	4 years
C1-M4	Information technology specialist	1 year
C1-M5	Assistant exam coordinator	4 years
C1-F6	OCOS coordinator	4 years
C2-M1	Administrator	6 years
C2-M2	Content development, Support service	6 years
C2-M3	Assistant administrator	4 years
C2-F4	Content development, Support service	6 years
C2-M5	Content development	6 years
C2-M6	OCOS coordinator	6 years
C3-F1	Administrator	3,5 years
C3-M2	Instructional designer	5 years
C3-F3	Assistant administrator	5 years
C3-F4	LMS management	4 years
C3-M5	Program coordinator, instructor	5 years
C3-F6	Program coordinator, instructor	4 years
C3-M7	LMS management	5 years
C3-M8	LMS management	5 years
C3-F9	Program coordinator, instructor	5 years
C4-M1	Administrator	3 years
C4-M2	Assistant administrator	3 years
C4-M3	Assistant administrator	3 years

This study included administrators and assistant administrators of institutions, program coordinators, technical personnel (e.g., information technology specialists, content development specialists), and instructors. While the administrators and assistant administrators at the institutions were both administrators and practitioners, the other participants were only practitioners. Table 2 presents the roles and experiences of the participants in the OCOS process.

Data Collection and Analysis

The data were collected from C1 first, followed by C4, C3, and C2. The researcher interviewed the administrators on the phone before visiting the DEC. The date and time of the interviews were decided. The researcher visited the DEC on the decided date and time. The participants were asked to fill out the “Volunteer Form.” The interviews were recorded with the permission of the participants. The interview took an average of 75 minutes for each participant. Since the interviews took a long time, a maximum of two participants were interviewed per day. For this reason, the researcher stayed for one week at the DEC with large numbers of participants.

The participants shared the documents (e.g., exam documents, orientation presentations) they used within the scope of OCOS with the researcher. In the LMS, the participants created a username and password for the researcher. This way, the researcher was able to investigate the functioning of the OCOS processes of the institutions. The data obtained as a result of this document review process were used to support the views of the participants, which were the primary data source. After the DEC visits, the active data collection process continued with scientific meetings and phone calls with the participants.

In the data analysis procedure, descriptive analyses were used, considering IHEP's (2000) three dimensions (teaching-learning, course content procurement, and assessment-evaluation) while determining the main themes, and content analysis was utilized in the development of sub-themes and codes (Yildirim & Simsek, 2013). The interviews were recorded and transcribed verbatim. The NVivo 10 program was used to analyze the data. Subsequently, data reduction, data display, and conclusion-drawing and verification procedures were followed.

Data Collection Tools

The interviews were the main source of information for the study. The documents shared by the participants and the LMSs of the institutions were the secondary source of data. A semi-structured interview form was prepared to explore the experiences of the participants in the OCOS process. The researcher developed the interview questions based on the dimensions of IHEP. Three experts reviewed the questions and finalized the forms. The interview questions included the following: personal information, teaching-learning processes, course content procurement, and assessment-evaluation. The term "personal information" refers to information such as name and surname, age, position in the institution, and duration of employment. The basic semi-structured interview questions in the dimensions of teaching and learning, course content procurement, and assessment and evaluation were as follows:

1. What kind of model do you apply to the (teaching-learning, course content procurement, and assessment-evaluation) processes in OCOS?
2. What influenced your decision on this model?

Validity and Reliability

Different strategies were employed to ensure the validity and reliability of the study. First, triangulation was applied to the participants and data sources to ensure reliability. Participants in different positions, such as administrators, program coordinators, technical personnel, and course development specialists, were considered in participant triangulation. In the triangulation of data sources, semi-structured interviews were used as the primary data source. As the secondary data source, documents shared by the practitioners and the LMSs of the institutions were used.

Secondly, two experts with doctoral degrees in the Department of Distance Education checked the themes and calculated the reliability score using the inter-rater agreement formula.

$$\text{Reliability} = \frac{\text{Number of agreements}}{\text{Number of agreements} + \text{Number of disagreements}}$$

According to the formula above, the agreement score was found to be 83%, which showed inter-rater reliability (Miles & Huberman, 1994). Thirdly, to ensure prolonged engagement, the researcher visited the institutions and conducted face-to-face interviews with two participants a day to collect in-depth information. Fourthly, the raw data were described in detail and reported with direct quotations to ensure transferability. Finally, although the data were kept for confirmability, experts with PhD degrees in Distance Education reviewed the data to confirm the consistency of the study.

RESULTS

Within the scope of OCOS, the inductive method was used to determine the factors affecting the decisions of DEC's regarding the models chosen by higher education institutions. This section presents the pull and push factors that influence the decisions of the institutions regarding the models to be used in each dimension.

Factors Affecting Decisions on Models in the Teaching-Learning Dimension

In the teaching-learning dimension for the DECs, semi-structured interviews and the LMSs of the institutions were used to determine the models they used in the online teaching process for on-campus students and the pull and push factors that were effective in their selection of these models. In this study, in the teaching-learning dimension, the models with mostly synchronous practices are expressed as “mostly synchronous,” the models with mostly asynchronous practices are expressed as “mostly asynchronous,” and the models that do not include synchronous practices are expressed as “completely asynchronous.” Looking at Figure 2, it is seen that C1 (mostly asynchronous) and C4 (mostly synchronous) preferred the same model each throughout the whole process, while C2 and C3 showed a model change.

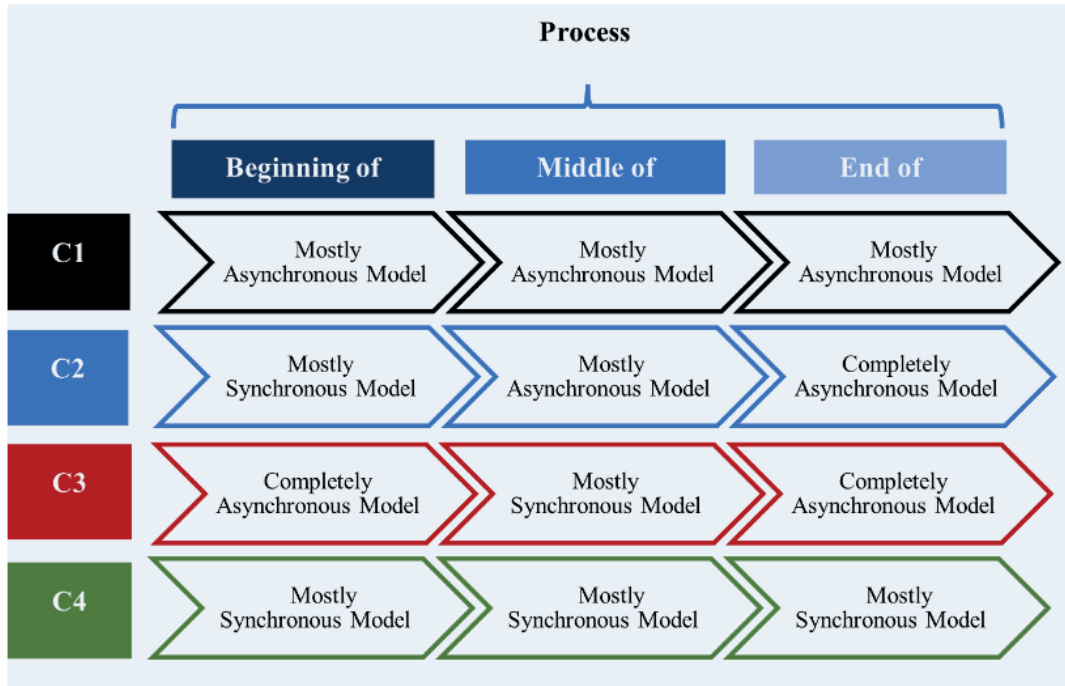


Figure 2. Changes in Teaching-Learning Models

Considering the LMS of C1, which is presented in Figure 3, it can be seen that they presented the courses asynchronously (pre-taken video, pdf), and this model could be used with interactive alternative practices (face-to-face office hours, open classroom, web TV, synchronous virtual classroom).

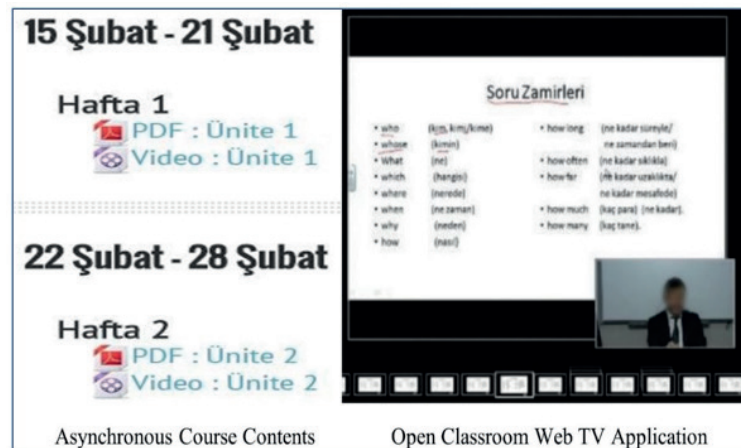


Figure 3. Asynchronous and Synchronous Practices Accessed on the LMS of C1

C4 preferred to provide the courses with a mostly synchronous model throughout the entire process. It was determined that C4 provided OCOS with a synchronous virtual classroom, and the recorded synchronous virtual classroom videos (asynchronous) could be watched again later. On the other hand, C2 and C3 tried various models in the process and finally decided to apply the completely asynchronous model, implemented only with asynchronous course contents (pre-shot video, ppt, pdf).

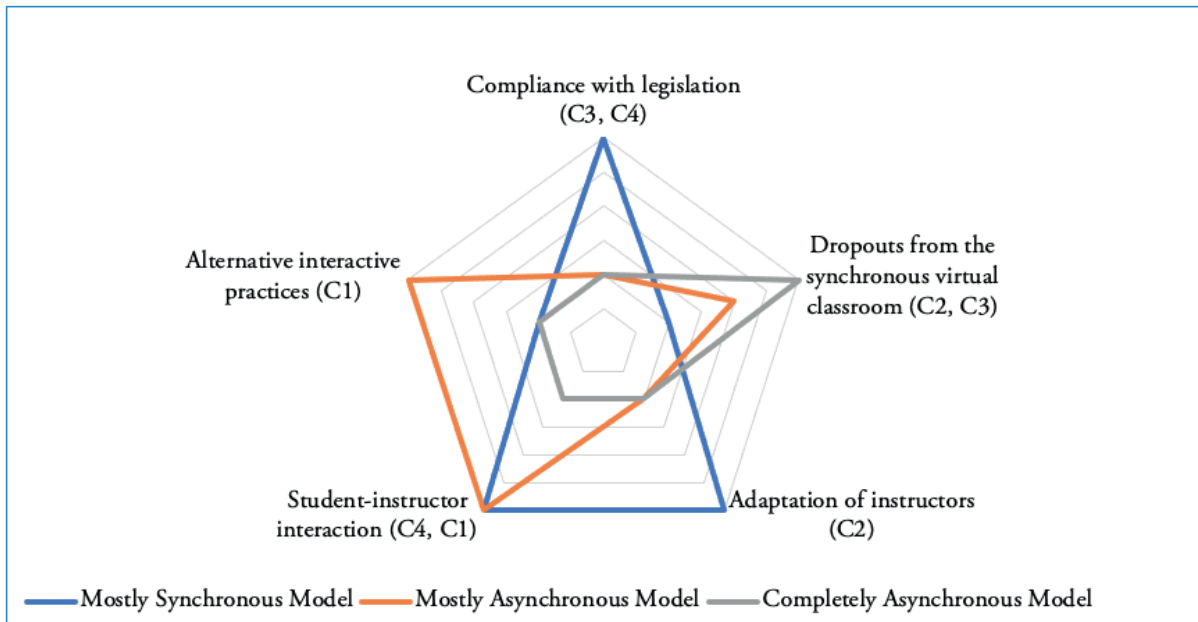


Figure 4. Factors Affecting Decisions on the Models in the Teaching-Learning Dimension

Figure 4 shows the pull and push factors that influenced the decision-making processes of the institutions on the teaching-learning model. As seen in Figure 4, when the model approached the factor, it represented the pull factor that influenced decision-making, whereas when it deviated from the factor, it represented the push factor that influenced decision-making. Accordingly, in Figure 4, the factors of compliance with legislation, student-instructor interaction, and adaptation of instructors were the pull factors for institutions to decide in favor of the mostly synchronous model, while the factor of dropouts from the synchronous virtual classroom was the push factor. Interactive alternative practices, student-instructor interaction, and the dropout rate in the synchronous virtual classroom acted as pull factors in deciding in favor of the mostly asynchronous model. The pull factor in choosing the completely asynchronous model was the dropout factor in the context of the synchronous virtual classroom. Factors including student-instructor interaction, interactive alternative practices, instructor adaptation, and compliance with legislation played a push-factor role in deciding on this model.

In the decision to implement the mostly synchronous model for C3 and C4, high sensitivity to compliance with legislation came to the fore. “When I came here, the mostly asynchronous model was being applied. Then, we implemented synchronous virtual classrooms for many years in accordance with the procedures and principles of CHE,” said F1, who worked as an administrator at C3, which stated that they decided to switch from a completely asynchronous to a mostly synchronous model due to the legislation issued by CHE. C4 developed their distance education guidelines based on the statement, “higher education institutions can make sub-regulations in line with the Procedures and Principles on Distance Education.” According to the C4 guidelines for distance education, at least 50% of courses should be synchronously offered, and different learning activities can support the other part. “The administration of these courses depends on the decision of the Senate. CHE leaves the decision to universities. We started these courses synchronously with the decision of the Senate, and we then continued asynchronously.” In the interview held with M1 at C2, it was seen that the decision made by the university senate was effective in deciding on the teaching-learning model to be adopted.

Another factor that was influential in deciding on the mostly synchronous model was the need to ensure the adaptation of instructors to distance education. “The instructors thought that distance education could not be as good as face-to-face education. They were worried that they would not be able to see the students and communicate with them through distance education. We preferred to start with a mostly synchronous model because they would adapt more easily, and they could see the students” (C2-M6). M6, who worked as the DEC program coordinator at C2, stated that they decided to start OCOS with this model, thinking that the instructors would adapt more quickly to the equally model. Similar results were also found at C4. “When we announced to our instructors that we decided to switch to these courses, they reacted very strongly. We received reactions saying that our ties with the students would be severed, and we would not be able to communicate. These reactions helped us make the decision to use a mostly synchronous model. We implemented this model to enable the instructor to interact with the students. This is because it is very important that the instructors are ready for the process. The more ready the instructor is, the more they get the student involved.” As to be understood from the statements of M3, who was an assistant administrator at C4, the adaptation of the instructors was effective in deciding on the model.

The rates of student dropout in synchronous virtual classrooms were influential in the decisions of the institutions to transition from the mostly synchronous model to the completely asynchronous model. “When it [the model] was first established, we offered the OCOS completely synchronously. They classes were being recorded, and the students could watch them again. Then, the model was changed because the number of students attending the synchronous virtual classes was not high, out of 14,000 students. As a result, it was decided to use an asynchronous system” (C2-M1). F1, who worked as an administrator at C3, stated that they decided to switch to the completely asynchronous model due to the low participation of students in virtual classes. “As the students were on campus while we were teaching, the participation rate in the synchronous virtual classes was 5%. Since most of the classrooms were empty, the instructors were explaining the courses to a blank screen. This was the main reason why we changed the course model to an asynchronous format.”

C1’s decision to use the mostly asynchronous model was influenced by the inclusion of interactive alternative practices in the model. “We include different face-to-face (office hours, open classroom) and online (online question and answer, web TV) interactive practices in these courses for students” (C1-F6). In Figure 5, there is an image of C1’s interactive web TV application.

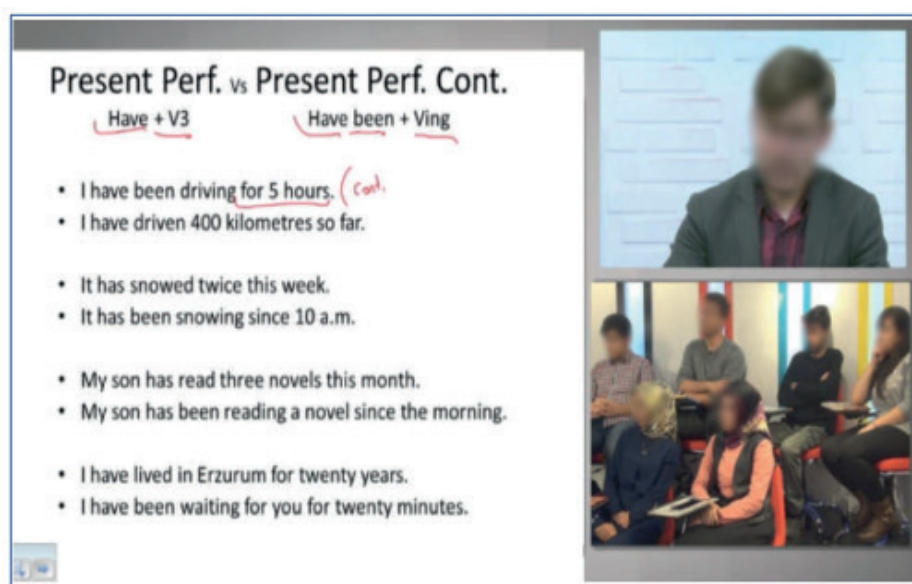


Figure 5. C1’s interactive web TV application

C4’s decision to use the mostly synchronous model was influenced by the idea that synchronous virtual classrooms provide effective interaction between students and instructors. “We want to make attendance

compulsory for these courses. Our instructors do not accept solely watching [the classes] from the archive. Therefore, more students attend synchronous virtual classrooms. If the instructor includes interaction in the courses and wants to be in the same settings as the student, the student participates” (C4-M1). E1, who worked at C4, stated that the students participate in the courses if the instructor involves interaction in the mostly synchronous courses.

Factors Affecting Decisions on Models in the Course Content Procurement Dimension

Semi-structured interviews and institution documents were used to determine the factors affecting the decisions of the institutions regarding course content procurement models. Three models were determined in the dimension of course content procurement. These were using existing content, developing content, and purchasing content from a company.

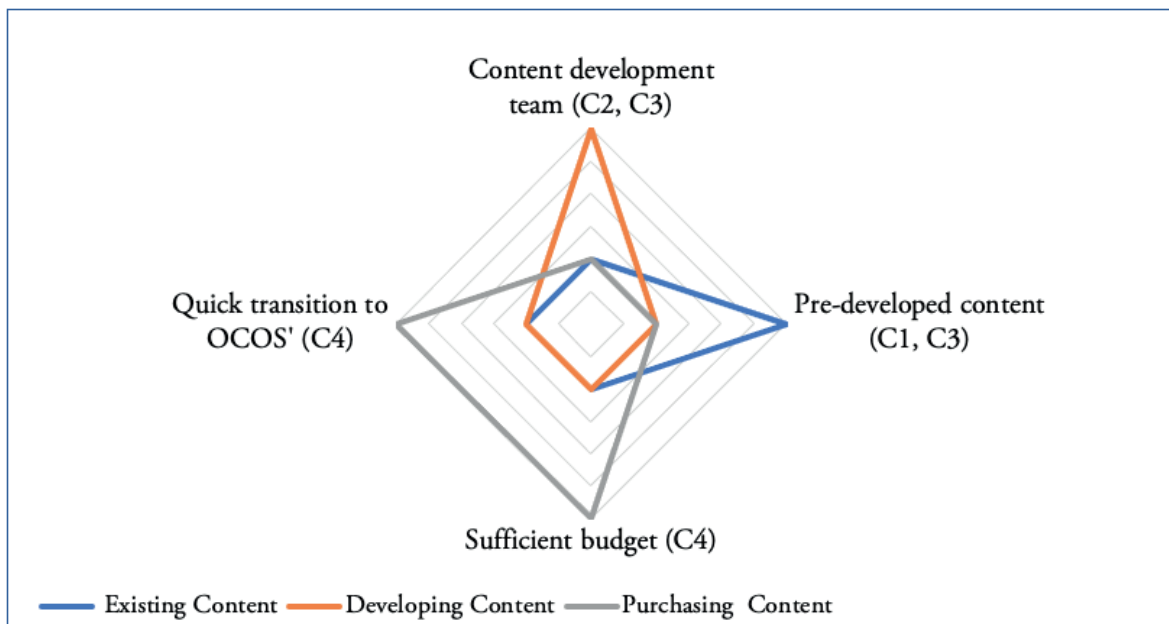


Figure 6. Factors Affecting Decisions on the Models in the Course Content Procurement Dimension

Figure 6 shows the pull and push factors that influenced the decision-making processes of institutions regarding the course content procurement model. As seen in Figure 6, when the model approached the factor, it represented the pull factor affecting decision-making, and when it deviated from the factor, it represented the push factor affecting decision-making. The factor of having pre-developed content acted as a pull factor when the organization decided on the model of using existing content within the scope of OCOS. While the pull factor in deciding on the content development model was the content development team, the push factors were a sufficient budget and a quick transition to OCOS. A sufficient budget and a quick transition to OCOS acted as pull factors in deciding in favor of the content purchasing model. The lack of pre-developed content and a content development team were the push factors for this model.

F3, working at C3, stated that having a content development team at the DEC was influential in their decision to develop content. “We have instructors who are not only instructional designers but also subject-matter experts and developers. We are all trying to get it done together somehow.” According to the statement of F4, who worked in the content development team at C2, it was determined that there should be a content development team within the institution to develop content. “At first, subject area experts, instructional designers, and graphic designers came together. What are the materials that the subject area experts want to use? Here is a video, here is a visual on this topic. We designed this process together.” Similar results were also found in the annual report of C2.

The pre-developed contents of institutions were effective in their decisions to use existing content in OCOS. “In particular, since the open education faculty supports us, they provided the contents because it was copyrighted content.” It was determined that they did not have to develop these pieces of content again because they had pre-developed course content according to M2 working at C1. It was determined that pre-developed content was used at C3 as well. “We had an advantage. First, we had distance education programs. Therefore, we developed this content for distance education programs. We used that content first” (C3-M7).

One of the factors affecting the decision to purchase content from a private company was the sufficiency of the institution’s budget. “The decision was made to quickly transition to OCOS. We had neither the time nor the staff to develop content. This is why we purchased the content. The institution provided a sufficient budget for the content” (C4-M3). According to M3, who worked as an assistant administrator at C4, the budget was provided by the institution for the purchase of the content.

Another factor affecting the decision to purchase content from a private company was the quick transition of the institutions to the OCOS delivery process. M1, who worked as an administrator at C4, stated that they preferred to purchase from a private company because they thought that the content developed in a short time would be of poor quality. “When the center was first established, it was decided to transition to OCOS in a very short time, and it was out of the question to develop content in a short time. The content was contracted and purchased from a private company” (C4-M1).

Factors Affecting Decisions on Models in the Assessment-Evaluation Dimension

Semi-structured interviews and documents from the institutions were used to determine factors affecting the decisions of the institutions regarding the model they used in the assessment and evaluation dimension. The models are first explained in this section to help understand the results better. Then, the factors affecting decision-making in the process of selecting these models are presented.

The four higher education institutions examined within the scope of this study decided to apply central, simultaneous, and independent exam models in the OCOS process. In the central exam model (C1), a single center carries out the preparation of questions, the printing of question papers, sending them to the units, conducting the exam, and evaluating the exam papers. Students in all units take exams face-to-face on the same day and at the same time in the different units specified for them. The central exam implementation process in C1’s orientation report is shown in Figure 7.



Figure 7. C1’s Proctored Face-to-Face Central Exam Practice

The feature distinguishing the simultaneous exam model (C2, C3) from the central exam model is that it is carried out by commissions created for each course rather than a single center. Exam questions prepared by

commissions are sent to relevant units, and all students take the proctored face-to-face exam on the same day and time in the units they are registered to. Considering C3's LMS, which used the simultaneous exam model, it was found that its midterm exams were held on an online exam platform that has a non-proctored form, as shown in Figure 8.

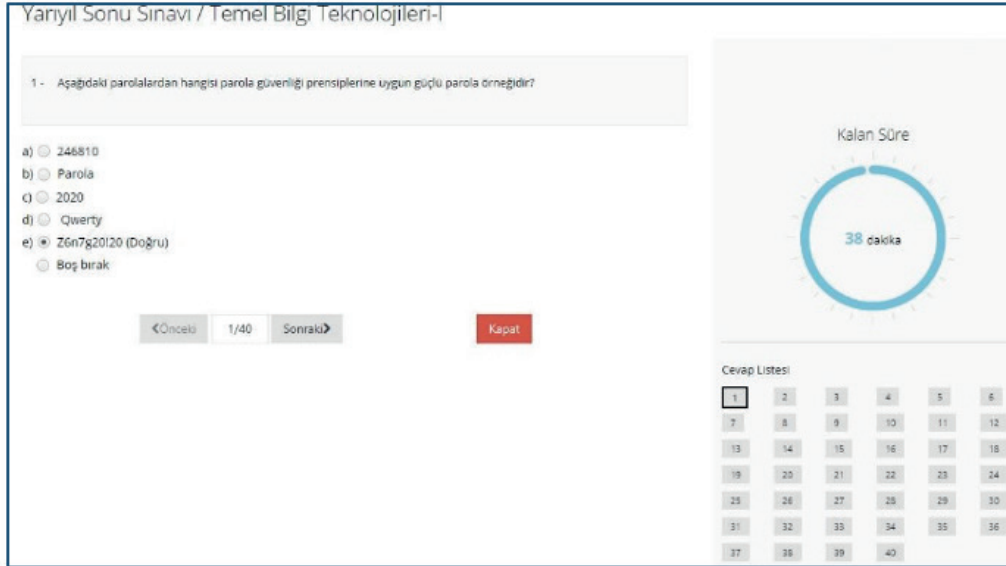


Figure 8. C3's Non-Proctored Online Exam Platform

In the independent exam model (C4), the instructor of the course carries out the entire assessment-evaluation process. In this model, no center or commission is involved in assessment-evaluation. Exams can be held on different days and times, and different questions can be asked to students in each branch.

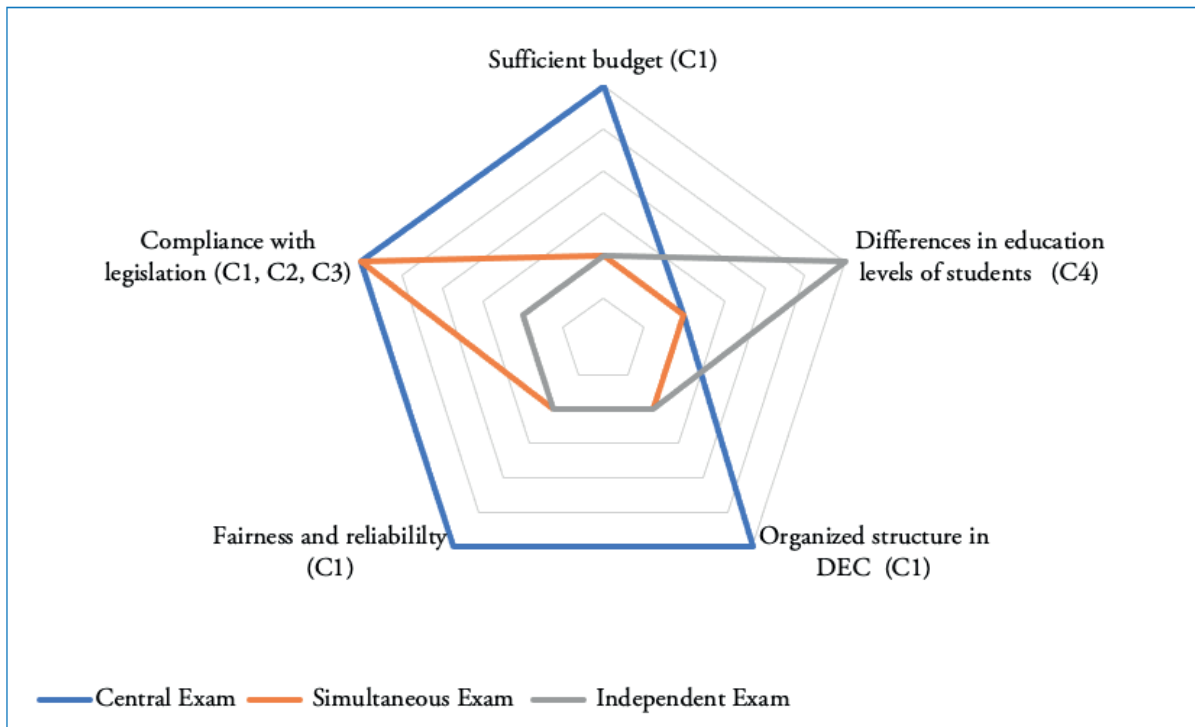


Figure 9. Factors Affecting Decisions on the Models in the Assessment-Evaluation Dimension

Figure 9 shows the pull and push factors affecting the decision-making processes of the institutions regarding the assessment-evaluation models. As seen in Figure 9, when the model approached the factor, it represented the pull factor affecting decision-making, and when it deviated from the factor, it represented the push factor affecting decision-making. A sufficient budget, an organized structure in DEC, fairness and reliability, and compliance with legislation all acted as pull factors in choosing the central exam model. Compliance with legislation was a pull factor that made it more likely to use the simultaneous exam model. Factors including the lack of an organized structure in DEC and an insufficient budget were found to be push factors for deciding in favor of the simultaneous model. On the other hand, differences in the education levels of students acted as a pull factor for the institutions to decide in favor of the independent exam model. The push factors influencing the decision to use the independent exam model were an insufficient budget and a disorganized structure in DEC.

According to the examination of the website of C1, C1 had a sufficient budget for preparing, printing, and evaluating the documents used in the exams in the central exam model. “We outsource only the printing of the exam booklets because it requires a large workload. Since we have paid programs, we can cover this cost” (C1-M2). M2, who worked as the exam coordinator at C1, stated that the institution had a sufficient budget due to its paid programs. Figure 9 shows images from the exam unit that C1 used for printing and sorting the exam documents.



Figure 10. C1's Exam Organization Unit

Having an organized structure within the DEC was effective in deciding in favor of the central exam model. The exam unit in C1 had an exam coordinator, an assistant, and IT personnel responsible for developing and using the necessary software. “We develop software with our team, according to our own needs” (C1-M4). M4, who worked as IT staff at C1, stated that they developed the software necessary to prepare exam documents. “I send the exam documents to my colleague in charge of the printing unit. He prints them directly in the printing unit in the center with a semi-professional machine.” (C1-M5). M5, who also worked as IT staff at C1, stated that the printing of the prepared exam documents was carried out in the printing unit at the institution.

Compliance with legislation was effective in the decision of C1 in favor of the central exam model and the decisions of C2 and C3 in favor of the simultaneous exam model. In the legislation published by CHE (2014), it is seen that “midterm exams shall be held in a non-proctored manner via electronic media if desired so, and final exams and make-up exams must be held face-to-face or electronically in a proctored manner.” The emphasis on the supervised face-to-face exam practice in the legislation was influential in the decision of C1 in favor of the central exam model. The legislation states that all exams, especially the final exams, should be proctored. “Here, the legislation offers a face-to-face or online option. For this reason, we preferred to do it face-to-face, as it was within our means. We hold both midterms and finals in a centralized, face-to-face, and proctored manner” (C1-M3). “The legislation says you can hold midterms in a non-proctored manner, but you must hold final exams in a proctored manner. Therefore, we held the midterms in a non-proctored and online form. It saved paper, and the assessment-evaluation process was completed quickly. However, the finals had to be proctored. We are not equipped to proctor online exams. For this reason, we decided that all

students should take the exam in a face-to-face, proctored manner at the same time” (C3-M8). The decision of C3 in favor of the simultaneous model was because the clause about supervised exams was included in the legislation.

The factor of fairness and reliability was influential in the decision of C1 in favor of the central exam model. “It is very appreciated to have a fair system in terms of assessment and evaluation. We are holding central exams here. It is a very serious responsibility; it is very tiring, and it takes a lot of effort. In my opinion, the assessment-evaluation system should be very robust for students to continue attending OCOSs. We are under such a responsibility just to have a quality system and make the system work. Otherwise, we can just say that you are qualified to teach” (C1-M1). M1, who worked as an administrator at C1, stated that students would pay more importance to these courses if central exams were conducted reliably. “We have our exam team. We are strong in that sense. However, a large organization is required for the preparation of central exams. We start preparations 2-3 weeks in advance. It takes a lot of time. Additionally, printing exam documents is costly. But we prefer face-to-face central exams to carry out assessments and evaluations in a fair and reliable way” (C1-M5). M5, who served as an assistant exam coordinator at C1, similarly stated that central exams bring a lot of workload to the institution and are costly, but institutions prefer them because they are reliable.

The fact based on the reports of the participants that C4 did not have the organized structure necessary for preparing the exam documents and ensuring the reliable administration of exams influenced their decision to transition from the central exam model to the independent exam model. The difference in the education levels of students was also found effective in abandoning the central exam model. M2, who worked as an assistant administrator at C4, stated that the difference in the education levels of students in the OCOSs taken by all students at the associate and undergraduate levels was reflected negatively on the exam results. “The success level of a student in the vocational school and a student in engineering is not the same. There were serious success cases on the one hand and serious failures on the other. In a classroom with 40 students in the vocational school, 3-4 students passed in the final” (C4- M2). “About 4000 students failed and will retake the exam, which is more than half. We were worried that this situation would be perceived as the institution’s failure. This is why we decided to change the model.” M1, who worked as an administrator at C4, stated that they decided to change the central exam model to the independent exam model, considering that the difference in the education levels of students could have been perceived as the institution’s failure. “When we ask questions based on the level of the students in the faculties, the students in the vocational schools experience great difficulties. When we ask questions according to the level of the vocational school students, they seem simple to faculty students. This is the most difficult part of the central exam system. ... because there are significant differences in student achievement levels” (C1- M3). It was determined that the differences in the education levels of students in C1, where the central exam model was applied, were very high, but this factor was not effective in making a decision on model selection.

DISCUSSION AND RECOMMENDATIONS

In the teaching-learning dimension of our study, there were mostly synchronous, mostly asynchronous, and completely asynchronous models. Factors such as student-instructor interaction, compliance with legislation, adaptation of instructors, interactive alternative practices, and dropout rates in synchronous virtual classrooms were effective in influencing the decisions of the institutions regarding these models. One of the factors affecting the preference for the mostly synchronous model was the idea that the instructors will adapt easily due to the similarity of OCOS to face-to-face classroom environments. In terms of being simultaneous and instructor-centered, synchronous virtual classrooms are similar to face-to-face classroom environments (Ozmen & Ediz, 2002). However, this model may be ineffective in relieving the concerns of the instructors (Kayaduman & Demirel, 2019). Instructors who teach for the first time in synchronous virtual classrooms may have negative attitudes toward change and experience insufficient technological and pedagogical content knowledge (Turnbull et al., 2022). To overcome these obstacles, the necessity of the provision of pedagogical, technical, and social support by the institutional administration comes to the fore.

It was determined that the institutions that considered the positive effects of interaction on learning in OCOS preferred a synchronous or mostly asynchronous model. Studies have shown that in the mostly synchronous approach, the constant interaction of students with their peers and instructors increases their motivation and provides a more social aspect to the learning experience (Hrastinski, 2008). The same is true for the mostly asynchronous model supported by interactive alternative practices such as open classrooms, office hours, and open classroom web TV applications. However, the results of our study showed that students did not sufficiently participate in these practices. This situation caused the institutions to turn to a completely asynchronous model with no student-instructor interaction. In this model where there is no interaction, a moderate level of learning takes place, and the model is ineffective for in-depth learning (Ibicioğlu & Antalyalı, 2005). Heilporn et al. (2021) included practices similar to the interactive practices in our study, and student participation was high. It is thought that the reasons for differences in the results of the two studies in which the same model was applied may be the interactions of instructors with students (Yazgan, 2022) and the characteristics of the courses, such as being a common course, a credit course, or requiring compulsory attendance (Karapınar et al., 2018). As a result, it was determined that the characteristics of instructors and students are effective in deciding on the models to be applied in the teaching-learning aspect of institutions.

The decision to adapt a simultaneously weighted model was influenced by the fact that this model was in compliance with the legislation. However, the fact that the articles related to OCOS in the legislation were not clear enough caused the administrators to make choices in line with the means of the institutions. The clarity of the articles in the legislation is very important in guiding institutions in the process of developing and disseminating BL practices, providing a framework for the operation of courses, and the emergence of innovative applications (Gunduz et al., 2020; Gonzalez & Roig, 2018). In the presence of strict restrictions in the legislation, administrators have difficulties making decisions and take less risk (Gunduz et al., 2020). Zhang et al. (2012) stated that these limitations might hinder the implementation of different teaching and learning models. Therefore, including explanatory clauses while developing legislation and providing flexibility for applying different models will facilitate easier decision-making among administrators.

In the course content procurement aspect of the institutions examined in this study, there were models of using existing content, developing course content, and purchasing content from a private company. Factors such as having pre-developed content, having a content development team, making a quick transition to OCOS, and having a sufficient budget were effective in deciding on these models. Institutions that do not have pre-developed content but have content development teams prefer to develop their own course content. However, Mete and Demir (2021) revealed that the problems experienced by people in a content development team at the point of interaction affect the quality of course content negatively. In our study, it was determined that institutions that do not have a content development team and make a quick transition to OCOS have to purchase their course content. Although institutions prefer cost-effective content purchasing processes (Arac & Akcadag, 2022), they should not lose sight of the quality of course content at this point. Gurer et al. (2016) determined that contents purchased from a private company contained insufficient, incomplete, and even inaccurate information. Consequently, it was seen that institutions that ran OCOS had difficulties procuring course content, including human resources, time, and budget problems, so they preferred the model closest to them. However, quality course content can be developed by establishing commissions of experts in open and distance learning. Reusing, retaining, revising, remixing, and redistributing these already developed pieces of content as Open Educational Resources (OER) may effectively save institutions human resources, time, effort, and budget.

In the assessment-evaluation dimension of our study, central, simultaneous, and independent exam models were identified. Factors such as having a fair and reliable system, having a sufficient budget, having a well-organized DEC structure, complying with legislation, and having students at different educational levels were effective in assisting institutions in making decisions based on these models. The fact that OCOSs are non-credited in most institutions causes them to be neglected by students (Karapınar et al., 2018). Institutions that want students to care about these courses have preferred the central exam model, which is more reliable than other exams. Similarly, the high reliability of face-to-face central exams at Athabasca University has

been a reason for preference in credit courses (Wang, 2011). If courses are credited, and reliable face-to-face central exams are administered, this will attract the interest of students in OCOS. Giving OCOS the same number of credits at all higher education institutions will also contribute to this.

Another factor that affects the preference for the central exam model by institutions is the sufficiency of their budget. Institutions that can cover costs such as the costs of printing exam materials and payments for transportation operations in central exams (Kayabas, 2020) prefer proctored face-to-face central exams because these exams are more reliable. While Balta (2014) argued that face-to-face central exams are cumbersome and laborious, Kayabas (2020) stated that institutions prefer the proctored online exam model to reduce the high cost of these exams. At institutions where the number of students is high, and there are not enough computer laboratories, the non-proctored online exam model can be preferred instead of the proctored online exam model. However, in such a model, situations such as someone else taking the exam instead of the student, getting help from others, or using digital media (Bozkurt & Ucar, 2018) reduce the reliability of exams.

The institution must have an organized structure in the DEC for the central exam model to be carried out systematically. According to Dundar et al. (2017), academic, technical, and administrative personnel are in communication and cooperation while carrying out exam services, and therefore, they can make examination arrangements more effectively and efficiently. DEC's that do not have an organized structure prefer simultaneous exams or independent exam models. The idea that the difference between the exam success scores of undergraduate and associate degree students could be perceived as the institution's failure was effective in making the institutions that were examined in this study prefer the independent exam model.

CONCLUSION

In line with the results obtained in this study, Figure 11 presents the pull and push factors that were thought to help institutions decide on the most appropriate models for their capabilities in the process of offering OCOSs. The factors influencing the decision-making process under each dimension are explained below.

Teaching-Learning Dimension

Institutions need to decide on what types of teaching-learning processes they will conduct before they start offering OCOSs. Accordingly, they can use three different models: mostly synchronous, mostly asynchronous, and completely asynchronous models. The factors that institutions should consider when deciding on these models are described below.

Mostly Synchronous Model

The first pull factor that influenced the decisions of the institutions to implement this model was that it allows the students to have high levels of interaction with the instructor. In this model, the students and the instructor of the course meet in real-time video chats in synchronous virtual classrooms at the times and days set by the course schedule.

The other pull factor was that this model is included in the relevant legislation. The legislation emphasizes the inclusion of synchronous virtual classroom practices in OCOS. It is also stated in the legislation that institutions can make their own Senate decisions. This allows institutions to implement different models. Ensuring the adaptation of instructors was one of the pull factors in selecting the mostly synchronous model at the institutions whose members were included in this study. If the instructors have concerns that distance education cannot replace face-to-face education, the institution can use this model to ensure easy instructor adaptation to the process because the synchronous virtual classroom practices in this model are similar to the face-to-face classroom environment, and they provide instant communication. However, institutions should take into account a push factor such as students not participating in synchronous virtual classes at all or stopping participating in synchronous virtual classrooms in the mostly synchronous model. Therefore, it is very important for institutions to implement this model after making the necessary arrangements and taking the necessary precautions.

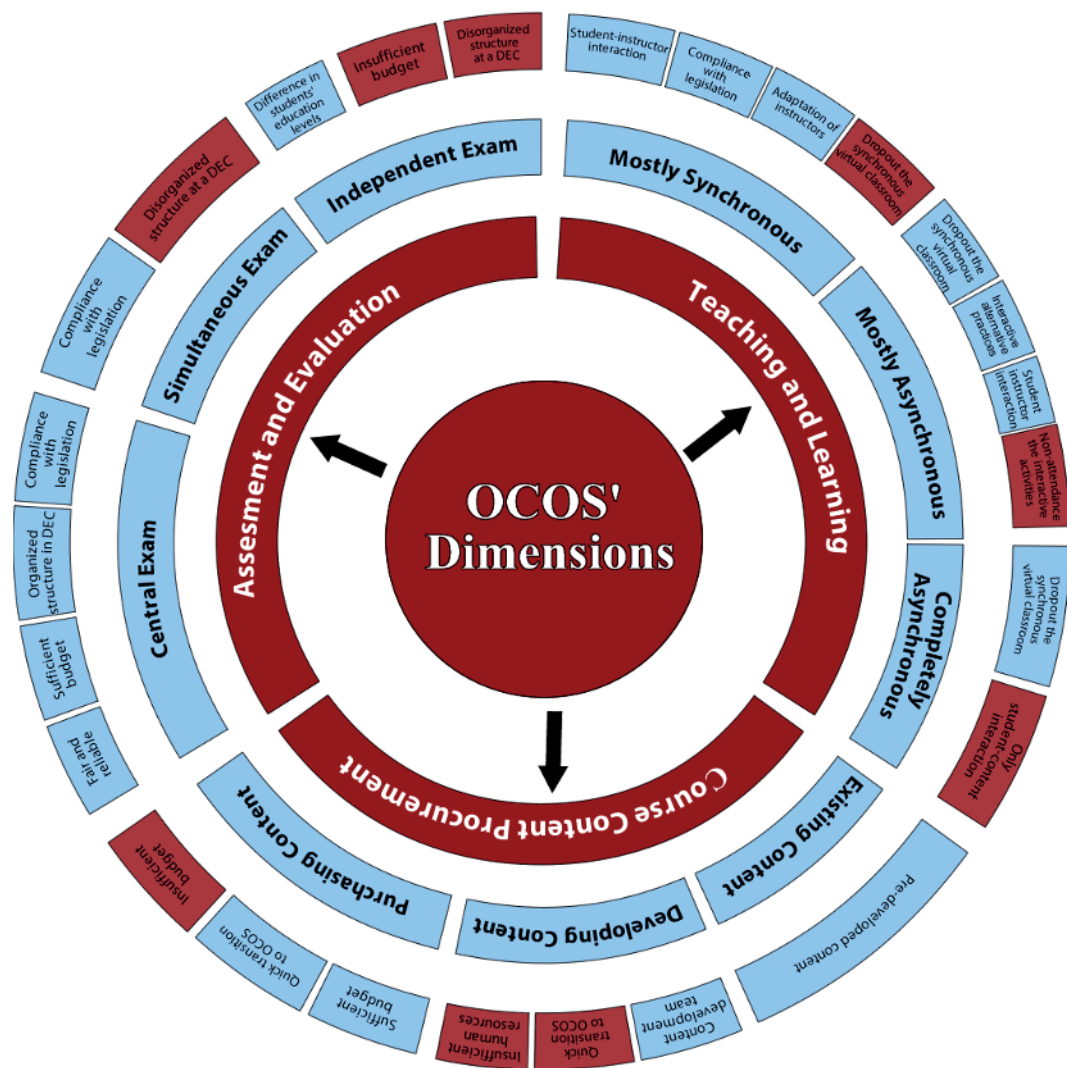


Figure 11. Factors Influencing Model Decision-Making in Online Courses for On-Campus Students

Mostly Asynchronous Model

One of the significant results of this study was that a factor that was a push factor for one model could be a pull factor for another model. For example, an institution may choose a mostly synchronous model without accounting for the fact that students may not participate in synchronous virtual classrooms. If students drop out of the synchronous virtual classrooms, the institution may decide to transition to a mostly asynchronous or a completely asynchronous model. In such a case, the factor of dropout in synchronous virtual classrooms, which was a push factor for the mostly synchronous model, became a pull factor for the mostly asynchronous model. The interaction between the student and the instructor was another pull factor in choosing the mostly asynchronous model. In the mostly asynchronous model, interactive alternative practices could take place mostly synchronously (online counseling hours, web TV) and occasionally face-to-face (open class, office hours). The non-attendance of students in these activities was a push factor for the institutions regarding the mostly asynchronous model. Therefore, it is very important for institutions to design such activities in a way that will increase the motivation of students, attract their attention, and ensure their attendance.

Completely Asynchronous Model

As in the mostly asynchronous model, dropping out of synchronous virtual classrooms was a pull factor for the completely asynchronous model. In the completely asynchronous model, the possibility of students not interacting with the instructors at all and only interacting with the course content was a push factor for the institutions.

Course Content Procurement Dimension

Institutions need to decide on how to procure course content before they start offering OCOSs. The results of this study showed that institutions can decide whether to use existing content, develop content, or purchase content. Institutions are expected to decide on these models within their own capabilities, taking certain factors into account.

Existing Content

The usage of previously developed content by institutions hosting OCOS for these courses may act as a pull factor for them to use this content. If institutions have distance education programs that had been conducted before the OCOSs, they can use the content that applies to the same curriculum as the OCOSs. In this study, there were no push factors related to the use of existing content.

Developing Content

Having a team of graphic designers, instructional designers, and content development specialists within the institution plays a role as a pull factor in deciding to develop content within the institution. Subject matter experts should also be included in this team while developing the content. After determining the scope of the course content, subject area experts should share the written and visual elements they want to include in the course material with instructional designers and graphic designers and make the final decision together. One of the push factors that may affect institutions in the process of implementing this model is that they must have a fast transition to OCOSs and might not have enough time. If institutions do not have enough time to develop content, they may need to implement alternative models until they develop their own course content. This is because it is very important that the content development process be completed before the course execution process begins. Another push factor is the insufficient number and quality of team members. If there are not enough human resources of sufficient quality and quantity, the content development process may be interrupted, for example, when there is a case of team turnover. For this reason, organizations should make sure that they have sufficient human resources when establishing a content development team.

Purchasing Content

One of the pull factors that influences the decisions of institutions to purchase content from private companies within the scope of OCOSs is a quick transition to the OCOS delivery process. Institutions whose course content development teams do not have enough time to develop content and do not have pre-developed content may prefer the content purchasing model. In this model, content is provided by companies in the form of a SCORM package. If there is a request for updates from the instructors teaching the course, these requests can be evaluated by the institution, and the companies can be asked to make the necessary updates. Of course, it is very important that the institution should have a sufficient budget to purchase the content. Otherwise, an insufficient budget is a pushing factor in the decision-making process regarding this model.

Assessment-Evaluation Dimension

Institutions need to decide what kind of model they will apply in the assessment-evaluation process before they start offering OCOSs. The results of this study showed that such institutions could decide among centralized, simultaneous, and independent exam models in the assessment-evaluation dimension, as shown in Figure 10. The pull and push factors affecting the decisions of institutions on these models are explained below.

Central Exam

In the central exam model, questions are prepared in cooperation with the DEC assessment-evaluation team and subject area experts. Documents such as question booklets, optical forms, exam guidelines, and student

entrance certificates are printed by the DEC. All students take the exam on the same day and at the same time at the exam locations listed on their exam entry documents. The instructors assigned by the DEC for proctoring deliver the exam documents to the building examiner at the end of the exam. Exam documents from all units are collected at the DEC. Exam results are evaluated on optical readers at the DEC, and these results are sent to the instructor of the course. Instructors announce exam grades on the LMS.

One of the pull factors for institutions to decide to implement this model is the perception that it is fair and reliable. When all students are examined at the same time, and the exams are evaluated by the DEC, these exams are considered fair and reliable. Another pull factor that is effective in the decision to conduct centralized exams is the sufficiency of the institution's budget. If the institution does not have the budget to purchase the necessary equipment to print the exam documents or to purchase printing services, it will not be possible to hold centralized exams. Therefore, while a sufficient budget is a pull factor in the central exam implementation process, an insufficient budget is a push factor. The existence of an organized structure within the institution that carries out examination procedures is also a pull factor in the implementation of the central examination model. Many processes, from the preparation of exam questions to the evaluation of exams, are carried out by the team within the organization. Therefore, it is highly necessary to have an organizational structure that can carry out all these processes within the unit. Another pull factor that influences institutions in the decision-making process regarding this model is the inclusion of this model in the legislation. In particular, the fact that there is an article on holding the final exams at the same time, in a proctored and face-to-face manner, is effective in the decision of an institution to use this model.

Simultaneous Exam

The simultaneous exam model is similar to the central exam model. However, it has certain differences. In this exam model, exam questions are prepared by commissions consisting of instructors of the courses, and the exam documents are printed by the instructors. The exam is held by the units (faculties and vocational schools) on the same day and at the same time in the exam halls located in the units of the students. Each unit assigns the instructors who will proctor the exam. The exams are evaluated, and their grades entered into the system by the instructors in the commission. In this model, the DEC is not involved at any stage of the assessment and evaluation process. As with the central exam model, the fact that this model is included in the legislation makes it a pull factor for institutions to decide to implement the simultaneous exam model. This is because both models meet the requirements in the legislation that the final exams be held simultaneously, both in a proctored and face-to-face manner. A disorganized structure at a DEC is a pulling factor in deciding in favor of the simultaneous exam model. If institutions do not have sufficient personnel to create an organizational structure for exams, they can decide to use the simultaneous exam model.

Independent Exam

In the independent exam model, the entire assessment and evaluation process is carried out by the instructor of the course. In this model, no center or commission is involved in the assessment and evaluation process. Exams can be held on different days and at different times, with different questions prepared for each class. Insufficient budgets and a disorganized structure within the institution make organizing exams difficult, which is one of the motivating factors for institutions to implement independent exams. The pull factor in this model is the difference in the educational levels of students. In the central and simultaneous exam models, the students are asked the same questions. While these questions are difficult for vocational school students, they are easy for undergraduate faculty students. Institutions may therefore decide to implement an independent exam model. However, asking different questions reduces the likelihood of this model being fair and reliable. Therefore, the factor of being fair and reliable, which is a pull factor in the central exam model, becomes a push factor in this model.

LIMITATIONS AND FUTURE RESEARCH

In this study, DEC's with different experiences were selected using the snowball and maximum variation sampling methods for participant inclusion. The results on the collected data are limited to interviews and

examinations carried out at four DECs. Since this is a qualitative study and requires a lot of time to collect, analyze, and report data, the obtained data are limited to the 2016–2019 period. In future research, the effects of different approaches on student motivation, such as OCOS with or without course credit, in a paid or unpaid form, requiring or not requiring compulsory attendance, can be examined. This study involved the examination of three dimensions of IHEP, and future studies may explore the dimensions of the student, instructor, and institutional support. Therefore, researchers can contribute to the field of distance education with more comprehensive studies that examine the dimensions of IHEP in depth. Finally, the DEC team provided the sample of this study. Hence, future research may involve senior university administration, instructors, and students.

Authors' Note: This study is a summary of the doctoral dissertation titled “Examination of Campus-Based Online Courses’ Processes Grounded on Distance Education Centers’ Experiences”, written by Aysin Gaye USTUN and supervised by Engin KURSUN.

Acknowledges: We would like to thank the managers and staff of the Distance Education Center who shared their experiences with us during the data collection process of the study.

BIODATA and CONTACT ADDRESSES of AUTHORS



Dr. Aysin Gaye USTUN is an Assist. Prof. in Vocational School at Sinop University, Turkiye. She earned her doctoral degree from the Department of Computer Education and Instructional Technology at Ataturk University, Turkiye. Her academic interest areas are open and distance learning and instructional technology. She worked in different units such as Sinop University Head of Computer Technology Department and Distance Education Center. She has book chapters on open and distance learning in national and international books.

Aysin Gaye USTUN
Department of Computer Technology
Address: Vocational School, Sinop University, 57000, Sinop, Turkiye,
Phone: +90 5054683752
E-mail: aysingaye.ustun@gmail.com



Dr. Engin KURSUN is a Prof. Dr. at the Kazim Karabekir Education Faculty, Ataturk University. Dr. Kursun gained his PhD in Educational Technology at Middle East Technical University. He worked as a visiting researcher at Institute of Educational Technology in British Open University and Center for Open Education (COER), Oldenburg University in Germany. He is currently working at the Department of Computer Education and Instructional Technology. His academic interest areas are instructional technology, technology enhanced learning environment, open and distance learning. He worked as a manager in different units such as Ataturk

University Computer Center, Distance Education Center and Head of Computer Education and Instructional Technology.

Engin KURSUN
Department of Computer Education and Instructional Technology
Address: Kazim Karabekir Education Faculty, Ataturk University, 25240, Erzurum, Turkiye,
Phone: +90 5055010583
E-mail: ekursun@gmail.com



Assoc. Prof. Dr. Halil KAYADUMAN is a member of the Distance Education Application and Research Center at Inonu University in Turkiye. His doctoral degree was earned from the Department of Computer Education and Instructional Technology at Middle East Technical University in Turkiye. His research interests primarily focus on teaching and learning in open and distance education environments, learning analytics, technology adoption in education, the design of technology-enhanced learning environments, and human-computer interaction. He is actively involved in exploring the intersection of technology and education, aiming to enhance learning experiences in distance settings. At

Inonu University, Halil KAYADUMAN contributes significantly to the advancements in distance education practices through his research and expertise.

Halil KAYADUMAN

Distance Education Application and Research Center

Address: Inonu University, 44280, Malatya, Turkiye,

Phone: +90 553 534 02 44

E-mail: halilkayaduman@gmail.com

REFERENCES

- Arac, M., & Akcadag, T. (2022). Evaluation of distance education management processes in higher education institutions in Istanbul. *Electronic Journal of Social Sciences*, 21(82), 603–627. <https://doi.org/10.17755/esosder.1022620>
- Aydin, C. H. (2019). Uzaktan Egitim Calistayi. *Uzaktan Egitimin Tasarimi ve Guncel Sorunlar*, 49.
- Aydin, S., & Ozturk, A. (2017). Anadolu Universitesi Acikogretim Sistemindeki ogrenenlerin sinav ve buro hizmetlerine yonelik goruslerinin degerlendirilmesi. *Acikogretim Uygulamalari ve Arastirmalari Dergisi*, 3(3), 64–79.
- Balta, Y. (2014). Online course providers views towards online measurement and evaluation methods in Turkey [Unpublished master's thesis]. Firat University
- Basir, H. M., Ahmad, A., & Noor, N. L. M. (2010). Institutional Strategy for Effective Blended E-Learning. *International Conference on User Science Engineering (i-USER)*, 71–76. <https://doi.org/10.1109/IUSER.2010.5716726>
- Bokolo, A., Kamaludin, A., Romli, A., Mat Raffei, A. F., A/L Eh Phon, D. N., Abdullah, A., Leong Ming, G., A. Shukor, N., Shukri Nordin, M., & Baba, S. (2020). A managerial perspective on institutions' administration readiness to diffuse blended learning in higher education: Concept and evidence. *Journal of Research on Technology in Education*, 52(1), 37–64. <https://doi.org/10.1080/15391523.2019.1675203>
- Bokolo, A. (2022). An exploratory study on academic staff perception towards blended learning in higher education. *Education and Information Technologies*, 27, 3107–3133. <https://doi.org/10.1007/s10639-021-10705-x>
- Bozkurt, A., & Ucar, H. (2018). E-learning and e-exams: examination of learners' perspectives concerning the authentication methods in online assessment processes. *Mersin University Journal of the Faculty of Education*, 14(2), 745–755. <https://doi.org/10.17860/mersinefd.357339>
- CHE (2020). Procedures and Principles Regarding Distance Education in Higher Education Institutions. https://www.yok.gov.tr/Documents/Kurumsal/egitim_ogretim_dairesi/Uzaktan_ogretim/yukseogretim_kurumlarinda_uzaktan_ogretime_iliskin_usul_ve_esaslar.pdf
- Christensen, C. M., Horn, M. B., & Staker, H. (2013). Is K-12 blended learning disruptive? An introduction to the theory of hybrids. *Clayton Christensen Institute for Disruptive Innovation*, 1-48.
- Dakduk, S., Santalla-Banderli, Z., & van der Woude, D. (2018). Acceptance of blended learning in executive education. *SAGE Open*, 8(3), 1–16. <https://doi.org/10.1177/2158244018800647>
- Dundar, S., Candemir, O., Demiray, Genc Kumtepe, E., Ozturk, S., Saglik, M. & Ulutak, I. (2017). Anadolu Universitesi calisanlarinin acik ve uzaktan ogretime iliskin tutumlari. *Acikogretim Uygulamalari ve Arastirmalari Dergisi*, 3 (4), 187-227.

- Garrison, D. R., & Vaughan, N. D. (2013). Institutional change and leadership associated with blended learning innovation: Two case studies. *Internet and Higher Education*, 18, 24–28. <https://doi.org/10.1016/j.iheduc.2012.09.001>
- Ghazal, S., Al-Samarraie, H., & Aldowah, H. (2018). “i am still learning”: Modeling LMS critical success factors for promoting students’ experience and satisfaction in a blended learning environment. *IEEE Access*, 6, 77179–77201. <https://doi.org/10.1109/ACCESS.2018.2879677>
- Gonzalez, A., & Roig, H. (2018). Regulations for distance education for the Argentine university: Pending advances and challenges. *Virtualidad Educacion Y Ciencia*, 9(16), 152-157.
- Gunduz, M. E., Kursun, E., Karaman, S., & Demirel, T. (2020). Problems, expectations, and amendments regarding distance education legislation in higher education institutions in Turkey. *Turkish Online Journal of Distance Education*, 21(4), 173-194. <https://doi.org/10.17718/tojde.803402>
- Gurer, M. D., Tekinarslan, E., & Yavuzalp, N. (2016). Opinions of instructors who give lectures online about distance education. *Turkish Online Journal of Qualitative Inquiry*, 7(1), 47. <https://doi.org/10.17569/tojqi.74876>
- Heilporn, G., Lakhali, S., & Belisle, M. (2021). An examination of teachers’ strategies to foster student engagement in blended learning in higher education. *International Journal of Educational Technology in Higher Education*, 18(1), 2–25. <https://doi.org/10.1186/s41239-021-00260-3>
- Hrastinski, S. (2008). What is online learner participation? A literature review. *Computers & Education*, 51(4), 1755-1765. <https://doi.org/10.1016/j.compedu.2008.05.005>
- Hung, M. L., & Chou, C. (2015). Students’ perceptions of instructors’ roles in blended and online learning environments: A comparative study. *Computers and Education*, 81, 315–325. <https://doi.org/10.1016/j.compedu.2014.10.022>
- IHEP (2000). Quality on the line: Benchmarks for success in internet based distance education. <http://www.ihp.org/sites/default/files/uploads/docs/pubs/qualityontheline.pdf> (27.02.2022’de alinmistir).
- Ibicioglu, H., & Antalyali, U. O. L. (2005). Uzaktan egitimin basarisinda imkân algi motivasyon ve etkileşim faktorlerinin etkileri: Karsilastirmali bir uygulama. *Cukurova Universitesi Sosyal Bilimler Enstitusu Dergisi*, 14(2), 325-338.
- Kapucu, N. K., & Adnan, M. (2018). Assessment of e-tutor success in online professional development. *HAYEF Journal of Education*, 15(1), 7-20.
- Karapinar, D. C., Guler, M., Kursun, E., & Karaman, S. (2018). Ataturk Universitesi kampus tabanlı dersler modeli bilesenlerine yonelik ogrenci gorusleri. *Acikogretim Uygulamalari ve Arastirmalari Dergisi*, 4(2), 90–111.
- Kayabas, B.K. (2020). E-sertifika programlarinda sinav uygulamalari: Sorunlar ve cozum onerileri. *Acikogretim Uygulamalari ve Arastirmalari Dergisi (AUAd)*, 6(4), 81-96.
- Kayaduman, H., & Demirel, T. (2019). International review of research in open and distributed learning different distance education courses. *International Review of Research in Open and Distributed Learning*, 20(5), 84–103.
- Kirmaci, O., & Acar, S. (2018). The problems of campus students in simultaneous online distance education. *Journal of Theory and Practice in Education*, 14(3), 276–291. <https://doi.org/10.17244/eku.378138>
- Mete, G., & Demir, T. (2021). Field experts’views on turkish course digital content development process. *The Journal of Academic Social Science*, 9 (116), 202-224.
- Miles, M. B., & Huberman, A. M. (1994). Qualitative data analysis: An expanded sourcebook (2nd ed.). California: SAGE Publications.
- Ozdemir, S. (2002). Egitimde toplam kalite yonetimi. *Kirgizistan-Turkiye Manas Universitesi Sosyal Bilimler Dergisi*, 2, 253–270.
- Ozmen, A., & Ediz, I. G. (2002). Uzaktan egitim ve Dumlupinar Universitesi modeli. *Acik ve Uzaktan Egitim Sempozyumu*, 25.

- Oztas, S., & Kilic, B. (2017). The evaluation of university students' opinions of teaching the Atatürk's Principles and History of Revolution course with distance education (Kirklareli University sample). *Turkish History Education Journal*, 6(2), 268–293.
- Rasheed, R. A., Kamsin, A., & Abdullah, N. A. (2020). Challenges in the online component of blended learning: A systematic review. *Computers and Education*, 144, 103701. <https://doi.org/10.1016/j.compedu.2019.103701>
- Saltan, F. (2016). Blended learning experience of students participating pedagogical formation program: Advantages and limitation of blended education. *International Journal of Higher Education*, 6(1), 63. <https://doi.org/10.5430/ijhe.v6n1p63>
- Siraj, K. K., & Maskari, A. Al. (2019). Student engagement in blended learning instructional design: an analytical study. *Learning and Teaching in Higher Education: Gulf Perspectives*, 15(2), 61–79. <https://doi.org/10.18538/lthe.v15.n2.283>
- Simsek, N. (2012). Quality indicators in distant education and the assessment of technology- based distant education according to these indicators. *Journal of Educational Sciences & Practices*, 11(21), 1-24.
- Tamim, R. M. (2018). Blended learning for learner empowerment: Voices from the Middle East. *Journal of Research on Technology in Education*, 50(1), 70–83. <https://doi.org/10.1080/15391523.2017.1405757>
- Tonbuloglu, B., & Aydin, H. (2015). Quality standards in distance education. *Journal of Research in Education and Teaching*, 4(4), 369–377.
- Toprak, E., & Sakar, A. N. (2021). Need for accreditation agencies as stakeholders in open and distance learning: Case of “audak” in Turkish Higher Education System. *Turkish Online Journal of Distance Education*, 21, 29–48. <https://doi.org/10.17718/TOJDE.770904>
- Turnbull, D., Chugh, R. & Luck, J. (2021). Transitioning to E-Learning during the COVID-19 pandemic: How have Higher Education Institutions responded to the challenge? *Education and Information Technologies*, 26, 6401–6419. <https://doi.org/10.1007/s10639-021-10633-w>
- Uysal, O., & Kuzu, A. (2011). Quality standards in online education: samples from America. *Anadolu Journal of Educational Sciences International*, 1(1), 49–74. <https://doi.org/10.18039/ajesi.01561>
- Ustun, A.G. (2020). Examination of campus-based online courses' processes grounded on distance education centers' experiences [Unpublished doctoral dissertation]. Ataturk University
- Wang, H. (2011). Creditable learning assessment in internet-based distance education: a protocol for online supervised examination with authentication, *The International Conference on E-Learning, E-Business, Enterprise Information Systems, & EGovernment, Proceedings Book*, 471-477.
- Wang, Y., Han, X., & Yang, J. (2015). Revisiting the blended learning literature: using a complex adaptive systems framework. *Journal of Educational Technology & Society*, 18(2), 380–393.
- Warren, L., Reilly, D., Herdan, A., & Lin, Y. (2021). Self-efficacy, performance and the role of blended learning. *Journal of Applied Research in Higher Education*, 13(1), 98–111. <https://doi.org/10.1108/JARHE-08-2019-0210>
- Williams, P. E. (2003). Roles and competencies for distance education programs in higher education institutions. *International Journal of Phytoremediation*, 21(1), 45–57. https://doi.org/10.1207/S15389286AJDE1701_4
- Yazgan, C. U. (2022). Attitudes and interaction practices towards distance education during the pandemic. *Education and Information Technologies*, 27, 5349–5364. <https://doi.org/10.1007/s10639-021-10843-2>
- Yildirim, A., & Simsek, H. (2013). Sosyal Bilimlerde Nitel Arastirma Yontemleri (9. Baski). Seckin Yayıncılık.
- Yin, R.K. (2003). *Case study research* (2nd ed.). Sage Publications.
- Zhang, J. F., Zheng, S. H., & Yu, D. (2012). Thoughts about legislation of modern long-distance education. *Adult Education*, 3.

ANTECEDENTS TO THE UNDERPRIVILEGED UNDERGRADUATE STUDENTS' INTENTION TO PARTICIPATE IN ONLINE CLASSES

Zarin Khan MOON

ORCID: 0000-0002-1819-7599
Department of Marketing
Jashore University of Science and Technology
Jashore, BANGLADESH

Dr. AI AMIN

ORCID: 0000-0003-2303-082X
Department of Marketing
Bangabandhu Sheikh Mujibur Rahman Science and Technology University
Gopalganj, BANGLADESH

Dr. Hossain ALI

ORCID: 0000-0003-0278-7575
Department of Accounting and Information Systems
Jashore University of Science and Technology
Jashore, BANGLADESH

Dr. Mahedi HASAN

ORCID:0000-0003-2648-0746
Department of Accounting and Information Systems
Jashore University of Science and Technology
Jashore, BANGLADESH

Received: 27/12/2022 **Accepted:** 05/06/2023

ABSTRACT

COVID-19 pandemic has forced educational institutions to use e-learning systems. Bangladesh is no exception; many students come from underprivileged families who are not well-off. This study aimed to explore the antecedents to the underprivileged undergraduate students' intention to participate in online classes in Bangladesh through the integration of the Technology Acceptance Model, Information Systems Success Model, and Theory of Planned Behaviour. We used confirmatory factor analysis (CFA) to test the hypotheses. The non-probability sampling method was used to select 394 respondents by dint of the subjective judgment of the researchers. Using smart PLS software, the data were analyzed with Structural Equation Modeling (SEM). It was divulged that e-Learning usage intention (BI) is influenced by attitude (ATT), perceived usefulness (PU), students' online learning satisfaction (SOS) and subjective norms (SN). But perceived ease of use (PEU) and system quality (SQ), internet service quality (ISQ) and perceived behavioral control (PBC) do not influence BI. Even ISQ does not influence SOS. It was also revealed that PEU mediated attitude and PU, and PEU and SQ also influenced SOS. The study contributes to e-Learning literature by incorporating three models which may guide policymakers in understanding how to integrate students from all social classes into e-learning systems to eliminate academic digital discrimination.

Keywords: Bangladesh, underprivileged undergraduate students, intention for e-learning.

INTRODUCTION

Bangladesh, a South-Asian country, reported the first COVID-19 case on March 8, 2020 (Shammi, Bodrud-Doza, Islam, & Rahman, 2020). Consequently, on March 17, 2020, the government was supposed to close

all educational institutions and order students at all academic levels to stay home to ensure social isolation (Emon, Alif, & Islam, 2020). Subsequently, many Bangladeshi schools, colleges, and universities have switched to e-learning platforms (Al-Amin, Zubayer, Deb, & Hasan, 2021). As a result, the learning strategy has completely transformed from in-person learning to virtual classes (Khan, Rabbani, Thalassinis, & Atif, 2020) where being in different locations, the students and instructors can communicate using the internet and computers (Moore, Dickson-Deane, & Galyen, 2011; Sing & Thurman, 2019). It is also referred to as e-learning, computer-based, web-based, or virtual learning (Bartley & Golek, 2004), which is very expensive to most unprivileged rural people in a developing country like Bangladesh. Though this system has recently been employed as an alternate strategy to offset losses in the education sector (Al-Amin et al., 2021), there is a big question regarding the digital discrimination resulting from the shift (Adam, Kaye & Haßler, 2020; Jæger and Blaabæk, 2020). For example, Sintema (2020) described that the percentage of passing students significantly dropped in 2020 because of digital discrimination due to unequal family financial conditions.

Moreover, online class participants experience various other challenges. Because of the pandemic's unpredictability and rapid growth, online teaching platforms were developed quickly without adequate evaluation (Han & Sa, 2021). In addition, students and teachers have been facing problems due to power cuts, poor and unstable internet connection, especially in the rural areas of the country (Al-Amin et al., 2021), lack of appropriate electronic devices (Rouf, Hossain, Habibullah, & Ahmed, 2022), lack of separate/isolated home study environments (Al-Amin et al., 2021).

So, this study aims to identify the factors influencing underprivileged undergraduate students' intention to participate in online classes in Bangladesh. Although some researchers have explored the determinants of the student's satisfaction with/intention to use e-learning (Farahat, 2012; Liaquat, Siddiqui, & Iqbal, 2021; Li & Yu, 2020; Masrom, 2007; Rahman, Uddin, & Dey, 2021), this study expands the existing research in several ways.

Firstly, this study unearths the factors of underprivileged undergraduate students' intention to participate in online classes in a developing country like Bangladesh through a conceptual model combining three theoretical models, namely the Technology Acceptance Model (TAM), Information Systems Success Model (ISSM), and Theory of Planned Behaviour (TPB). Previous studies in this context did not use comprehensive theoretical models to identify the predictors of e-learning usage intention (Al-Amin et al., 2021; Rahman et al., 2021; Rouf et al., 2022; Sarkar, Das, Rahman, & Zobaer, 2021).

Secondly, the sample of this study consists of only underprivileged and marginalized undergrad-level university students. This population subgroup presents a unique research opportunity because of the disproportionately large impact of COVID-19 and related government interventions on this group, which has become even bigger due to the pandemic (Lata, 2022). Survey results claim that poverty rose to 42%, and extreme poverty rose to as high as 28.5% of the total population of Bangladesh during the COVID-19 pandemic (Raihan, Uddin, Ahmed, Nahar, & Sharmin, 2021). Moreover, a nationwide survey also reported a significant decrease in the education expenditure of poor households (Raihan et al., 2021). Therefore, the adoption of an online education system by poor students is specifically explored in this study.

PURPOSE OF THE STUDY

Previous Literature on E-Learning Usage Intention

By the second quarter of 2020, COVID-19 has infected approximately 1.2 billion individuals, forcing the closure of numerous educational institutions (Dhawan, 2020) and the adoption of online learning (Chandra, 2021). Online learning often refers to organizing class sessions using applications such as Zoom, Microsoft Teams, Moodle, Google Meet, Adobe Connect, etc. (Liaquat et al., 2021). Various factors determine the effectiveness of and learners' intention to use this e-learning system (Aristovnik, 2020).

Studies exploring learners' intentions to use e-learning system span across different countries and regions (e.g. in the US (Lee, 2010) in Korea (Lee and Kim, 2009; Han and Sa, 2021; Kim, Kim, & Han, 2021; Li & Yu, 2020; Lee, 2010), in Malaysia (Masrom, 2007), in Egypt (Farahat, 2012), in Lebanon (Tarhini, Hone, & Liu, 2014), in Algeria (Mouloudj, Bouarar, & Stojczew, 2021), in Bangladesh (Rahman et al., 2021). The studies employed various theoretical models/lenses, e.g., TAM (Farahat, 2012; Han and Sa, 2021; Li & Yu, 2020; Masrom, 2007; Tarhini et al., 2014), TPB (Kim et al., 2021; Mouloudj et al., 2021).

The existing survey-based literature on the perception of online learning during the Covid-19 pandemic in Bangladesh is abundant, with evidence of challenges educators and learners face at different levels. However, no comprehensive conceptual/theoretical framework has been developed and tested (see Al-Amin et al., 2021; Rouf et al., 2022; Sarkar et al., 2021). Although Rahman et al. (2021) presented important evidence on the mediating role of online learning motivation on online learning satisfaction, a range of other factors, as suggested by many behavioural models, are still out of the picture. Therefore, this scarcity of research employing comprehensive behavioural models to identify the factors of online education usage intention in Bangladesh motivates this study. This study fills the gap said above. So, this study aims to explore the antecedents that play a pivotal role in upholding underprivileged undergraduate students' continuing intention to attend online classes.

Theoretical Framework

The preceding discussions and assessments of prior studies on students' acceptance behaviour and the linkages between variables serve as the foundation for developing a conceptual framework to investigate the elements influencing unprivileged students' intentions to participate in online classes. The intention is defined as how someone is willing to attempt to do a behaviour and how dedicatedly they intend to be in completing the behaviour.

According to the previously reviewed literature, significant research has been conducted using the Theory of Reasoned Action (TRA) model to discover online support service quality, online learning acceptance, and student satisfaction (Lee, 2010).

Aside from this theoretical framework, the Technology Acceptance Model (TAM) has been investigated to emphasize the link between variables. Davis (1989) proposed the TAM by expanding Fishbein and Ajzen's (1977) theory of reasoned action (TRA). TAM is the most effective methodology for analyzing information technology uptake (Gefen and Straub, 2000; Venkatesh & Davis, 2000; Wang, Wang, Lin, & Tang, 2003). The TAM of Davis (1989) is presented as a succinct and effective theoretical framework for examining how the perceived usefulness (PU) and perceived ease of use (PEU) of new technology or service affect its acceptance. As a result, TAM employs the two notions of "perceived ease of use" and "perceived usefulness" to explain users' intention to use information systems while embracing the causality of TRA (Davis, 1989).

In addition to this theory, the TPB has been studied to underline the relationship between attitude and intention. The TRA provides the foundation for the concept of planned behaviour. This theory adds perceived behavioural control as additional evidence of intention to attitude and subjective norms. Several researchers used TPB or an expanded version of TPB to look into students' intentions to use online learning (Chu & Chen, 2016; Lung-Guang, 2019; Ngafeeson & Gautam, 2021). Kim et al. (2021) and Akour, Alshurideh, Kurdi, Ali, & Salloum (2021) used both the TAM and the TPB to evaluate factors impacting students' intention to use online learning.

This study examines intention in terms of attitude, PU, PEU, subjective norm, system quality, online learning satisfaction, and service quality. Previous research has found that a new technology or service's perceived usefulness and ease of use influence its acceptability. On the other hand, subjective norms and attitudes are the most influential TRA factors in determining people's propensity to adopt online platforms as a learning medium. The factors of ISSM (Information Systems Success Model) model-System quality, service quality, online learning satisfaction, and IT competency are all new factors discovered in earlier studies that are being studied to see if there is a link between these factors and online learning platform adoption.

Based on a review of the existing literature and empirical evidence, the conceptual model for this study was constructed by integrating TPB, TAM, and ISSM from the perspective of Bangladesh to assess the antecedents to the marginalized undergraduate students' intention to participate in online classes in Bangladesh. Figure 1 depicts the conceptual model adopted in this investigation (conceptual framework).

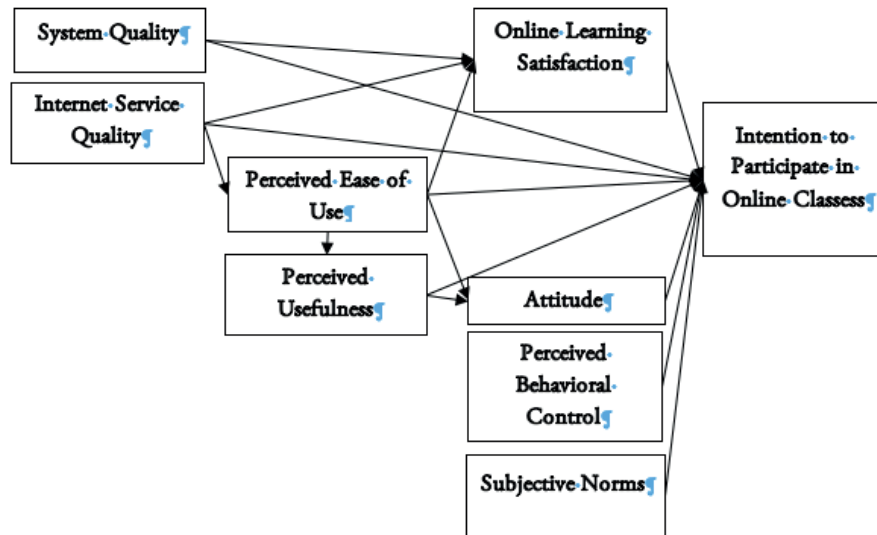


Figure 1. Proposed research model (Conceptual framework) of the study

Hypotheses Development

Attitude (ATT)

As per TPB, attitude is “the degree to which a person has a favourable or unfavourable evaluation or appraisal of the behaviour in question” (Ajzen, 1991). Here the researchers define attitude as “an overall positive or negative evaluation towards the behaviour of users of the online learning system.” Because the learners’ behavioural intention to use online learning systems is influenced by the response resulting from attitudes (Sukendro et al., 2020; Muhaimin et al., 2019). Several studies showed that attitude positively affects the intention to use e-learning platforms (Kim et al., 2021; Akour et al., 2021; Mailizar, Burg, & Maulina, 2021; Ndubisi, 2006, Chu and Chen, 2016). Consequently, the following hypothesis was developed:

H1: Students’ attitudes positively and significantly affect their intentions to use online learning systems.

Perceived Usefulness (PU)

As per TAM, the degree to which the user believes using the technology would boost their productivity is termed PU (Masrom, 2007). In the context of e-learning, it is assumed that the availability of useful, efficient information and enhanced educational outcomes will result in the student’s intention to use online learning platforms (Han & Sa, 2021; Lee, 2010). In the previous studies, it was seen that PU has a positive relationship with acceptance of and satisfaction with e-learning (Farahat, 2012; Han & Sa, 2021; Liaquat et al., 2021; Masrom, 2007; Tarhini et al., 2014); online learning acceptance, and student satisfaction (Lee, 2010; Kim et al., 2021). Thus:

H2a: Perceived usefulness positively and significantly affect the intentions to use online learning systems.

In the context of E-learning in different studies, it was seen that perceived usefulness has a positive relationship with attitudes toward online learning platforms (Farahat, 2012; Kim & Han, 2021; Li & Yu, 2020, Masrom, 2007). Thus:

H2b: Perceived usefulness positively and significantly affects attitudes towards online learning systems.

Perceived Ease of Use (PEU)

As per TAM, PEU is the degree to which users believe utilizing the system would require no effort or how simple it would be to learn and use (Davis, 1989). In the context of e-learning, if the students feel that they can clearly and easily understand and skillfully use the online learning system, it will result in a positive

attitude toward the system through the satisfaction that will lead to the intention to use online learning system (Han & Sa, 2021). In the prior studies, it was seen that PEU influences students' attitudes toward online learning (Farahat, 2012; Kim et al., 2021; Li & Yu, 2020; Masrom, 2007), perceived usefulness of the learning system (Farahat., 2012; Masrom, 2007; Tarhini et al., 2014), online learning satisfaction of the students (Han & Sa, 2021) and finally the behavioural intention of the students to use the online learning system (Liaquat et al., 2021; Han & Sa, 2021; Tarhini et al., 2014). Thus:

H3a: PEU positively and significantly affects students' attitudes toward online learning systems.

H3b: PEU positively and significantly affects the PU of the learning system.

H3c: PEU positively and significantly affects students' perceived online learning satisfaction.

H3d: PEU positively and significantly affects the behavioural intention to participate in online classes.

Perceived Behavioural Control (PBC)

PBC is an individual's perceived ease or difficulty in performing a particular behaviour of interest (Ajzen, 1991). It describes a student's assessment of the perceived ease or difficulty of carrying out the desired conduct (Valtonen et al., 2015). In the context of e-learning, it is assumed that if the students have the ability and required resources to use the online learning system, they will be intended to use the e-learning system. Although in a former study, it was seen that students' PBC has no substantial influence on BI to use e-learning (Kim & Han, 2021), the following hypothesis has been developed to justify that finding:

H4: Students' PBC positively and significantly affects the BI participating in online classes.

System Quality (SQ)

System quality refers to how well an e-learning system performs its functions and how well users rate the system in terms of the information it provides and the efficiency of information transmission (Rui & Lin, 2018). In the context of e-learning, if the students are satisfied with the e-learning system functions, internet speed, and e-learning content, it will result in their satisfaction with the platform and will lead to the intention to use the e-learning system. Several research findings (Islam, 2010; Zeithaml, Parasuraman, & Malhotra, 2000) show that system quality influences students' perceived online learning satisfaction (SOS), which affects behavioural intention (Ajzen, 1991; Al-Marroof, Salloum, AlHamadand, & Shaalan, 2020; Cheng, 2012; Davis, 1989). Thus:

H5a: SQ positively and significantly affects the SOS.

H5b: SQ positively and significantly affects the BI participating in online classes.

Internet Service Quality (ISQ)

In the case of the online learning system, service quality refers to the internet service with the innovative and advanced technology with strong and high-quality network signals ensuring quick communication service more efficiently (Joudeh & Dandis, 2018). In this study, it is assumed that if the internet service is competent and efficient with strong and high-quality network signals providing easy access to the students during busy times, then it will be easy for the students to handle, ensuring satisfaction resulting in the intention to use the e-learning systems. Several research (Cristobel and Guinaliu, 2007; Gounaris & Dimitriadis, 2008; Zeithaml et al., 2000) demonstrated that service quality influences satisfaction, which in turn affects behavioural intention (Ajzen, 1991; Davis and Venkatesh, 1991; Fishbein and Ajzen, 1975). The following hypotheses have been offered based on ideas, concepts, and evidence from various empirical studies, namely:

H6a: ISQ positively and significantly affects the BI for participating in online classes.

H6b: ISQ positively and significantly affects the PEU of online classes.

H6c: ISQ positively and significantly affects the SOS.

Students' Online Learning Satisfaction (SOS)

Satisfaction is key to improving user continuity intention and enhancing e-learning's competitive advantage (Paramadini and Suzianti, 2021). In this study, it is assumed that if the students are satisfied with the online instructional styles of the instructors, the learning contents and course structure, the assignment submission process, and online exams, they will be motivated to attend and continue the online classes. Previous research suggested that PU and satisfaction can directly affect continuance intention (Al-Marroof et al., 2020; Chen, Lai, and Ho, 2015; Venter and Swart, 2018). Thus:

H7: SOS positively and significantly affects BI to participate in online classes.

Subjective Norm (SN)

Subjective norm, as the social pressures on an individual to do or not to execute a specific activity, regulates conduct motivated by a desire to act as others expect (Ajzen, 1991). In this study, it was assumed that if the people important to the students influence them and want them to use online classes, and if most of their friends use online classes, they will be motivated to use them. Previous studies showed that subjective norms directly impact behavioural intention (Kim et al., 2021; Mouloudj et al., 2021; Tarhini et al., 2014). Thus:

H8: SN positively and significantly affects BI to participate in online classes.

Mediation Relationships

This study explores the mediation effect of attitude, perceived ease of use, perceived usefulness, and students' online learning satisfaction on e-learning usage intention. Therefore the following hypothesis is also tested.

H9: Attitude mediates the impact of ISQ, PEU, PU and SQ; PEU mediates the effects of ISQ; PU mediates the impact of PEU, and SOS mediates the impact of PEU, ISQ, and SQ on the intention to use online learning systems.

METHOD

Research Design and Participants

This study aims to determine the antecedents to the online learning intention of Bangladesh's unprivileged marginalized undergraduate students. The target respondents for this study are unprivileged students who go through socioeconomic conditions where there is a lack of proper logistic support that facilitates online learning systems. The students of Jashore University of Science and Technology, Bangabandhu Sheikh Mujibur Rahman Science and Technology University of Gopalgang, and Khulna University, which are situated in the bordering zone of Bangladesh, were focused. After selecting the population and respondent category, we select the minimum sample size using the following formula (Saunders, Lewis and Thornhill, 2019):

$$n = \frac{Z^2 p(1-p)}{\epsilon^2} = \frac{Z^2 pq}{\epsilon^2} = 384$$

Here, n = sample size, Z = tabulated value = 1.96 (for a large sample at a 5% significance level), p = proportion of success, $q = 1 - p$ = proportion of failure, ϵ = margin of error = 0.05. Based on the formula, the sample size is 384. But this paper used 394 respondents as the sample for better results of the data analysis.

Here the population was known, but as the sampling frame was unknown, the non-probability sampling method was used to select the respondents by the subjective judgment of researchers (Saunders, Lewis, & Thornhill, 2019). We used the judgmental sampling technique (i.e., purposive sampling) to lessen the sampling error arising from the random sampling technique in this situation where the marginalized students are to be found. Besides, judgmental sampling enables us to minimize the cost and time of data collection (Hair, Hult, Ringle, & Sarsstedt, 2017).

The questionnaire was of two parts- (i) one was for demographic information, and (ii) another one was for measurement items. Following the back-translation method (Brislin, 1976), we translated the English questionnaire into Bengali, the mother tongue of Bangladeshis, for better comprehension by the students. Two bilingual professors of marketing checked the Bengali version of the questionnaire. Then pilot survey was conducted among 25 students, and the study result showed that they appropriately comprehended the measurement items, and then it was accepted for data collection.

Measurement Scale

A Likert scale with a maximum of five points was employed for all of the constructs, with ‘1’ being “strongly disagree” and ‘5’ being “strongly agree.” The existing researches are the source of all the measurement items. The items with sources are not reported but are available on demand.

Data Collection and Data Analysis

The researchers collected data from April 2021 and June 2021. During the pandemic situation, to maintain social distance, the universities introduced online learning systems. At that time, the students faced some difficulties in attending online classes. An email containing a cover letter and a questionnaire was sent to each respondent’s email address following Dillman’s (2000) suggestion to guarantee optimal convenience for responding to the survey. Email requests to complete the survey were repeatedly made to the responders. The prospective respondents received 700 questionnaires, and 425 responded with their opinions. 394 replies (56.29%) were kept after the incomplete ones were discarded. 35.3% (139) of them were female, and 64.7% (255) were men.

We applied structural equation modelling (SEM) to evaluate the data, which simultaneously analyzes several dependent variables, causal models, or equations (Chin, 1998; Cohen, 2018; Wang, Lew, Lau, & Leow, 2019). The SEM can be divided into two categories: partial least square SEM (PLS-SEM) and covariance-based SEM (CB-SEM) (Wang et al., 2019). While PLS-SEM analyzes independent and dependent factors to forecast and estimate the maximum explained differences, CB-SEM examines whether the observed variables in the covariance matrix are suitable (Wang et al., 2019). Additionally, PLS-SEM can forecast how much an ensemble of exogenous variables will affect the endogenous variables’ fluctuations (Al Amin et al., 2021). The current study followed the recommendations of Hair et al. (2017) and used SMART PLS 3.0 software for confirmatory factor analysis (CFA).

Table 1. Demographic profile of the respondents

Variable	Number	Percentage
Gender		
Male	255	64.7
Female	139	35.3
Living Area		
Urban	255	64.7
Rural	139	35.3
Devices		
Smart Mobile	291	73.9
Laptop	99	25.1
Desktop	4	1.0
Internet Users		
Wifi	176	44.7
Mobile Data	218	55.3

Research Validation and Results

Validating Measurement Model

As per the suggestion of Hair et al. (2017), the outer measurement model was tested to validate the research model. We used rohA, CR, and Cronbach Alpha to assess the model's construct reliability. AVE and factor loadings were used to validate the model's convergent validity, while the Fornell and Lacker criteria and the HTMT ratio were used to assess the model's discriminant validity.

Construct Reliability and Convergent Validity

As per the suggestion of Hair et al. (2017)), we have ensured the construct reliability. They proposed that composite reliability (CR) should be more than 0.7, explaining 70% of the variation in the measurement model. Additionally, the reference range for Cronbach's alpha and rohA provided by Hair et al. (2017), which ranges from 0 to 1, was used in our research to validate the measurement model. Greater consistency is explained by the value that is closer to 1. The cut-off value was said to be 0.7 (: >0.7; rohA: >0.7). Additionally, the convergent validity was confirmed by dint of cross-loadings and average variance extracted (AVE). The cut-off value for AVE for each construct was more than 0.5, explaining 50% of the variance in the research model (Hair et al., 2017). Each construct met the prerequisites for rohA, CR, Cronbach Alpha, AVE, and factor loadings in table 2. Fornell and Lacker criteria and heterotrait-monotrait (HTMT) Ratio of correlations were used to ensure the discriminant validity of the measurement model. As per the suggestion of Hair et al. (2017), the diagonal values resembling the squared root of AVE should be greater than off-diagonal values, which were ensured by The Fornell and Lacker criterion (table 3). The HTMT correlation ratio, shown in table 4, must be less than 0.85 (HTMT < 0.85) to be considered legitimate (Henseler, Ringle, &, Sarstedt, 2015).

Table 2. Construct reliability (rohA, CR, and Cronbach Alpha), AVE, and cross-loading.

Constructs	Items	Loadings	CR>0.7	Cranach's alpha> 0.7	rhoA> 0.7	AVE> 0.5
Attitude (ATT)	ATT1	0.853	0.885	0.827	0.835	0.660
	ATT2	0.843				
	ATT3	0.796				
	ATT4	0.754				
Intention (INT)	INT1	0.910	0.964	0.954	0.954	0.844
	INT2	0.933				
	INT3	0.945				
	INT4	0.904				
	INT5	0.900				
Internet Service Quality (ISQ)	ISQ1	0.858	0.953	0.942	0.943	0.742
	ISQ2	0.874				
	ISQ3	0.892				
	ISQ4	0.777				
	ISQ5	0.877				
	ISQ6	0.842				
	ISQ7	0.904				
Perceived Behavioral Control (PBC)	PBC1	0.839	0.876	0.824	0.890	0.642
	PBC3	0.814				
	PBC4	0.887				
Perceived Ease of Use (PEU)	PEU1	0.849	0.916	0.878	0.885	0.732
	PEU 2	0.891				
	PEU 3	0.863				
	PEU 4	0.818				

Perceived Usefulness (PU)	PU 1	0.810	0.938	0.922	0.924	0.682
	PU2	0.814				
	PU 3	0.837				
	PU 4	0.822				
	PU 5	0.851				
	PU 6	0.807				
	PU 7	0.839				
Subjective Norm (SN)	SN1	0.891	0.929	0.897	0.909	0.767
	SN2	0.928				
	SN3	0.924				
	SN4	0.749				
Student's online learning satisfaction (SOS)	SOS1	0.791	0.905	0.867	0.877	0.658
	SOS2	0.893				
	SOS3	0.868				
	SOS4	0.876				
System quality (SQ)	SQ 1	0.878	0.895	0.843	0.861	0.681
	SQ2	0.703				
	SQ3	0.844				
	SQ4	0.864				

Table 3. Fornell and Lacker criteria.

	ATT	BI	ISQ	PBC	PEU	PU	SN	SOS	SQ
ATT	0.812								
BI	0.750	0.919							
ISQ	0.415	0.472	0.862						
PBC	0.584	0.573	0.493	0.847					
PEU	0.433	0.363	0.324	0.583	0.856				
PU	0.770	0.745	0.452	0.550	0.436	0.826			
SN	0.727	0.751	0.462	0.590	0.373	0.698	0.876		
SOS	0.642	0.697	0.512	0.563	0.408	0.668	0.635	0.858	
SQ	0.561	0.641	0.663	0.552	0.375	0.615	0.593	0.757	0.825

Table 4. Heterotrait-monotrait ratio of correlations (HTMT).

	ATT	BI	ISQ	PBC	PEU	PU	SN	SOS	SQ
ATT									
BI	0.843								
ISQ	0.466	0.497							
PBC	0.703	0.632	0.573						
PEU	0.499	0.391	0.351	0.700					
PU	0.871	0.790	0.480	0.624	0.476				
SN	0.847	0.810	0.502	0.688	0.411	0.762			
SOS	0.747	0.757	0.561	0.652	0.458	0.736	0.714		
SQ	0.659	0.709	0.764	0.659	0.431	0.687	0.679	0.869	

Validating structural model. We have used multiple correlations (R2) to validate our structural model, according to Henseler et al. (2015). Using the SMART PLS3 software, we determined the path coefficient for validating our proposed model, assessing the *t*-test value by the routine bootstrapping of 5000 resamples. Path coefficient results and hypotheses have been depicted in table 5. H1 was supported and ATT had an impact on BI ($\beta = 0.232$, *t*-statistics = 3.357, $p < 0.001$) (table 5). In case of H2a, and H2b, it was seen that PU influenced ATT ($\beta = 0.717$, *t*-statistics = 25.747, $p < 0.000$) and BI ($\beta = 0.211$, *t*-statistics = 3.783, $p < 0.000$) in supporting H2a and H2b in a significant and positive manner. BI is also influenced by SOS ($\beta = 0.161$, *t*-statistics = 2.584, $p < 0.010$) and SN ($\beta = 0.267$, *t*-statistics = 4.229, $p < 0.000$) supporting H8 and H9 in the model. Besides, in the context of H3a, H3c and H3d, ATT ($\beta = 0.120$, *t*-statistics = 3.321, $p < 0.001$),

Table 5. Path coefficient and hypotheses test result.

Hypotheses	Relationship	Path Coefficient	Standard Deviation	T Statistics (O/STDEV)	P Values	Result
H1	ATT -> BI	0.232	0.069	3.357	0.001	Supported
H2a	PU -> ATT	0.717	0.028	25.747	0.000	Supported
H2b	PU -> BI	0.211	0.056	3.783	0.000	Supported
H3a	PEU -> ATT	0.120	0.036	3.321	0.001	Supported
H3b	PEU -> BI	-0.065	0.045	1.422	0.155	Not supported
H3c	PEU -> PU	0.436	0.045	9.617	0.000	Supported
H3d	PEU -> SOS	0.145	0.042	3.475	0.001	Supported
H4	PBC -> BI	0.059	0.052	1.136	0.256	Not supported
H5a	SQ -> BI	0.086	0.063	1.371	0.171	Not supported
H5b	SQ -> SOS	0.703	0.053	13.169	0.000	Supported
H6a	ISQ -> BI	0.009	0.041	0.219	0.826	Not supported
H6b	ISQ -> PEU	0.324	0.052	6.295	0.000	Supported
H6c	ISQ -> SOS	-0.001	0.052	0.021	0.983	Not supported
H7	SOS -> BI	0.161	0.062	2.584	0.010	Supported
H8	SN -> BI	0.267	0.063	4.229	0.000	Supported

PU ($\beta = 0.436$, *t*-statistics = 9.617, $p < 0.000$), and SOS ($\beta = 0.145$, *t*-statistics = 3.475, $p < 0.001$) are influenced by PEU in the model. On the other hand, PEU is influenced by ISQ ($\beta = 0.324$, *t*-statistics = 6.295, $p < 0.000$) supporting H6b. But BI is not influenced by PEU ($\beta = -0.065$, *t*-statistics = 1.422, $p < 0.155$), PBC ($\beta = 0.059$, *t*-statistics = 1.136, $p < 0.256$), SQ ($\beta = 0.086$, *t*-statistics = 1.371, $p < 0.171$) and ISQ ($\beta = 0.009$, *t*-statistics = 0.219, $p < 0.826$) in the model that means H3b, H4, H5a and H6a are not supported.

Coefficient of determination (r2) and strength of the effect. It was seen that the R2 values for BI and ATT were 0.714 and 0.604, respectively, which explains 71.4% and 60.4% variation in BI and ATT caused by independent variables. Besides, the R2 value for PEU = 0.105, PU = 0.190 and SOS = 0.591 which are accounted for 10.5 %, 19.0% and 59.1% variation in PEU, PU and SOS by the independent variables in the model (table 6).

Table 6. Coefficient of determination (R2) and strength of the effect.

	R2	Adjusted R2	f2	Effect Size
Effect of BI				
ATT -> BI	0.714	0.708	0.060	Small
PU -> BI			0.051	Small
PEU -> BI			0.009	Small
PBC -> BI			0.006	Small
SQ -> BI			0.008	Small
ISQ -> BI			0.000	Small
SOS -> BI			0.031	Small
SN -> BI			0.094	Small
Effect of ATT				
ATT -> BI	0.604	0.602	0.060	Small
PU -> ATT			1.052	Large
PEU -> ATT			0.029	Small
Effect of PEU				
PEU -> ATT	0.105	0.103	0.029	Small
PEU -> PU			0.235	Moderate
PEU -> SOS			0.043	Small
ISQ -> PEU			0.118	Small
Effect of PU				
PU -> ATT	0.190	0.188	1.052	Large
PU -> BI			0.051	Small
PEU->PU			0.235	Moderate
Effect of SOS				
PEU -> SOS	0.591	0.587	0.043	Small
SQ -> SOS			0.642	Large
ISQ -> SOS			0.000	Small

Effect sizes (f^2) of independent variables were categorized into small, medium, and large by Chin (1998), with values of 0.02, 0.15, and 0.35, respectively. The effect size for this research model ranges from 0.0 to 1.05 (table 6).

Table 7. Indirect effect.

Hypotheses	Relationship	b	t-statistics	P Values
H9a	ISQ -> PEU -> ATT	0.039	2.861	0.004
H9b	PEU -> PU -> ATT	0.313	9.000	0.000
H9c	ISQ -> PEU -> PU -> ATT	0.102	4.564	0.000
H9d	PEU -> ATT -> BI	0.028	2.144	0.032
H9e	ISQ -> PEU -> ATT -> BI	0.009	1.978	0.048
H9f	PU -> ATT -> BI	0.166	3.351	0.001
H9g	PEU -> PU -> ATT -> BI	0.073	3.164	0.002
H9h	ISQ -> PEU -> PU -> ATT -> BI	0.024	2.686	0.007
H9i	ISQ -> PEU -> BI	-0.021	1.307	0.191
H9j	PEU -> PU -> BI	0.092	3.575	0.000
H9k	ISQ -> PEU -> PU -> BI	0.030	2.843	0.004
H9l	ISQ -> SOS -> BI	0.000	0.020	0.984

H9m	PEU -> SOS -> BI	0.023	1.869	0.062
H9n	ISQ -> PEU -> SOS -> BI	0.008	1.841	0.066
H9o	SQ -> SOS -> BI	0.113	2.544	0.011
H9p	ISQ -> PEU -> PU	0.142	4.709	0.000
H9q	ISQ -> PEU -> SOS	0.047	3.084	0.002

Mediation analysis. The current study bootstrapped 5000 times to analyze the indirect effects, which checked PEU's and PU's mediation effect on ATT. We tried to see the mediating effect of PEU between ISQ and ATT/BI/PU/SOS and the mediating effect of ATT between BI and PEU/PU. We also found the mediating impact of PU between PEU and ATT/BI; the mediating effect of SOS between BI and ISQ/PEU/SQ. Besides, the combined impact of PEU and PU between ISQ and ATT/BI; the combined effect of PU and ATT between PEU and BI; the combined effect of PEU and ATT between ISQ and BI; the combined effect of PEU and SOS between ISQ and BI and the combined effect of PEU, PU, and ATT between ISQ and BI were divulged in the model. It was seen that there was significant mediation of 13 hypotheses with a *p*-value less than 0.05 ($p < 0.05$) (table 7). The results proposed BI's partial (complementary) mediation effect among all equations (Hair et al., 2017).

DISCUSSION

The research focused on incorporating TAM, ISSM, and TPB to explore Bangladeshi marginalized university students' BI to use e-learning platforms. Here we have combined three models to examine the intention of using an e-learning platform. We have shown whether there is an association between the determinants of TPB and other models. In hypothesis H1, ATT positively influences the BI for online learning. This finding agrees with previous studies (Akour et al., 2021; Chu and Chen, 2016; Kim et al., 2021; Mailizar et al., 2021; Ndubisi, 2006). This might be due to the COVID 19 pandemic, which forced the students to maintain physical distance, having shaped positive attitudes towards online classes, which is considered a better alternative to class on-campus maintaining a physical distance.

In H2a and H2b, PU, a determinant under TAM, positively influences ATT and BI. Former research works also found a similar relationship between PU and BI (Han & Sa, 2021; Lee, 2010; Li & Yu, 2020; Liaquat et al., 2021; Kim et al., 2021) and between PU and ATT (Farahat, 2012; Kim & Han, 2021; Li & Yu, 2020; Masrom, 2007). As the students' learning performance was hampered due to having been kept in quarantine for a long time due to COVID-19, they believed using online learning technology might improve their performance.

In H3a, H3c, and H3d, PEU, a TAM determinant, significantly influences ATT, PU, and SOS. The former research works also found a similar relationship between PEU and ATT (Farahat, 2012; Kim et al., 2021; Li & Yu, 2020; Masrom, 2007), PEU and PU (Farahat, 2012; Masrom, 2007; Tarhini et al., 2014) and between PEU and SOS (Han & Sa, 2021) which is a determinant of ISSM model. This study is confined to students who are from marginalized families. Any technology to which they have easy access and which is easy to use will benefit them, resulting in positive attitudes towards the technology through satisfaction.

But in hypothesis H3b, we see that PEU does not influence BI, which disagrees with previous studies' findings (Han & Sa, 2021; Liaquat et al., 2021; Tarhini et al., 2014). This might be because an online learning platform requires mobile data or a Wi-Fi connection, and the marginalized students lack money. This is why, although they have positive attitudes toward e-learning, it will not result in the intention to use it because if they get the chance, they will attend in-house classes. And it might be for this reason, in hypothesis H4, we see that PBC does not affect BI, which agrees with the findings of former studies (Kim & Han, 2021).

In H5a, we see that SQ, a factor ISSM, does not influence BI, which disagrees with the former studies (Al-Marroof et al., 2020). As higher SQ requires higher investment in hardware and software, which underprivileged students cannot afford, the variability in SQ in our study sample is not adequately high and therefore, SQ could not explain differences in BI. In H5b, SQ substantially influences SOS, which agrees with the former studies (Cheng, 2019; Salam and Farooq, 2020).

As the students are not from well-off families, SQ will not result in BI but might enhance their satisfaction. And so, in H5b, we see that SQ results in SOS, and for the same reason, in H7, we see that SOS influences BI. The previous studies also found similar findings between SOS and BI (Al-Marroof et al., 2020; Chen et al., 2015; Venter and Swart, 2018). In H8, we see that SN influences BI, which agrees with the previous studies (Kim et al., 2021; Mouloudj et al., 2021; Tarhini et al., 2014). This indicates that when peers attend online classes during COVID-19, the students from unprivileged, especially marginalized families, also feel motivated to attend online classes.

In hypotheses H6a, H6b, and H6c, we see that ISQ does not influence BI, PEU and SOS. These findings disagree with the previous studies (Ajzen, 1991; Cristobel & Guinaliu, 2007; Davis and Venkatesh, 1991; Fishbein & Ajzen, 1975; Gounaris & Dimitriadis, 2008; Zeithaml et al., 2000). This implies that the quality of the internet across the study sample is homogenous. The experienced ISQ is necessarily low and, due to insufficient variability across the sample, cannot explain the variability in BI, PEU, and SOS. The higher the ISQ, the larger the internet expenditure required in Bangladesh. A broadband connection is required to get a stable high-speed internet service, which requires a large initial investment and additional monthly expenditure. This is beyond the affordability/availability of some underprivileged undergraduate students (who use mobile data) while inefficient for others (who avail broadband but experience unstable and low-speed internet due to low-cost packages and/or unstable electricity supply). This is why digital discrimination must be alleviated to ensure the continuing intention of underprivileged undergraduate students to attend online classes.

CONCLUSION AND IMPLICATIONS

This research work has validated an integrated research model to identify the determinants of Bangladeshi unprivileged university students' behavioural intention to use e-learning platforms. Given that online learning was the only way to continue education, students perceived it to be useful, although the perception was varied and could explain the variation in intention to use e-learning. However, ease of use, internet service quality and system quality were perceived to be low as these require resources and investments which poor students could not afford. Therefore, these variables could not explain the variability in the underprivileged university students' intention to use the e-learning approach. Our findings contrast with those of previous literature (based on participants from broader classes and income groups as opposed to our sample of specific groups, namely underprivileged university students) and have significant practical implications for a number of audiences.

This study corroborates previous research showcasing evidence of the digital divide in higher education, which was further exacerbated during the COVID-19 pandemic (Rouf et al., 2022; Sarkar et al., 2021; Emon et al., 2020). The educational institutions, government organizations, non-government organizations (NGOs) and private sector organizations working in the education sector will be benefited from our findings. Universities and other authorities that strive to design and implement wholly or partially online education delivery systems will realize the importance of paying attention to the severe digital divide (that makes poor students show little interest in e-learning) during such design and implementation process (Sarkar et al., 2021). Local and international financial institutions and development organizations, e.g. (the World Bank) and regulatory authorities shall realize the need for financing schemes that narrow the digital divide (e.g. to ensure low-cost and stable internet connectivity and appropriate electronic gadgets for all learners) in an emerging economy like Bangladesh (Emon et al., 2020).

Further research should be undertaken to explore the challenges faced by the teachers who conduct online classes in an emerging economy like Bangladesh.

BIODATA and CONTACT ADDRESSES of AUTHORS



Zarin Khan MOON is a Lecturer in the Department of Marketing of the Faculty of Business Studies, Jashore University of Science and Technology. She completed her Master of Business Administration (MBA) and Bachelor of Business Administration (BBA) in **Accounting and Information Systems (AIS)** from Jashore University of Science and Technology (JUST). She is interested in academic research, especially in the areas of consumer behavior, sustainability, e-learning, and Islamic finance. By this time, she has 5 research articles published internationally.

Zarin Khan MOON

Address: Department of Marketing, Faculty of Business Studies
Jashore University of Science and Technology, Jashore 7408, Jashore, Bangladesh
Phone: +8801741408603
E-mail: zarinmoon.ais.just@gmail.com



Md. Al AMIN is an Assistant Professor (On Study Leave) of Marketing at Bangabandhu Sheikh Mujibur Rahman Science and Technology University, Gopaganj-8100, Bangladesh. He is a Doctor of Philosophy (PhD) Candidate at the School of Business and Management (SBM), Queen Mary University of London (QMUL), UK, receiving the most competitive fully funded QMUL's SBM Doctoral Studentship. His research interests lie in the areas of sustainable marketing, anthropomorphic artificial intelligence, consumer smart technology adoption behavior, and social media marketing. Al Amin's papers are published by leading national and international top-tier journals (e.g., Environment, Development and Sustainability, Management of Environmental Quality, Journal of Food Products Marketing, Journal of Financial Services Marketing, Journal of Global Marketing, E-Learning, and Digital Media, European Journal of Management and Business Economics, Psychology Research and Behavior Management).

Al AMIN

Department of Marketing,
Faculty of Business Studies
Bangabandhu Sheikh Mujibur Rahman Science & Technology University, Bangladesh.
Phone: +88-01738235013
Email: md.al.amin@qmul.ac.uk



Md. Hossain ALI is an Assistant Professor of Accounting and Information Systems at Jashore University of Science and Technology. His research areas include sustainability accounting and reporting, auditing, corporate governance, and accounting education etc. Especially, he has a passion for exploring behavioral issues in accounting and finance. Mr. Ali has published several journal articles in renowned international outlets in the field of business and management.

Hossain ALI

Address: Department of Accounting and Information Systems
Jashore University of Science and Technology, Jashore – 7408; Bangladesh
Phone: +880 1815468448
E-mail: hossain.ais@just.edu.bd



Dr. Md. Mahedi HASAN is an Associate Professor (Marketing) in the Department of Accounting and Information Systems at Jashore University of Science and Technology, Bangladesh. He has worked as the Program Organizer of Bangladesh Betar, the National Radio of Bangladesh for several years. Dr. Hasan gained his PhD in Educational Technology in 2015. His academic interest areas are marketing, media analysis, and motivation. By this time, he has published 25 research articles at home and abroad.

Mahedi HASAN

Address: Department of Accounting and Information Systems
Jashore University of Science and Technology, Jessore 7408; Bangladesh
Phone: +88-01711111817
E-mail: mahedi.mkt@just.edu.bd

REFERENCES

- Adam T, Kaye T & Haßler B (2020) The Maldives and Sri Lanka: Question & Answer Session. EdTech Hub Helpdesk Response No.18). EdTech Hub. <https://doi.org/10.53832/edtechhub.0018>
- Ajzen, I. (1991). The theory of planned behavior. *Organizational behavior and human decision processes*, 50(2), 179-211. [https://doi.org/10.1016/0749-5978\(91\)90020-T](https://doi.org/10.1016/0749-5978(91)90020-T)
- Akour, I., Alshurideh, M., Al Kurdi, B., Al Ali, A., & Salloum, S. (2021). Using machine learning algorithms to predict people's intention to use mobile learning platforms during the COVID-19 pandemic: Machine learning approach. *JMIR Medical Education*, 7(1), 1-17. <https://doi.org/10.2196/24032>
- Al-Amin, M., Al Zubayer, A., Deb, B., & Hasan, M. (2021). Status of Tertiary Level Online Class in Bangladesh: Students' Response on Preparedness, Participation and Classroom Activities. *Heliyon* 7 (1), e05943. <https://doi.org/10.1016/j.heliyon.2021.e05943>
- Al Amin, M., Arefin, M. S., Hossain, I., Islam, M. R., Sultana, N., & Hossain, M. N. (2021). Evaluating the determinants of customers' mobile grocery shopping application (MGSA) Adoption during COVID-19 pandemic. *Journal of Global Marketing*, 1-20. <https://doi.org/10.1080/08911762.2021.1980640>
- Al-Marooif, R. S., Salloum, S. A., AlHamadand, A. Q. M., & Shaalan, K. (2020). Understanding an Extension Technology Acceptance Model of Google Translation: A Multi-Cultural Study in United Arab Emirates. *International Journal of Interactive Mobile Technologies*, (3). <https://doi.org/10.3991/ijim.v14i03.11110>
- Aristovnik, A., Kerzic, D., Ravselj, D., Tomazevic, N., & Umek, L. (2020). Impacts of the COVID-19 pandemic on life of higher education students: A global perspective. *Sustainability*, 12(20), 8438. <https://doi.org/10.3390/su12208438>
- Paramadini, S.A., & Suzianti, A. (2021, January). Driving Factors Analysis of E-learning Use in Primary Schools During the Covid-19 Pandemic Era: An Exploratory ISSM Model. *In 2021 The 4th International Conference on Software Engineering and Information Management* (pp.214-219). <https://doi.org/10.1145/3451471.3451505>
- Bartley, S. J., & Golek, J. H. (2004). Evaluating the Cost Effectiveness of Online and Face-to-Face Instruction. *Educational Technology & Society*, 7 (4), 167-175.
- Brislin RW (1976) Comparative research methodology: cross-cultural studies. *International Journal of Psychology* 11(3): 215–229. <https://doi.org/10.1080/00207597608247359>
- Chandra, Y. (2021). Online education during COVID-19: Perception of academic stress and emotional intelligence coping strategies among college students. *Asian Education and Development Studies*, 10(2), 229-238. <https://doi.org/10.1108/AEDS-05-2020-0097>
- Chen, C. P., Lai, H. M., & Ho, C. Y. (2015). Why do teachers continue to use teaching blogs? The roles of perceived voluntariness and habit. *Computers & Education*, 82, 236-249. <https://doi.org/10.1016/j.compedu.2014.11.017>

- Cheng, Y. (2012). Effects of quality antecedents on e-learning acceptance. *Internet Research*, 22(3). 361-390. <https://doi.org/10.1108/10662241211235699>
- Cheng, Y. (2019). How does task-technology fit influence cloud-based e-learning continuance and impact?. *Education+ Training*, 61(4), 480-499. <https://doi.org/10.1108/ET-09-2018-0203>
- Chin WW (1998) Commentary: Issues and Opinion on Structural Equation Modeling. *MIS Quarterly* 22(1). 7–16. Available at: <https://www.jstor.org/stable/249674>
- Chu, T.-H., & Chen, Y.-Y. (2016). With Good, We Become Good: Understanding e-learning adoption by the theory of planned behavior and group influences. *Computers & Education*, 92-93, 37–52. <https://doi.org/10.1016/j.compedu.2015.09.013>
- Cohen, L., Manion, L., & Morrison, K. (2018) *Research Methods in Education*. 8th ed. New York, NY: Routledge.
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13, 319–340. <https://doi.org/10.2307/249008>
- Davis, F.D., & Venkatesh, V. (1991). A critical assessment of potential measurement biases in the technology acceptance model: three experiments”, *Human-Computer Studies*, 45(1), 19-45. <https://doi.org/10.1006/ijhc.1996.0040>
- Dhawan, S. (2020). Online Learning: A Panacea in the Time of COVID-19 Crisis. *Journal of Educational Technology Systems*, 49(1), 5-22. <https://doi.org/10.1177/0047239520934018>
- Dillman D. A. (2000) Mail and internet surveys: The tailored design method. John Wiley & Sons New York: Wiley
- Emon EKH, Alif AR, & Islam MS (2020) Impact of COVID-19 on the institutional education system and its associated students in Bangladesh. *Asian Journal of Education and Social Studies* 11(2):34–46. <https://doi.org/10.9734/ajess/2020/v11i230288>
- Farahat, T. (2012) Applying the Technology Acceptance Model to Online Learning in the Egyptian Universities. *Procedia - Social and Behavioral Sciences*, 64, 95 – 104. <https://doi.org/10.1016/j.sbspro.2012.11.012>
- Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention, and behavior: An introduction to theory and research*. Reading, MA: Addison- Wesley.
- Gefen, D., & Straub, D. W. (2000). The relative importance of perceived ease of use in IS adoption: A study of e-commerce adoption. *Journal of the Association for Information Systems*, 1(1), 8.
- Gounaris, S & Dimitriadis, S. (2008). Assessing Service Quality on the Web Evidence from Business-To-Consumer Portals. *Journal of Services Marketing*, 17(5). <https://doi.org/10.1108/08876040310486302>
- Hair, J.F., Hult, G.T.M., Ringle, C.M., & Sarstedt, M. (2017). *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*. Los Angeles: Sage.
- Han, H., J. & Sa, J., H. (2021). Acceptance of and satisfaction with online educational classes through the technology acceptance model (TAM): the COVID19 situation in Korea. *Asia Pacific Education Review*. <https://doi.org/10.1007/s12564-021-09716-7>
- Henseler J, Ringle C.M. & Sarstedt M (2015) A new criterion for assessing discriminant validity in variancebased structural equation modeling. *Journal of the Academy of Marketing Science*, 43: 115–135. <https://doi.org/10.1007/s11747-014-0403-8>
- Islam, A.K.M Najmul. (2010). The Detenninant of the Post Adoption Satisfaction of Educators with E-learning System. *Journal of Information System Education*, 22 (4). Available at: <http://jise.org/volume22/n4/JISEv22n4p319.html>
- Jæger MM & Blaabæk EH (2020) Inequality in Learning Opportunities during Covid-19: Evidence from Library Takeout. *Research in Social Stratification and Mobility* 68: 100524. <https://doi.org/10.1016/j.rssm.2020.100524>
- Joudeh, J. M., & Dandis, A. (2018). Service quality, customer satisfaction and loyalty in internet service providers. *International Journal of Business and Management*, 13(8), 108-120. <https://doi.org/10.5539/ijbm.v13n8p108>

- Khan, S., Raza Rabbani, M., Thalassinou, E. I., & Atif, M. (2020). Corona virus pandemic paving ways to next generation of learning and teaching: futuristic cloud based educational model. <https://dx.doi.org/10.2139/ssrn.3669832>
- Kim, E., Kim, J.J., & Han, S. (2021). Understanding student acceptance of online learning systems in higher education: Application of social psychology theories with consideration of user innovativeness. *Sustainability*, 13(2), 896. <https://doi.org/10.3390/su13020896>
- Lata, L. N. (2022). COVID-19, Poverty, and Inequality in Bangladesh. *Current History*, 121(834), 141–146. <https://doi.org/10.1525/curh.2022.121.834.141>
- Lee, J. W. (2010). Online support service quality, online learning acceptance, and student satisfaction. *The internet and higher education*, 13(4), 277-283. <https://doi.org/10.1016/j.iheduc.2010.08.002>
- Lee, J. W., & Kim, Y. E. (2009). Perceived interaction in online classes and technology acceptance model to student satisfaction. *Journal of Distribution science*, 7(3), 25-48
- Li, H., & Yu, J. (2020). Learners' continuance participation intention of collaborative group project in virtual learning environment: an extended TAM perspective. *Journal of Data, Information and Management*, 2(1), 39-53. <https://doi.org/10.1007/s42488-019-00017-8>
- Liaquat, S., Siddiqui, A., & Iqbal, A. (2021). E-Learning and Student's Perception: An Outlook of Virtual Classes Amid Covid-19 Pandemic. *Pakistan Journal of Educational Research*. Vol 4 (3). Retrieved from <https://pjer.org/index.php/pjer/article/view/264>
- Lung-Guang, N. (2019). Decision-making determinants of students participating in MOOCs: Merging the theory of planned behavior and self-regulated learning model. *Computers & Education*, 134, 50–62. <https://doi.org/10.1016/j.compedu.2019.02.004>
- Mailizar, M., Burg, D., & Maulina, S. (2021). Examining university students' behavioural intention to use e-learning during the COVID-19 pandemic: An extended TAM model. *Education and Information Technologies*. <https://doi.org/10.1007/s10639-021-10557-5>
- Masrom, M. (2007, May 21-24). Technology acceptance model and e-learning. *Paper presented at the 12th International Conference on Education, Sultan Hassanali Bolkuah Institute of Education, Universiti Brunei Darussalam*.
- Moore, J. L., Dickson-Deane, C., & Galyen, K. (2011). e-Learning, online learning, and distance learning environments: Are they the same? *The Internet and Higher Education*, 14(2), 129-135. <https://doi.org/10.1016/j.iheduc.2010.10.001>
- Mouloudj, K., Bouarar, A. C., & Stojczew, K. (2021). Analyzing the students' intention to use online learning system in the context of COVID-19 pandemic: A theory of planned behavior approach. *University of South Florida M3 Center Publishing*, 3(2021), 9. <https://www.doi.org/10.5038/9781955833042>
- Muhaimin, M., Habibi, A., Mukminin, A., Saudagar, F., Pratama, R., Wahyuni, S., ... & Indrayana, B. (2019). A sequential explanatory investigation of TPACK: Indonesian science teachers' survey and perspective. *JOTSE*, 9(3), 269-281. <http://dx.doi.org/10.3926/jotse.662>
- Ndubisi, N. O. (2006). Factors of online learning adoption: A comparative juxtaposition of the theory of planned behavior and the technology acceptance model. *International Journal on E-Learning*, 5(4), 571–591. <https://www.learntechlib.org/primary/p/6173/>
- Ngafeeson, M. N., & Gautam, Y. (2021). Learning management system adoption: A theory of planned behavior approach. *International Journal of Web-Based Learning and Teaching Technologies (IJWLTT)*, 16(1), 27- 42. <https://doi.org/10.4018/IJWLTT.2021010104>
- Rahman, M. H. A., Uddin, M. S., & Dey, A. (2021). Investigating the mediating role of online learning motivation in the COVID-19 pandemic situation in Bangladesh. *Journal of computer assisted learning*, 37(6), 1513-1527. <https://doi.org/10.1111/jcal.12535>
- Raihan, S., Uddin, M., Ahmed, M.T., Nahar, M.A., & Sharmin, E. (2021). COVID -19 Fallout on Poverty and Livelihoods in Bangladesh: Results from SANEM's Nation-wide Household Survey (November-December 2020). SANEM Publications, Dhaka, Bangladesh.

- Rouf, M. A., Hossain, M. S., Habibullah, M., & Ahmed, T. (2022). Online classes for higher education in Bangladesh during the COVID-19 pandemic: a perception-based study. *PSU Research Review*. <https://doi.org/10.1108/PRR-05-2021-0026>
- Rui-Hsin, K., & Lin, C. T. (2018). The usage intention of e-learning for police education and training. *Policing: An International Journal*, *41*(1), 98-112. <https://doi.org/10.1108/PIJPSM-10-2016-0157>
- Salam, M., & Farooq, M. S. (2020). Does sociability quality of web-based collaborative learning information system influence students' satisfaction and system usage?. *International Journal of Educational Technology in Higher Education*, *17*(1), 1-39. <https://doi.org/10.1186/s41239-020-00189-z>
- Sarkar, S. S., Das, P., Rahman, M. M., & Zobaer, M. S. (2021, July). Perceptions of public university students towards online classes during COVID-19 pandemic in Bangladesh. *Frontiers in Education*, *6*. <https://doi.org/10.3389/feduc.2021.703723>
- Saunders M.H.K., Lewis P. and Thornhill A. (2019) *Research Methods for Business Students*. 8th ed. Harlow, United Kingdom; New York: Pearson
- Shammi, M., Doza M. B., Islam, A. R. M. T. & Rahman, M. M. (2020). Strategic assessment of COVID19 pandemic in Bangladesh: comparative lockdown scenario analysis, public perception, and management for sustainability. *Environment, Development and Sustainability* (2021) *23*:6148–6191 <https://doi.org/10.1007/s10668-020-00867-y>
- Singh, V., & Thurman, A. (2019). How many ways can we define online learning? A systematic literature review of definitions of online learning (1988-2018). *American Journal of Distance Education*, *33*(4), 289-306. <https://doi.org/10.1080/08923647.2019.1663082>
- Sintema EJ (2020) Effect of COVID-19 on the Performance of Grade 12 Students: Implications for STEM Education. *Eurasia Journal of Mathematics, Science and Technology Education* *16*(7). <https://doi.org/10.29333/ejmste/7893>
- Sukendro, S., Habibi, A., Khaeruddin, K., Indrayana, B., Syahrudin, S., Makadada, F. A., & Hakim, H. (2020). Using an extended Technology Acceptance Model to understand students' use of e-learning during Covid-19: Indonesian sport science education context. *Heliyon*, *6*(11), e05410. <https://doi.org/10.1016/j.heliyon.2020.e05410>
- Tarhini, A., Hone, K., & Liu, X. (2014). The effects of individual differences on e-learning users' behaviour in developing countries: A structural equation model. *Computers in human behavior*, *41*, 153-163. <https://doi.org/10.1016/j.chb.2014.09.020>
- Valtonen, T., Kukkonen, J., Kontkanen, S., Sormunen, K., Dillon, P., & Sointu, E. (2015). The impact of authentic learning experiences with ICT on pre-service teachers' intentions to use ICT for teaching and learning. *Computers & Education*, *81*, 49-58. <https://doi.org/10.1016/j.compedu.2014.09.008>
- Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management Science*, *46*(2), 186–204. <http://dx.doi.org/10.1287/mnsc.46.2.186.11926>
- Venter, M., & Swart, A. J. (2018, April). An integrated model for the continuous use intention of Microsoft Office simulation software. In *2018 IEEE Global Engineering Education Conference (EDUCON)* (pp. 320-329). IEEE. <https://doi.org/10.1109/EDUCON.2018.8363246>
- Wang, L., Lew, S., Lau, S. & Leow, M.. (2019) Usability factors predicting continuance of intention to use cloud e-learning application. *Heliyon* *5*(6): e01788. <https://doi.org/10.1016/j.heliyon.2019.e01788>
- Wang, Y., Wang, Y., Lin, H., & Tang, T. (2003). Determinants of user acceptance of internet banking: An empirical study. *International Journal of Service Industry Management*. <https://doi.org/10.1108/09564230310500192>
- Zeithaml, V. A., Parasuraman, A., & Malhotra, A. (2000). A conceptual framework for understanding e-service quality: implications for future research and managerial practice (Vol. 115). Cambridge, MA: Marketing Science Institute. Retrieved from http://thearf-org-unified-admin.s3.amazonaws.com/MSI/2020/06/MSI_WP_00-115.pdf

HIERARCHICAL EFFECT OF ACADEMIC SELF-EFFICACY AND SOCIO-DEMOGRAPHIC CHARACTERISTICS ON SATISFACTION AND DROPOUT OF STUDENTS WITH DISABILITY IN HIGHER EDUCATION

Dr. Merve BULUT

ORCID: 0000-0001-6694-095X
Tourism Faculty
Mugla Sitki Kocman University
Mugla, TURKIYE

Yaren BULBUL

ORCID: 0000-0002-3100-8860
Tourism Faculty
Mugla Sitki Kocman University
Mugla, TURKIYE

Received: 31/01/2023 **Accepted:** 05/06/2023

ABSTRACT

Even though distance education from the home environment has seemed comfortable and economic for students with disability in formal higher education during the pandemic, insufficiency in their academic self-efficacy, satisfaction and an increasing tendency to drop out were observed. This quantitative research is based on development of the scales and hierarchical regression analyses to determine the resources of academic self-efficacy, satisfaction and the tendency to drop out of students with disability in higher education beyond physical accessibility. The hierarchical effect of sub-dimensions of academic self-efficacy on satisfaction and the tendency to drop out and hierarchical predictor roles of socio-demographic characteristics (gender, rate of personal disability, type of disability, and four fields of study) were analysed. Some of the important findings are; self-efficacy in training, emotional well-being, technique and communication are determined as the sub-dimensions of academic self-efficacy. Self-efficacy in emotional well-being is the most effective sub-dimension of academic self-efficacy on satisfaction. Hierarchically, fields of study (social science and health sciences), rate of disability and types of disability (chronic illness and hearing disability) are effective on academic self-efficacy. The results support the decision makers to increase the quality of more inclusive higher education by considering differences based on education fields, types of disability and rate of (personal) disability and gender.

Keywords: Distance higher education, students with disability, self-efficacy, satisfaction, dropout.

INTRODUCTION

According to Postsecondary National Policy Institute (2021), there are 21% of undergraduate students and 12% of postgraduate students with disabilities in higher education. 25% of them drop out in the first year. 35% of them drop out in the second year of their higher education in the United States of America (Shaewitz and Crandall, 2020).

From a psychological aspect, self-efficacy and satisfaction affect the academic performance of students (Jones et. al., 2010; Fabio and Fabio, 2011). But, the sources (sub-dimensions) of academic self-efficacy from training to emotions and their effects on satisfaction and the tendency to drop out have not been determined completely. There is some research (Blake and Rust, 2002; Sattuck et. al., 2014 etc.) about the socio-

demographic characteristics and self-efficacy of students with disability. But, the moderator role of the rate of (personal) disability, type of disability, fields of study, and gender on the relationship between academic self-efficacy, satisfaction and tendency to drop out in higher education has not been determined adequately. The hierarchical predictor role of the socio-demographic characteristics of students with disability on the mentioned concepts is still not clear enough as well.

In Türkiye, there are 51,647 students with disability in higher education. Because of inaccessible conditions, 89% of them continue to Open University (Higher Education Board of Türkiye, 2020). Inaccessible conditions affect their self-efficacy (Shen et. al., 2013; Shattuck et. al., 2014), academic participation (Matonya, 2016), and satisfaction (Manandhar and Gaulee, 2022).

At first glance, distance education seemed to be appropriate for students with disabilities in formal (in-person) higher education. Particularly, this is because of the easement to access education from a comfortable and safe home environment. However, it was observed by the researchers of this study that they have some challenges during distance education and this affected their tendency to drop out or suspend their education as well as satisfaction and academic self-efficacy. The importance of determining the factors that affect academic self-efficacy, satisfaction and tendency to drop out has emerged considering distance education. So, the factors that affect academic self-efficacy, satisfaction and tendency to dropout might be determined beyond physical accessibility (such as accessible ramp and lift in the building, Bas: 2016) in higher education.

Evaluation of distance education through the eyes of students with disability from different fields of study in formal higher education provides useful implications to increase the quality of distance education in different fields including medicine, fine arts, tourism etc. The implications may contribute to a possible hybrid model for students with a high rate of disability that allows students with disability to participate in formal higher education more.

Therefore this research is important to determine (1) if academic self-efficacy and its sub-dimensions affect satisfaction and the tendency to drop out; (2) if satisfaction affects the tendency to drop out; (3) if there is a moderator role of socio-demographic characteristics (rate of disability, type of disability, fields of study, and gender) on the relationship between academic self-efficacy, satisfaction and tendency to drop out; (4) if there is predictor role of socio-demographic characteristics for academic self-efficacy, satisfaction and tendency to drop out of students with disability in formal distance higher education in Türkiye.

The scale of academic self-efficacy (with four dimensions), satisfaction and tendency to drop out have been analysed based on the mixed method of this research. Importantly, this research analyses distance education from the viewpoint of students with disability in formal higher education in different fields of study. The results contribute to increasing the number of students with disability and quality of inclusive higher education (for both face-to-face and distance education).

ACADEMIC SELF-EFFICACY, SATISFACTION, DROPPING OUT BEHAVIOUR OF STUDENTS WITH DISABILITY IN HIGHER EDUCATION

According to Bandura (1997 retrieved from Bandura, 2016) self-efficacy refers to “beliefs in one capability to organize and execute the courses of action required to produce given attainments”. Self-efficacy affects people’s behaviours, efforts, and choices as well as their thoughts and feelings. Physical inaccessibility and communicational, psychological and financial challenges may cause a lack of self-efficacy and dissatisfaction of the student with a disability (Manandhar and Gaulee, 2022).

There was temporary distance education in higher education during the pandemic (COVID-19) that was declared on 11th March 2020 by the World Health Organization. Lack of online support on the websites of the colleges (Meleo-Erwin et. al., 2021) and required technological devices (Salmi, 2020; Aquino and Scott, 2022) have been the challenges in distance education during the pandemic. During this period, physiological and psychological states have affected self-efficacy (Van Dinther et. al., 2011). Lack of self-efficacy (Alivernini and Lucidi, 2011; Dogan, 2015) and dissatisfaction (Sakurai et al., 2012; McFarland and Hamilton, 2016) affect their academic performance. Therefore, this may cause them to drop out of higher education. For this reason, behavioural support (e.g., guiding students on how to communicate with others), personalize instruction (e.g., motivating students to believe they can succeed), rigorous and relevant

instruction (e.g., equipping the students with the skills to prevent them dropping out) (Pyle and Wexler, 2012) may increase their self-efficacy and their satisfaction with learning.

Accordingly, considering students with disability in formal higher education during distance education, it was hypothesized that H_1 : There is a significant negative effect of academic self-efficacy on dropping out behaviour. H_2 : There is a significant positive effect of academic self-efficacy on satisfaction. H_3 : There is a significant negative effect of satisfaction on dropping-out behaviour (as seen in Figure 1).

The needs of persons with disability can vary by socio-demographic characteristics (Bas, 2016). Some of the socio-demographic characteristics, such as severity and visibility of disability, are effective on self-efficacy (Blake and Rust, 2002). Gender is effective on satisfaction (Ashong and Commander, 2012; Holcomb et. al., 2004) and academic performance (Matonya, 2016). Relatedly, it was hypothesized that $H_{2,1}$: There is a moderator influence of socio-demographic characteristics on the relationship between academic self-efficacy and satisfaction. $H_{3,1}$: There is a moderator influence of socio-demographic characteristics on the relationship between academic self-efficacy and the tendency to drop out. H_4 : There is a significant effect of socio-demographic characteristics on self-efficacy. H_5 : There is a significant effect of socio-demographic characteristics on satisfaction. H_6 : There is a significant effect of socio-demographic characteristics on dropping-out behaviour.

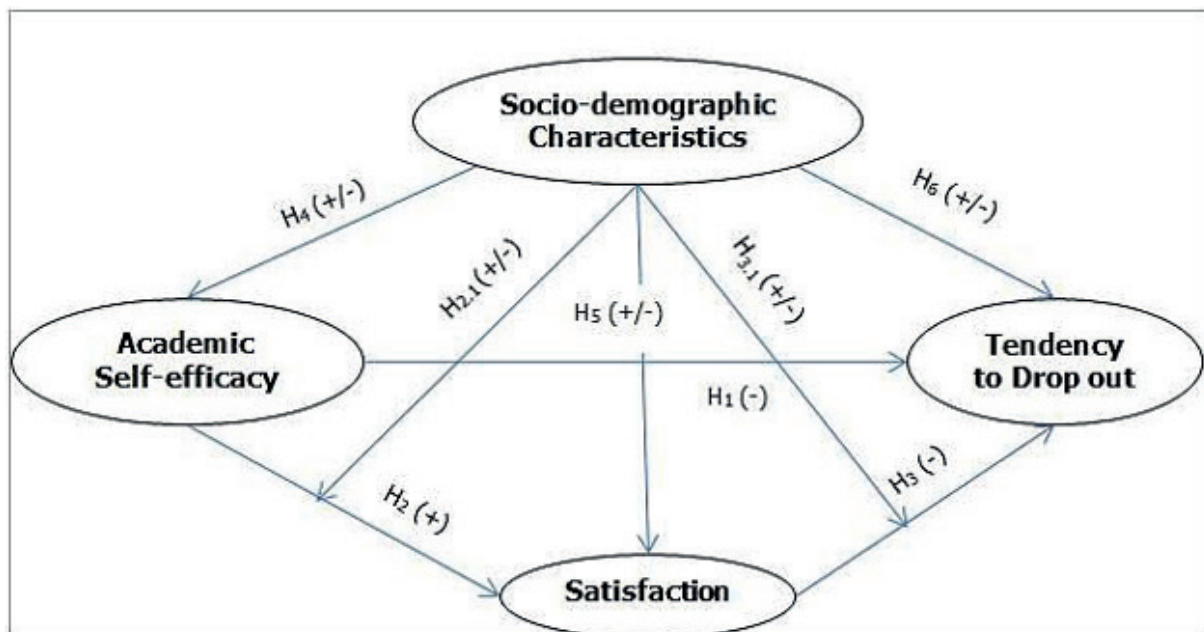


Figure 1. Proposed Research Model and Hypotheses

METHOD

In this research, a mix method was applied. The scales of (1) academic self-efficacy, (2) satisfaction and (3) tendency to drop out of students with disability in higher education were developed based on the interviews in the qualitative part of the research. The survey was conducted in the quantitative part of the study. Ethical approval of this research was obtained from the Ethical Board of (anonymised) University.

Participants

The data was gathered with qualitative (interviews) and quantitative (survey) methods. A purposive sampling technique was used that depends on the researcher's decision to choose the appropriate participants for the sample (Etikan et. al., 2016). Due to the lack of a completely adaptable academic self-efficacy scale for this research, the items of the scale consisted of the data acquired from the in-depth interview with 28 students with four different types of disability in formal higher education who experienced distance education during

the pandemic in Türkiye. The sample of both qualitative and quantitative research parts of this research includes students with four types of disability at different levels (30% - 100% disability). These are; visual disability (e.g., night blindness), hearing disability, physical disability, and chronic illness (e.g. Attention Deficiency and Hyperactivity Disorder, and Thalassaemia). The interviews were made by the researcher. Mainly, based on the findings of interviews, the scales of academic self-efficacy, satisfaction and tendency to drop out of students with disability were developed.

Data Collection and Analysis

The survey was emailed to disability coordinators of 207 universities in Türkiye and 32 universities in the European Union, Britain, Australia, North America and New Zealand through official correspondence to forward the survey link directly to the students with disability (via WhatsApp groups, email or in person). The survey was translated from Turkish into English and German as well. Some of the students with disability in the researchers' university were called directly to ask for answering the survey. The data of the survey were gathered between the dates 1st March – 30th May 2022. Finally, 134 students with disability from 17 universities in Türkiye responded to the survey, and 123 responded surveys were valid and taken into consideration for the analyses (n=123). According to the Council of Higher Education Board of Türkiye (2020), there are nearly 5,649 students with disability in formal higher education in Türkiye. But the population size (N) is still not precise for this research due to uncertainty in the number of students with disabilities who attended the lecture continuously and had enough temporary distance education experience in formal higher education. Some researchers (Gorsuch, 1983 retrieved from MacCallum et. al. 1999; Guadagnoli and Velicer, 1988) accept the minimum sample size (n) as 100 and as 50 for exploratory factor analysis (Winter et. al., 2009). Some of the disability-related research includes around 100-150 sample size (Gatchel et. al., 2006; Dryer et. al. 2016; Tanveer et. al. 2018 etc.). As a result, the present research was decided to be continued with a sample of 123 (n=123) participants depending on the information mentioned earlier and the rarity of sample characteristics.

Exploratory factor analysis (EFA) was made through the SPSS statistics package program. Exploratory factor analysis is applied to analyse factor structure and the validity for new scale development (Di Fabio and Perio, 2018; Le et. al., 2020). Pearson correlation analysis (95% confidence interval) was used to determine the relationship between variables. The data were assumed normally distributed since Kurtosis and Skewness values are between +1, 5 and -1, 5 (Tabachnick and Fidell, 2013). Hierarchical multiple regression analysis was made to measure the effects of independent variables hierarchically (gradually) on dependent variables and to compare their contributions to the regression model considering the change in significance and R² (R²). Also simple and multiple regression analyses were made. Categorical variables (gender, types of disability, education areas) were defined as dummy variables before the regression analyses. *K (number of categorical variables) - 1* dummy variable were included in the analyses to prevent a dummy variable trap (multicollinearity). The critical tolerance value ($>1 - R^2$, Gurbuz and Sahin, 2018) and VIF value (<10 , Hair et al., 2014) were considered to prevent the problem of multicollinearity. Standardization (Z score) of independent variables and interaction values (X*M) were used in hierarchical regression analysis to measure the moderator influence of socio-demographic characteristics on the relationship between academic self-efficacy and satisfaction and the tendency to drop out.

The Scales

Three main scales were developed in this research: *Academic self-efficacy*, *tendency to drop out* and *satisfaction* of students with disability. Despite the self-efficacy scales in the literature (Sherer and Maddux, 1982; Tschannen-Moran and Hoy, 2001; Bandura 2006; Jenson et. al., 2011; Shen et. al, 2013 etc.), no completely adaptable scale was found for this research considering the sample characteristics. The items of the scales were revealed according to the results of the depth interviews with 28 students with four different types of disabilities. Seven-point Likert scale was used for all three scales. At the end of the survey, there was one (optional) open-ended question to determine if there is anything to mention by the participants. Additionally, some research

in the literature about self-efficacy (Sherer and Maddux, 1982; Tschannen-Moran and Hoy, 2001; Bandura 2006; Jenson et. al., 2011; Shen et. al, 2013; Du et al., 2019 etc.), satisfaction (Caprara, 2006; Smedema et. al., 2022), tendency to drop out (States et. al., 2005; Fabio and Fabio, 2011) and the structure of the scales were used as references. Prereading of the survey was made by ten students with different types of disability and academicians to check its understandability.

FINDINGS

Sample Description

The total number of the sample is 123 students with four types of disabilities who experience hybrid education formal higher education. Male participants (63; 51, 2%) are slightly more than female participants (60; 48, 8%). Students with chronic illness have the highest frequency level (46; %37, 4) in all types of disability. Frequencies of other types of disability are subsequently: physical disability (40; 32, 5 %), hearing disability (20; 16, 3 %), and visual disability (17; 13, 8%). Participants whose personal disability rates are between 30% - 49% has the highest frequency level (the number of those: 47 = 38, 2 %). Frequency of personal disability rates are subsequently; 50%-69% (the number of those: 40 = 32, 5 %), 70%-89% (the number of those: 19 = 15, 4%), and 90%-100% (the number of those: 17 = 13, 8%). The frequency of education levels is subsequently; bachelor's degree (80; 65%), associate degree (39; 31, 7%), master's degree (3; 2, 4%), a doctoral degree (1; 0, 08%). The highest participation is from social sciences (61; 49, 6%), and the rest of them are subsequently physical sciences (31; 25, 2%), educational sciences (20; 16, 3%), health sciences (11; 8, 9%).

Reponses to the (Optional) Open-Ended Question

Eight students with disability answered the optional **open-ended** question asking if there was anything else they wanted to mention about the topic. The topics that were mentioned by the students in this part of the survey were: (1) support for course notes and course records and uploading of them before the time of the online course (25%); (2) being more tolerating of absence by illness or treatment (25%); (3) making online courses optional for the students with disabilities in formal higher education (25%); (4) the need for psychological support to adapt to university (12.5%) ; (5) inability to achieve the online exams and courses due to inaccessibility and hearing disabilities (12.5%).

Validity and Reliability

The Scale of Academic Self-Efficacy and the Dimensions

Firstly, the survey was conducted with 42 items. A seven-point Likert scale A seven-point Likert scale, which ranged from 1: Completely low (disagree) to 7: Completely high (agree) was used. As seen in Table 1, after exploratory factor analysis, the number of items was reduced to 25 items. This is because of the low level of factor loading (<0.5), loading more than one item with close values (<0, 1), causing meaningless dimension/s and the aim of increasing the total variance. Cronbach's alpha value on the scale of academic self-efficacy was determined as 0,953 and assumed as adequate due to being close to 1 (Ural and Kilic, 2013). Value of Kaiser Meyer Olkin Measure of Sampling Adequacy (KMO= 0,896) and Bartlett's Test of Sphericity (0.000; sig. < 0, 05) was adequate for the factor analysis (Hair et al., 2014). The total variance coverage ratio is 72, 296% and is accepted as adequate due to being over 60% (Gurbuz and Sahin, 2017). Intercorrelation between the items was significant (p<0, 05). As seen in Table 1 thoroughly, there are four items with the eigenvalues; academic self-efficacy in (1) training (11,986), (2) in emotional wellbeing (emotions-focused) (2,726), (3) in technique (2,136), (4) in communication (1, 227).

Table 1. Findings of exploratory factor analysis of academic self-efficacy scale

Items	Components and Factor Loadings			
	(1) Self-efficacy in Training	(2) Self-efficacy in Emotional Wellbeing	(3) Self- efficacy in Technique	(4) Self-efficacy in Communication
1	Being able to understand online practical courses	0,958		
2	Being able to understand online course notes of practical courses	0,860		
3	Being able to complete homework that requires group work	0,839		
4	Being able to achieve exams of online theoretical courses	0,838		
5	Being able to achieve practical exams and home works	0,813		
6	Being able to study enough (e.g. having enough time)	0,623		
7	Being able to understand the theoretical online courses without any problem	0,617		
8	Being able to feel good during distance education		0,977	
9	Being able to feel happy during distance education		0,953	
10	Being able to feel comfortable and safe during distance education		0,908	
11	Being able to feel motivated well during distance education		0,856	
12	Being able to feel productive during distance education		0,855	
13	Being able to feel successful during distance education		0,696	
14	Being able to access technical services during the online course when there are disconnections and other problems		0,967	
15	Being able to access online library and resources without any problem		0,878	
16	Being able to access the equipment (headphone, microphone, camera and internet etc.) during distance education		0,763	
17	Being able to complete the online theoretical exams without any disconnections or internet slow down		0,643	
18	Being able to upload homework to the online course management system and send it to the lecturer		0,629	
19	Being able to access and follow the synchronous courses without any problem (i.e. disconnection, slow down)		0,617	
20	Being able to access (open) the online theoretical exams without any problem		0,556	
21	Being able to communicate easily with the instructor outside of synchronous courses for example instructor's timely response to the email			1,034
22	Being able to communicate easily with the instructor during online exam			0,880

23	Being able to communicate easily with the instructor during the synchronous course without any problem (by writing, speaking and asking questions etc.)				0,769
24	Being able to be aware of written or verbal announcements in the online course system without any problem				0,681
25	Being able to have accessible applications within the course (e.g. slow and understandable lecture) and in the course notes (e.g. high font).				0,535
Eigenvalues		11,986	2,726	2,136	1,227
% of the variance (cumulative)		47,944	58,847	67,389	72,296
Total Variance		72,296%			
Cronbach's Alpha		0,953			
Extraction Method: Principal Component Analysis. Rotation Method: Promax with Kaiser Normalization					

The highest correlation was determined between academic self-efficacy in communication and technique ($r=0,685$, $p<0, 01$). The lowest correlation was determined between academic self-efficacy in communication and emotional well-being ($r=0,448$, $p<0, 01$).

The scale of Satisfaction for Students with Disability

A seven-point Likert scale (1: Completely dissatisfied; 7: Completely satisfied) was used. As a result of exploratory factor analysis, one item was removed from the scale due to low factor loading and decreasing total variance. As seen in Table 2, Cronbach's alpha value of the scale of satisfaction was determined as 0,877 and assumed as adequate (Ural and Kilic, 2013). Value of Kaiser Meyer Olkin Measure of Sampling Adequacy (KMO= 0,877) and Bartlett's Test of Sphericity (0.000; sig. < 0, 01) was adequate for the factor analysis (Hair et al., 2014). As seen in Table 2, one dimension (eigenvalue: 4,754) with 8 items and a 59,425% total variance coverage ratio were determined. Obtained variance is accepted to be adequate considering the single factor structure and being above 50% (Altunisik et. al., 2012) Intercorrelation between the items was significant ($p<0, 05$). The lowest value of factor loading is 0,723 and the highest value is 0,817. The mean of academic satisfaction is 5, 44 of (slightly satisfied) according to descriptive analysis.

Table 2. Findings of Exploratory Factor Analysis of Satisfaction scale

Items	Component (1) and Factor Loadings
1 With my academic performance such as understanding the course and passing the exams in the distance education	0,817
2 With communication opportunities in distance learning period such as communication with the instructor, returning e-mails and messages	0,773
3 With accessible opportunities in the distance education period such as course notes with high font size, subtitles on online courses, support of reader and writer during the online exams	0,752
4 With the sufficiency of equipment that is necessary for distance education such as computers, internet, and headphones	0,763
5 With psychological effects of distance education such as feeling safe, happy or unhappy	0,723
6 With economic conditions in distance education such as the ability to have a computer, no transport cost, and cost of internet using	0,775
7 With the appropriateness of my home or dormitory for distance education in terms of silence, cleanness and safety	0,759
8 Generally, with the period of distance education	0,800
Eigenvalue	4,754
Total Variance	59,425%
Cronbach's alpha	0,877
Extraction Method: Principal Component Analysis, 1 component extracted	

The Scale of Tendency to Drop out

Dropping-out behaviour was measured with 4 items. Seven-point Likert scale was used: (1: Completely disagree; 7: Completely agree) Two of them were reverse coded and removed from the scale due to decreasing total variance coverage ratio and reliability of the scale. Values of inter-item correlations are significant ($p < 0,05$). Cronbach's alpha value of the scale of the tendency to drop out was determined as 0,810 and assumed as adequate (Ural and Kilic, 2013). The total variance coverage ratio is 84,102%. Values of Kaiser Meyer Olkin Measure of Sampling Adequacy (KMO= 0,50) and Bartlett's Test of Sphericity (0.000; sig. < 0,05) were adequate for the factor analysis (Hair et al., 2014). Relatedly, the requirement for the acceptable minimum level of KMO (0,5 < KMO < 1) (Le et. al., 2020; Kaiser, 1974; retrieved from Samir et. al, 2022) for the sample size around 100 - 200 (Shrestha, 2021) was considered. Additionally, some researchers (Silverstone et. al., 2002, Forsell et. al., 2019, Kraepelien et. al., 2021 etc.) developed the scale with 2 items and determined the scale as a working tool for the measurement. The scale of the tendency to drop out was applied with two items in this research with regard to the high level of reliability (0,810), total variance explained (84,102%) and acceptable values of KMO and Bartlett's Test of Sphericity,

The items are (1) I am thinking of dropping out of higher education, (2) I am thinking of suspending my studies (temporarily stopping) my higher education (factor loadings: 0,917; Eigenvalue: 1,682; Extraction Method: Principal Component Analysis). The item related to the school suspension was added to the scale based on the findings of interviews with students with disability and the significant relationship between suspension and increasing dropping-out behaviour (States et. al., 2005). According to the descriptive analysis, the mean of the tendency to drop out is 2,11 (mostly disagree).

Hypothesis Tests

Effect of Academic Self-efficacy on Tendency to Drop out

The results of correlation and simple regression analysis show that there is no significant relationship between academic self-efficacy and tendency to drop out ($p = 0,300 > 0,05$). H_1 hypothesis is rejected.

Effect of Academic Self-efficacy on Satisfaction of Students with Disability

The results of correlation analysis and Simple linear regression analysis show that there is a positive and strong significant relationship between academic self-efficacy and satisfaction (Pearson Correlation=0,808; $p = 0,000 < 0,01$). [$f_{(1,121)} = 228,301, p < 0,01$]; H_2 hypothesis is accepted. Based on the simple regression model ($Y = a + bx$), unstandardized coefficients, and mean of academic self-efficacy of this research (5,5366; between slightly and *mostly high*), the regression equation for the satisfaction of students with disability is $0,100 + 0,966(5,5366) = 5,44835$. The participants are close to *slightly satisfied* (=5). Academic self-efficacy explains satisfaction at 65% (adjusted $R^2 = 0,651$). One unit standard deviation in academic self-efficacy causes differentiation in satisfaction of students with disability at 80% ($\beta = 0,808$).

Hierarchical Effects of Sub-dimensions of Academic Self-efficacy on Satisfaction of Students with Disability

Hierarchical multiple regression analysis was made to determine how each dimension of academic self-efficacy affects the satisfaction of students with disability gradually. According to the correlation analysis, there are moderate and strong correlations between all the variables ($p < 0,01$). "Self-efficacy in emotional well-being" has the highest correlation ($r = 0,713$) with satisfaction. "Self-efficacy in training" has the lowest correlation ($r = 0,585$) with satisfaction.

As seen in Table 3, the dimension of self-efficacy in emotional wellbeing has a significant contribution to the regression model 1 ($f_{(1,121)} = 125,345, p < 0,01$) that one unit standard deviation in self-efficacy in emotional wellbeing causes 71% differentiation ($\beta = 0,71$) in satisfaction. Self-efficacy in emotional well-being explains the total variance of satisfaction with 50% (Adjusted $R^2 = 0,505$) and makes a high (significant) contribution to the satisfaction.

In model 2, self-efficacy in technique explains additional variance at 16% (R^2 change [R^2] = 0,160) in satisfaction. This differentiation in R^2 is significant ($f_{(2, 120)} = 125,129, p < 0, 01$). One unit standard deviation in self-efficacy in technique causes differentiation in satisfaction at 46% ($\beta = 0,460$) and this dimension secondly makes the highest significant contribution to the satisfaction.

In model 3, self-efficacy in communication explains additional variance at 1, 6 % (R^2 change [R^2] = 0,016) in satisfaction. This differentiation in R^2 is significant ($f_{(3, 119)} = 89,179, p < 0, 01$). One unit standard deviation in self-efficacy in communication causes differentiation in satisfaction at 17% ($\beta = 0,178$).

In model 4, self-efficacy in training causes differentiation at 0, 1 % (R^2 change [R^2] = 0,001) in the satisfaction, but this differentiation is not significant considering Sig. F Change ($=0,603 > 0, 05$). However, all the dimensions of academic self-efficacy (in model 4) explain the satisfaction of students with disability at 68% (Adjusted $R^2 = 0,682$; $p < 0, 01$). Based on the unstandardized coefficients in Table 3, the hierarchical regression equation is *Academic satisfaction of students with disability* = 0,306 + 0,371 (*self-efficacy in emotional wellbeing*) + 0,348 (*self-efficacy in technique*) + 0, 179 (*self-efficacy in communication*) + 0, 04 (*self-efficacy in training*). There is no multicollinearity in the hierarchical regression analyses of each model: Tolerance values of model 1, 2, 3, 4 $> 1-R^2$, and the highest VIF value of model 1,2,3,4 is 2,313 < 10 .

Table 3. Results of Hierarchical Multiple Regression Analysis Between Dimensions of Academic Self-Efficacy and Satisfaction of Students with Disability

Model		B	Std. error	Beta (β)	R^2	Adj. R^2	R^2	Sig. Change	Sig. F Change	Sig.
1	^a Emotional wellbeing	0,586	0,05	0,71	0,509	0,505	0,509	0,000	0,000	*0,000
		0,402	0,04	0,49	0,676	0,670	0,16	0,000		
2	^a Emotional wellbeing	0,461	0,05	0,46				0,000	0,000	*0,000
	^a Technique									
3	^a Emotional wellbeing	0,380	0,04	0,46	0,692	0,684	0,016	0,000		
	^a Technique	0,354	0,07	0,35				0,000	0,014	*0,000
	^a Communication	0,197	0,07	0,17				0,014		
^b 4	^a Emotional wellbeing	0,371	0,05	0,45	0,693	0,682	0,001	0,000	0,603	*0,000
	^a Technique	0,348	0,07	0,35				0,000		
	^a Communication	0,179	0,08	0,16				0,03		
	^a Training	0,040	0,07	0,38				0,603		

Dependent Variable: Satisfaction, ^aPredictors (constant), * $p < 0, 01$; ^b constant=0,306

Effects of Academic Self-efficacy in Training, Technique and Communication on Academic Self-efficacy in Emotional Wellbeing

Hierarchical regression analysis revealed that academic self-efficacy in training (adjusted $R^2 = 0,28$; $\beta = 0,38$; $p < 0,01$) and technique (adjusted R^2 change = $0,4$; $\beta = 0,26$; $p < 0,01$) explains academic self-efficacy in emotional wellbeing. There is no significant contribution by academic self-efficacy in communication to the regression model. Academic self-efficacy in training made the most significant contribution to the regression model that one unit standard deviation in academic self-efficacy in training causes 38% differentiation in academic self-efficacy in emotional wellbeing.

Moderator Role of Socio-demographic Characteristics

As a result of hierarchical multiple regression analysis, there is no moderating effect of socio-demographic characteristics on the relationship between academic self-efficacy and satisfaction and the tendency to drop out behaviour of students with disability ($p > 0,05$). $H_{2,1}$ and $H_{3,1}$ hypotheses are rejected.

Effect of Satisfaction on Tendency to Dropping out Behaviour of Students with Disability

The results of correlation and simple regression analyses show that there is no significant relationship between satisfaction and tendency to drop out ($p = 0,259 > 0,05$). H_3 hypothesis is rejected.

Hierarchical Effects of Socio-Demographic Characteristics on Academic Self-efficacy of Students with Disability

Hierarchical multiple regression analysis was made to explain the effect of socio-demographic characteristics on academic self-efficacy (Table 4). There are significant correlations between academic self-efficacy and chronic illness ($r = 0,19$; $p < 0,05$), hearing disability ($r = -0,21$; $p < 0,05$), rate of disability ($r = -0,15$; $p < 0,05$), social sciences ($r = 0,23$; $p < 0,01$) and health sciences ($r = -0,22$; $p < 0,01$). There is a negative relationship between academic self-efficacy and hearing disability, rate of disability and health sciences. Aforementioned socio-demographic variables that have a significant correlation with academic self-efficacy were included in the hierarchical multiple regression analysis. Despite no moderating effect on the relationship between academic self-efficacy and satisfaction and the tendency to drop out the behaviour of students with disability.

Three models were revealed in hierarchical multiple regression analysis (Table 4). Model 1 which includes the effect of chronic illness and hearing disability on academic self-efficacy makes a significant contribution to the regression model ($f_{(2,120)} = 3,923$; $p < 0,05$). They explain academic self-efficacy at 4% (Adjusted $R^2 = 0,04$). One unit standard deviation in chronic illness causes differences at 13% ($\beta = 0,13$) in academic self-efficacy. One unit standard deviation in hearing disability causes negative differences at -16% ($\beta = -0,16$) in academic self-efficacy.

In model 2, the rate of disability explains additional variance with 4% ($R^2 = 0,04$) in academic self-efficacy. This differentiation in R^2 is significant ($f_{(3,119)} = 4,454$; $p < 0,01$). One unit standard deviation in the rate of disability causes negative differentiation in academic self-efficacy at -20% ($\beta = -0,20$). The rate of disability makes the lowest significant contribution to academic self-efficacy but increased the general level of R^2 value of Model 2.

In model 3, social sciences and health sciences (fields of study) explains additional variance with 7% ($R^2 = 0,07$) in academic self-efficacy. This differentiation in R^2 is significant ($f_{(5,117)} = 5,872$; $p < 0,01$). One unit standard deviation in the social sciences causes differentiation in academic self-efficacy at 15% ($\beta = 0,15$). One unit standard deviation in the health sciences causes negative differentiation in academic self-efficacy at -18% ($\beta = -0,18$). Social sciences and health sciences make the greatest significant contribution to academic self-efficacy. The socio-demographic variables explain academic self-efficacy at 14% ($R^2 = 0,14$).

Table 4. Results of Hierarchical Multiple Regression Analysis Between Socio-Demographic Characteristics and Academic Self-Efficacy of Students with Disability^a

Model		B	Std. error	Beta (β)	R ²	Adj. R ²	R ²	Sig. Change	Sig. F Change	Sig.
1	Chronic Illness	0,33	0,22	0,13	0,06	0,04	0,06	0,14	0,02	*0,02
	Hearing Disability	-0,51	0,29	-0,16				0,08		
2	Chronic Illness	0,34	0,22	0,14	0,10	0,07	0,04	0,12	0,02	**0,005
	Hearing Disability	-0,61	0,29	-0,19				0,03		
	Rate of (personal) Disability	-0,22	0,09	-0,20				0,02		
3	Chronic Illness	0,35	0,21	0,14	0,17	0,14	0,07	0,10	0,006	**0,000
	Hearing Disability	-0,61	0,28	-0,19				0,03		
	Rate of (personal) Disability	-0,19	0,09	-0,17				0,04		
	Social Sciences	0,35	0,20	0,15				0,08		
	Health Sciences	-0,75	0,36	-0,18				0,04		

^aDependent variable: Academic self-efficacy ; *p<0,05; **p<0,01

According to descriptive analysis students with 70% - 89% disability have the highest level of academic self-efficacy (mean=5, 88: mostly high). Students with 30% - 49% disability have the second highest level of academic self-efficacy (mean=5, 74: mostly high). Students with 90% -100% disability have the lowest level of academic self-efficacy (mean=4, 93: slightly high). The mean of academic self-efficacy is 5, 53 which is between slightly and mostly high. There is no significant relationship between gender, study areas (physical and social and natural sciences), physical disability and academic self-efficacy ($p > 0, 05$). H_4 hypothesis is partially accepted.

Hierarchical Effects of Socio-Demographic Characteristics on Satisfaction of Students with Disability

According to correlation analysis, there are significant correlations between satisfaction and chronic illness ($r = 0, 19$; $p < 0, 05$), hearing disability ($r = - 0, 15$; $p < 0, 05$), social sciences ($r = 0, 26$; $p < 0, 01$) and health sciences ($r = -0, 18$; $p < 0, 05$). There is a negative relationship between satisfaction and hearing disability and health sciences. The socio-demographic variables that have a significant correlation with satisfaction were included in the hierarchical multiple regression analysis.

2 models were revealed by hierarchical multiple regression analysis (Table 5). Model 1 includes the effect of chronic illness and hearing disability on the satisfaction of students with a disability that does not make a significant contribution to the regression model ($f_{(2,120)} = 2,952$; $p > 0, 05$). In model 2, fields of study (social science and health sciences) explain additional variance with 8% ($R^2 = 0, 08$) in satisfaction. This differentiation in R^2 is significant ($f_{(4, 118)} = 4,369$; $p < 0, 01$). One unit standard deviation in social sciences causes positive differentiation in satisfaction at 21% ($\beta = 0, 21$). One unit standard deviation in health sciences causes negative differentiation in satisfaction at -13% ($\beta = -0, 13$). Relatedly, fields of study came into prominence to predict satisfaction more than types of disability.

Table 4. Results of Hierarchical Multiple Regression Analysis Between Socio-Demographic Characteristics and Satisfaction of Students with Disability^a

	Model	B	Std. error	Beta (β)	R ²	Adj. R ²	R ²	Sig. F Change	Sig.
1	Chronic Illness	0,47	0,27	0,16					
	Hearing Disability	-0,35	0,35	-0,09	0,04	0,03	0,04	0,05	0,056
2	Chronic Illness	0,47	0,26	0,164					
	Hearing Disability	-0,35	0,34	-0,09					
	Social Sciences	0,60	0,25	0,21	0,12	0,09	0,08	*0,005	*0,002
	Health Sciences	-0,64	0,44	-0,13					

^aDependent variable: Satisfaction ; *p<0,01

There is no significant relationship between gender, rate of disability, physical disability, life sciences and satisfaction of students with disability ($p>0,05$). H_5 hypothesis is partially accepted.

Effects of Socio-Demographic Characteristics on Tendency to Drop out of Students with Disability

Hierarchical multiple regression analysis was made to explain the effect of socio-demographic characteristics on satisfaction. A significant (negative) correlation was found between only gender (female) and the tendency to drop out ($r = -0,23$; $p < 0,05$). H_6 hypothesis is partially accepted. Gender (female) explains the tendency to drop out of students with disability at 4,5% (adjusted $R^2 = 0,045$; $f_{(1,121)} = 6,772$; $p < 0,01$). One unit standard deviation in gender (female) causes negative differentiation in the tendency to drop out at -23% ($\beta = -0,23$). Additionally, the regression analysis between gender (male) and tendency to drop out is significant ($p < 0,05$). Gender (male) explains the tendency to drop out at 5,3% (adjusted $R^2 = 0,053$). One unit standard deviation in gender (male) causes positive differentiation in the tendency to drop out at 23% ($\beta = 0,23$).

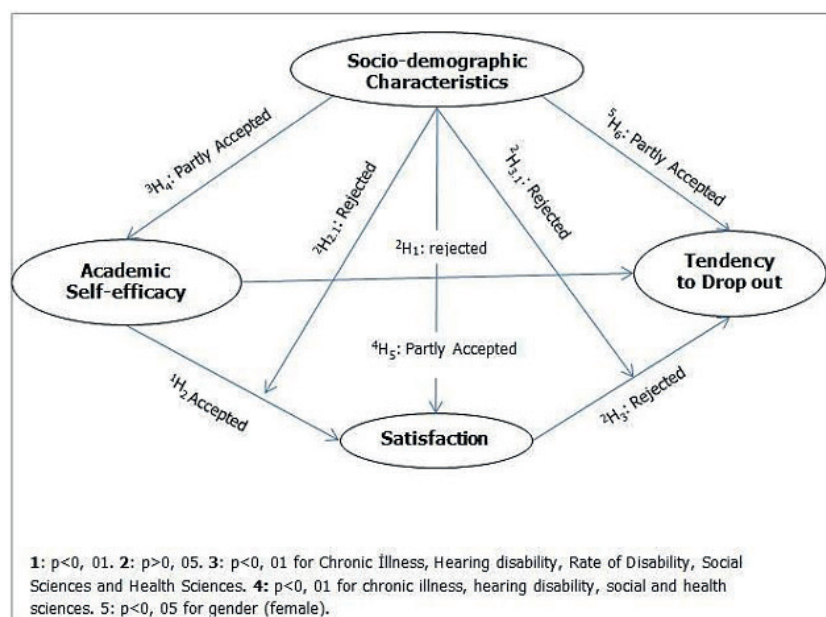


Figure 2. Research Model with Acceptance - Rejection Status of Hypothesis

DISCUSSION

Dissimilar to the literature (Jones et al. 2005; Fabio and Fabio, 2011), self-efficacy and satisfaction do not affect the tendency to drop out according to the findings of this research. This might be because of financial problems in Turkiye. Students with disability have difficulties finding a job after graduation and financial problems (Ataman et al., 2023). So, if they can be appointed as a result of the Public Personnel Selection Exam (PPSE), they drop out higher education since they see public positions guaranteed. Additionally, persons with disability are given priority to be appointed to the state staff.

Self-efficacy affects satisfaction in face-to-face (Coffman and Gilligan, 2002; Caprara et al., 2006) and online education (Shen et al., 2013; Hamdan et al., 2021) for students with disability (Smedema et al., 2022). Interaction with the instructor, classmates and ability to complete the online course are significant indicators of the satisfaction of students (Shen et al., 2013). Interestingly, *self-efficacy in learning* (understanding the online courses, uploading homework without problems, fulfilling the requirements of the course etc.) was determined as the least effective sub-dimension on satisfaction. The disability may cause feeling unsafe and uncomfortable in the learning environment (Afolabi, 2019). So, in distance education, the importance of self-efficacy in emotional well-being (e.g., being able to be comfortable and safe during distance education) was revealed. In this research, self-efficacy in emotional well-being is determined as the most significant predictor of satisfaction during distance education in the present research. Importantly, academic self-efficacy in training is the most significant indicator of self-efficacy of emotional well-being in all sub-dimensions of academic self-efficacy.

Inaccessibility in communication (e.g., fast speech and lack of sub-titles) causes the negative relationship between hearing disability and academic self-efficacy as mentioned by the student with hearing impairment in the (optional) open-ended question of the survey form. Yet, the academic self-efficacy of students with chronic illness was not affected as negatively as the students with hearing disabilities due to not having sensory or mobility disabilities. The rate of disability affects academic self-efficacy negatively and should be considered.

The reason behind the positive relation between social sciences and academic self-efficacy is not including practical courses that can make distance education more accessible or interactive. Some departments require intense practices, such as health-related and recreation departments, that make distance education difficult to understand. Additionally, working in hospitals during the pandemic can be exhausting for those in health-related departments. This seems to cause the negative effect of health sciences as a field of study on academic self-efficacy and satisfaction.

A very limited amount of research in the literature about the effects of fields of study, types of disability, and rate of disability on self-efficacy and satisfaction of the students with disability in higher education. The severity and visibility of disability affect the social self-efficacy of college students positively due to the inability to hide and necessity to be open about their disability (Blake and Rust, 2002). Dissimilarly, according to the present research, hearing disability is invisible but negatively affects academic self-efficacy. Chronic illness is invisible and positively affects academic self-efficacy, and the rate of disability affects self-efficacy negatively. The differences might be because of the difference between academic and social self-efficacy. Technical, communicational and emotional wellbeing-related factors are determined to be effective on academic self-efficacy in the present research. However, at one point, this study revealed that the students with a high rate (70%-89%) of disability have the highest level of academic self-efficacy parallel with findings of Blank and Rust, (2002) this can be due to flexibilities (e.g. education in the home environment) in distance education. However, the ones with the highest rate (90%-100%) of disability have the lowest level of academic self-efficacy.

Having the required information and handling things are related to higher self-efficacy for students with autism spectrum (Shattuck et al., 2012). Partly, similar to the present research, academic self-efficacy in emotional well-being, technique, and communication contributes to the satisfaction of students with disability in higher education. Similarly, Hampton and Mason (2003) did not find a significant relationship between gender and the self-efficacy of students with learning disabilities. Dissimilar to the research of Ashong and Commander (2012) and Holcomb et al. (2004) in online learning, there is no significant relationship between gender and satisfaction. This might be due to the sample characteristics of the present

study. Fields of study (social sciences and health sciences) come into prominence rather than gender to predict satisfaction for students with disability.

According to the present research, male students with disability tend to drop out more than female students with disability. According to the interviews with some female students, they find distance learning easier than face-to-face education during the pandemic due to participation in the courses from a comfortable and safe home environment. They do not need to carry heavy materials for the practical courses. Distance education ensures economic advantages and the opportunity to feel more family support at home. Supportively, engagement in high-risk behaviours (e.g. substance use) is an indicator of the tendency to drop out the behaviour of students with learning disabilities according to the research of Doren et. al. (2014). Matonya (2016) revealed that family support and accessibility in higher education are effective for the participation of female students with disability.

CONCLUSION AND IMPLICATIONS

In conclusion, this research contributes to the literature with three scales for students with disability in formal higher education considering distance (emergency remote) education experience during the pandemic with an eye to: (1) Academic self-efficacy, (2) satisfaction, and (3) tendency to drop out. The scales were applied to four different types of disability and may be adapted to specific types of disability. The importance of self-efficacy and its sub-dimensions on the satisfaction of students with disability in higher education came into prominence. Hierarchically, academic self-efficacy in emotional well-being, technique, communication and training are the parts of academic self-efficacy and effective on satisfaction. There are no moderating roles of socio-demographic factors in this relationship while some socio-demographic characteristics of students with disability are significant to predict academic self-efficacy, satisfaction and tendency to drop out one by one. Differently, the present research considered particularly education fields, types of disability, and rate of disability of students besides their gender during the analyses.

Practically, the scales of academic self-efficacy, satisfaction and tendency to drop out can be used regularly by advisors of students with disability in higher education. The developed scales additionally can be adapted to face-to-face education and a specific type of disability as well. Thus, authorities in higher education can have information about the level of academic self-efficacy, satisfaction and tendency to drop out behaviour of students with disability. This may help the authorities to take preventive measures for performance issues. Based on the results of this research, increasing emotional well-being of students with disability, accessible technical conditions, qualifying their communication (with instructors during and outside of course/exams as well as online accessible announcements), accessible training environment (e.g., online course without disconnection and with subtitles) affect positively both academic self-efficacy and their satisfaction. The rate of (personal) disability, the different requirements of fields of study and types of disability should be taken into consideration. The tendency to drop out by male students with disability should be considered as well. According to the results of the present research, students with hearing disabilities and chronic illness studying health sciences have a lower level of academic self-efficacy and satisfaction than the ones in social sciences. Accordingly, making regular interviews with those students about how to make them feel confident and motivated may help to increase satisfaction and academic self-efficacy and prevent them from leaving the study program. Departments that include practical courses should be intensely cared for in order to reduce the challenges. Students with disabilities who have experienced both distance and formal (face-to-face) education answered the questions of this research considering the temporary distance education period during the pandemic (emergency remote teaching). This experience lets them evaluate the questions from a comparative perspective (distance and face-to-face education). Accordingly, optional online courses came into prominence for students with disability to increase their participation in the course and prevent their absences caused by treatments. This option was particularly emphasized in answers to the open-ended question of the survey.

Limitations and Future Research

This research was able to be conducted with 123 students with disability. This is a limit for the present research. The determined scales can be applied to a larger sample size and this may allow the carrying out

of structural equation modeling and confirmatory factor analysis. The scales may be used for a comparative analysis of face-to-face and distance education, and/or students with and without disabilities. The factors or sources which are effective on the emotional well-being of students with disability, in addition to academic self-efficacy in training and technique, should be investigated more in the coming future due to being the most significant factor in satisfaction. The reasons that cause a negative significant relation between health sciences and academic self-efficacy of students with disability, and other related terms (self-esteem, motivation and risk perception etc.) are worth to be studied as well. The findings allow for searching ways to increase the self-efficacy and satisfaction of students with disability and achieving more inclusive higher education. The reasons for the tendency of students with disability to drop out and its differentiation by gender are still not completely clear and should be analysed considering socio-economic profiles of the countries and perceived financial risk as well.

BIODATA and CONTACT ADDRESSES of AUTHORS



Dr. Merve BULUT is a Research Associate (Ph.D.) at Tourism Faculty, Mugla Sitki Kocman University. Dr. Bulut gained her Ph.D. in Tourism Faculty at November, 2018. Her academic interest areas are inclusive tourism and higher education, tourism marketing, and accessible tourism. She has national and international publications on tourism, marketing and inclusive management. She continues to her research activities on tourism, marketing and accessibility.

Merve BULUT

Tourism Management Department, Tourism Faculty

Address: Tourism Faculty, Mugla Sitki Kocman University, Mugla, Turkiye

Phone: +90 533 708 94 27

E-mail: mervebas@mu.edu.tr



Yaren BULBUL is a student at Tourism Faculty, Mugla Sitki Kocman University. Her academic interest areas are inclusive tourism and higher education, and accessibility. She is currently engaged in research on accessible education and tourism in collaboration with Dr. Bulut. She has experience in TUBITAK project work. She has practical experience in Tourism Industry. She is actively continuing her studies alongside Dr. Bulut.

Yaren BULBUL

Accommodation Management Department, Tourism Faculty

Address: Tourism Faculty, Mugla Sitki Kocman University, Mugla, Turkiye

Phone: +90 555 751 25 84

REFERENCES

- Ataman, S., Karaaslan, O., Kosretas, B., & Yavuz, M. (2023). The Opinions of Turkish Civil Servant Employees with Disability and Their Working Experience. *Kalem Eğitim ve İnsan Bilimleri Dergisi*, 13(2).
- Afolabi, A. (2019). Influence of Peer Pressure on Academic Performance and Social Behaviour of Students with Physical and Health Impairment. *International Journal of Innovative Psychology and Social Development*, 7(2), 91-96. <http://seahipaj.org/journals-ci/june-2019/IJIPSD/full/IJIPSD-J-12-2019.pdf>
- Altunisik, R., Coskun, R., & Bayraktaroglu, S., Yildirim E. (2012). *Sosyal Bilimlerde Arastirma Yontemleri (SPSS Uygulamali)* (7th ed.). Sakarya, Sakarya Publishing. ISBN: 9786054229277
- Alivernini, F., & Lucidi, F. (2011). Relationship between social context, self-efficacy, motivation, academic achievement, and intention to drop out of high school: A longitudinal study. *The journal of educational research*, 104(4), 241-252. <https://doi.org/10.1080/00220671003728062>
- Ashong, C. Y., & Commander, N. E. (2012). Ethnicity, gender, and perceptions of online learning in higher education. *MERLOT Journal of Online Learning and Teaching*, 8(2).
- Aquino, K. C., & Scott, S. (2022). Disability resource professionals' perceived challenges in minority-serving institutions during COVID-19: Recommendations for supporting students with disabilities. *Journal of Diversity in Higher Education*, 15(5), 542–547. <https://doi.org/10.1037/dhe0000428>
- Bandura, A. (2006). Guide for constructing self-efficacy scales. *Self-efficacy beliefs of adolescents*, 5(1), 307-337. https://scholar.google.com/scholar_lookup?title=Guide%20for%20constructing%20self-efficacy%20scales&publication_year=2006&author=A.%20Bandura
- Bas, M. Engelli Turizmi, Ankara, Nobel Publishing House. ISBN: 978-605-320-335-3
- Blake, T. R., & Rust, J. O. (2002). Self-esteem and self-efficacy of college students with disabilities. *College student journal*, 36(2), 214-222. <https://eds.s.ebscohost.com/eds/detail/detail?vid=0&sid=7a040778-0cf1-4235-9125-301823dc0443%40redis&dbdata=Jmxbhmc9dHImc2l0ZT1lZHMtbGl2ZQ%3d%3d#AN=7169650&db=asn>
- Caprara, G. V., Barbaranelli, C., Steca, P., & Malone, P. S. (2006). Teachers' self-efficacy beliefs as determinants of job satisfaction and students' academic achievement: A study at the school level. *Journal of school psychology*, 44(6), 473-490. <https://doi.org/10.1016/j.jsp.2006.09.001>
- Coffman, D. L., & Gilligan, T. D. (2002). Social support, stress, and self-efficacy: Effects on students' satisfaction. *Journal of College Student Retention: Research, Theory & Practice*, 4(1), 53-66. <https://doi.org/10.2190/BV7X-F87X-2MXL-2B3L>
- Di Fabio, A., & Peiro, J. M. (2018). Human Capital Sustainability Leadership to promote sustainable development and healthy organizations: A new scale. *Sustainability*, 10(7), 2413. <https://doi.org/10.3390/su10072413>
- Dogan, U. (2015). Student engagement, academic self-efficacy, and academic motivation as predictors of academic performance. *The Anthropologist*, 20(3), 553-561. <https://doi.org/10.1080/09720073.2015.11891759>
- Doren, B., Murray, C., & Gau, J. M. (2014). Salient predictors of school dropout among secondary students with learning disabilities. *Learning Disabilities Research & Practice*, 29(4), 150-159. <https://doi.org/10.1111/ldrp.12044>
- Dryer, R., Henning, M. A., Tyson, G. A., & Shaw, R. (2016). Academic achievement performance of university students with disability: Exploring the influence of non-academic factors. *International Journal of Disability, Development and Education*, 63(4), 419-430. <https://doi.org/10.1080/1034912X.2015.1130217>

- Du, J., Fan, X., Xu, J., Wang, C., Sun, L., & Liu, F. (2019). Predictors for students' self-efficacy in online collaborative groupwork. *Educational Technology Research and Development*, 67(4), 767-791. <https://doi.org/10.1007/s11423-018-9631-9>
- Etikan, I., Musa, S. A., & Alkassim, R. S. (2016). Comparison of convenience sampling and purposive sampling. *American journal of theoretical and applied statistics*, 5(1), 1-4. DOI: 10.11648/j.ajtas.20160501.11
- Fabio Alivernini & Fabio Lucidi (2011) Relationship Between Social Context, Self-Efficacy, Motivation, Academic Achievement, and Intention to Drop Out of High School: A Longitudinal Study, *The Journal of Educational Research*, 104:4, 241-252, DOI: HYPERLINK "https://doi.org/10.1080/100220671003728062"10.1080/00220671003728062
- Forsell, E., Kraepelien, M., Blom, K., Isacson, N., Jernelov, S., Svanborg, C., ... & Kaldo, V. (2019). Development of a very brief scale for detecting and measuring panic disorder using two items from the Panic Disorder Severity Scale-Self report. *Journal of Affective Disorders*, 257, 615-622. <https://doi.org/10.1016/j.jad.2019.07.057>
- Gorsuch, R. L. (1983). *Factor analysis* (2nd ed.). Hillsdale, NJ: Erl^aum. Retrieved from Moineddin, R., Matheson, F. I., & Glazier, R. H. (2007). A simulation study of sample size for multilevel logistic regression models. *BMC medical research methodology*, 7(1), 1-10.
- Guadagnoli, E., & Velicer, W. F. (1988). Relation of sample size to the stability of component patterns. *Psychological bulletin*, 103(2), 265.
- Gurbuz, S., & Sahin, F. (2016). *Sosyal Bilimlerde Arařtırma Yontemleri* (3rd ed.). Ankara, Seckin Publishing House, ISBN: 978-975-02-4455-1
- Hair, J. F., Black, W. C., Babin, J. B., & Anderson, R. E. (2014, ISBN 10: 1-292-02190-X). *Exploratory Factor Analysis*. In J. F. Hair, W. C. Black, J. B. Barry, & R. E. Anderson Eds. *Multivariate Data Analysis* (7th ed.). Edinburgh Gate Harlow Essex, Pearson Education Limited. pp.89-149.
- Hamdan, K. M., Al-Bashaireh, A. M., Zahran, Z., Al-Daghestani, A., Samira, A. H., & Shaheen, A. M. (2021). University students' interaction, Internet self-efficacy, self-regulation and satisfaction with online education during pandemic crises of COVID-19 (SARS-CoV-2). *International Journal of Educational Management*. <https://doi.org/10.1108/IJEM-11-2020-0513>
- Hampton, N. Z., & Mason, E. (2003). Learning disabilities, gender, sources of efficacy, self-efficacy beliefs, and academic achievement in high school students. *Journal of school psychology*, 41(2), 101-112. [https://doi.org/10.1016/S0022-4405\(03\)00028-1](https://doi.org/10.1016/S0022-4405(03)00028-1)
- Higher Education Board of Turkey (2020), YOK, Pandemi Doneminde Engelli Ogrencilerin Egitime Erisimini Mercek Altina Aldi, YOK Engelsiz Erisim ve Engelsiz Egitim, <https://www.yok.gov.tr/Sayfalar/Haberler/2020/engelsiz-erisim-engelsiz-egitim.aspx>
- Holcomb, L. B., King, F. B. & Brown, S. W. (2004). Student traits and attributes contributing to success in online courses: evaluation of university online courses. *Journal of Interactive Online Learning*, 2, 3, 1-17.
- J. C. F. de Winter, D. Dodou & P. A. Wieringa (2009) Exploratory Factor Analysis With Small Sample Sizes, *Multivariate Behavioral Research*, 44:2, 147-181, DOI: HYPERLINK "https://doi.org/10.1080/00273170902794206"10.1080/00273170902794206
- Jenson, R. J., Petri, A. N., Day, A. D., Truman, K. Z., & Duffy, K. (2011). Perceptions of self-efficacy among STEM students with disabilities. *Journal of Postsecondary Education and Disability*, 24(4), 269-283.
- Jones, F., Harris, P., Waller, H., & Coggins, A. (2005). Adherence to an exercise prescription scheme: the role of expectations, self-efficacy, stage of change and psychological well-being. *British journal of health psychology*, 10(3), 359-378. <https://doi.org/10.1348/135910704X24798>

- Kraepelien, M., Blom, K., Forsell, E., Isacson, N. H., Bjurner, P., Morin, C. M., ... & Kaldo, V. (2021). A very brief self-report scale for measuring insomnia severity using two items from the Insomnia Severity Index-development and validation in a clinical population. *Sleep Medicine*, 81, 365-374. <https://doi.org/10.1016/j.sleep.2021.03.003>
- Le, H. T. H., Tuyet, V. T. B., Hanh, C. T. B., & Do, Q. H. (2020). Factors affecting tax compliance among small-and medium-sized enterprises: Evidence from Vietnam. *The Journal of Asian Finance, Economics and Business*, 7(7), 209-217. DOI:10.13106/jafeb.2020.vol7.no7.20
- MacCallum, R. C., Widaman, K. F., Zhang, S., & Hong, S. (1999). Sample size in factor analysis. *Psychological methods*, 4(1), 84.
- Manandhar, R., & Gaulee, U. (2022). Students with disabilities of higher education in Nepal during a pandemic. In E. J. Valeau, R. L. Raby, & U. Gaulee (eds), *Shaping a humane world through global higher education: Pre-challenges and post-opportunities during a pandemic* (pp. 119-130). STAR Scholars.
- Matonya, M. (2016). Accessibility and participation in Tanzanian higher education from the perspectives of women with disabilities. *Jyvaskyla studies in education, psychology and social research*, (568). ISBN 978-951-39-6844-1 (PDF)
- McFarland, D., & Hamilton, D. (2005). Factors affecting student performance and satisfaction: Online versus traditional course delivery. *Journal of Computer Information Systems*, 46(2), 25-32. <https://doi.org/10.1080/08874417.2006.11645880>
- Meleo-Erwin, Z., Kollia, B., Fera, J., Jahren, A., & Basch, C. (2021). Online support information for students with disabilities in colleges and universities during the COVID-19 pandemic. *Disability and Health Journal*, 14(1), 101013. <https://doi.org/10.1016/j.dhjo.2020.101013>
- Postsecondary National Policy Institute, 2021, Students with Disabilities in Higher Education, retrieved from: <https://pnpi.org/students-with-disabilities-in-higher-education>
- Pyle, N., & Wexler, J. (2012). Preventing students with disabilities from dropping out. *Intervention in School and Clinic*, 47(5), 283-289. <https://doi.org/10.1177/1053451211430118>
- Sakurai, Y., Pyhalto, K., & Lindblom-Ylanne, S. (2012). Factors affecting international doctoral students' academic engagement, satisfaction with their studies, and dropping out. *International Journal for Researcher Development*. DOI 10.1108/17597511311316964
- Salmi, J. (2020). COVID's Lessons for Global Higher Education: Coping with the Present While Building a More Equitable Future. *Lumina foundation*. <https://eric.ed.gov/?id=ED611329>
- Samir, D. A. S., Sabbir, M. M., Zohora, F. T., & Rahman, M. S. (2022). Investigating purchase intention for skin care products in Bangladesh: The role of personal factors. *Turkish Journal of Marketing*, 7(2), 72-84. <https://doi.org/10.30685/tujom.v7i2.154>
- Shaewitz, D. & Crandall J.R. (2020), *Higher Education's Challenge: Disability Inclusion on Campus*, Higher Education Today, a blog by American Council on Education. <https://www.higheredtoday.org/2020/10/19/higher-educations-challenge-disability-inclusion-campus/>
- Shattuck, P. T., Steinberg, J., Yu, J., Wei, X., Cooper, B. P., Newman, L., & Roux, A. M. (2014). Disability identification and self-efficacy among college students on the autism spectrum. *Autism research and treatment*. <http://dx.doi.org/10.1155/2014/924182>
- Shen, D., Cho, M.-H., Tsai, C.-L., & Marra, R. (2013). Unpacking online learning experiences: Online learning self-efficacy and learning satisfaction. *The Internet and Higher Education*, 19, 10-17. doi:10.1016/j.iheduc.2013.04.001
- Sherer, M., Maddux, J. E., Mercandante, B., Prentice-Dunn, S., Jacobs, B., & Rogers, R. W. (1982). The self-efficacy scale: Construction and validation. *Psychological reports*, 51(2), 663-671.
- Shrestha, N. (2021). Factor analysis as a tool for survey analysis. *American Journal of Applied Mathematics and Statistics*, 9(1), 4-11. doi: 10.12691/ajams-9-1-2

- Silverstone, P. H., Entsuah, R., & Hackett, D. (2002). Two items on the Hamilton Depression rating scale are effective predictors of remission: comparison of selective serotonin reuptake inhibitors with the combined serotonin/norepinephrine reuptake inhibitor, venlafaxine. *International clinical psychopharmacology*, 17(6), 273-280.
- Smedema, S. M., Lee, D., & Bhattarai, M. (2022). An examination of the relationship of core self-evaluations and life satisfaction in college students with disabilities. *Rehabilitation Counseling Bulletin*, 65(2), 129-139. <https://doi.org/10.1177/0034355221993569>
- States, J., Detrich, R. & Keyworth, R. (2015). School Suspension and Student Outcomes. Oakland, CA: The Wing Institute. <https://www.winginstitute.org/does-suspension-impact-student>.
- Tabachnick, B. G., & Fidell, L., S. (2013). *Using Multivariate Statistics*. Allyn and Bacon/Pearson Education
- Tanveer, F., Shahid, S., & Hafeez, M. M. (2018). Effect of Forward Head Posture on Neck Disability and Level of Stress Among Undergraduate Students. *Isra Med J*, 10(2), 78-80.
- Tschannen-Moran, M., & Hoy, A. W. (2001). Teacher efficacy: Capturing an elusive construct. *Teaching and teacher education*, 17(7), 783-805. [https://doi.org/10.1016/S0742-051X\(01\)00036-1](https://doi.org/10.1016/S0742-051X(01)00036-1)
- Ural, A., & Kilic, I. (2013). *Bilimsel Arastirma Sureci ve SPSS ile Veri Analizi* (4th ed.). Detay Publishing.
- World Health Organization, 11th March 2020, Virtual press conference on COVID-19 – 11March 2020, (retrieved 27th July, 2021, https://www.who.int/docs/default-source/coronaviruse/transcripts/who-audio-emergencies-coronavirus-press-conference-full-and-final-11mar2020.pdf?sfvrsn=cb432bb3_2)
- Van Dinther, M., Dochy, F., & Segers, M. (2011). Factors affecting students' self-efficacy in higher education. *Educational research review*, 6(2), 95-108. <https://doi.org/10.1016/j.edurev.2010.10.003>

USEFULNESS AND CHALLENGES OF CLUSTERED SELF-DIRECTED LEARNING MODULES IN ENTREPRENEURSHIP FOR SENIOR HIGH SCHOOL DISTANCE LEARNING

Dr. Almighty Cortezo TABUENA

ORCID: 0000-0002-5875-3617

Senior High School, High School Department
Espiritu Santo Parochial School of Manila, Inc.
Manila, PHILIPPINES

Elena Garcia VILLAREAL

ORCID: 0000-0002-0774-629X

Student Behavior Management Head, High School Department
Espiritu Santo Parochial School of Manila, Inc.
Manila, PHILIPPINES

Received: 13/07/2022 **Accepted:** 07/03/2023

ABSTRACT

Despite the promising outcome of modular distance learning, its implementation is challenging. Thus, this study aimed to examine the usefulness and challenges of the implemented clustered self-directed learning modules in entrepreneurship for senior high school distance learning amidst the emerging pandemic using the descriptive-survey research method. This study was conducted at Espiritu Santo Parochial School of Manila, Inc., during the school year 2021–2022, among Grade 12 students using a stratified proportional random sampling technique. The study used both quantitative and qualitative methods of analyzing the data, including descriptive statistics and thematic analysis. As a result, all the modules were inferred to be very effective and very useful in terms of their usefulness for distance learning. On the other hand, there were six emergent themes from twenty-five challenges, as follows: (a) difficulties and limitations in theoretical and practical processes; (b) concerns about time constraints and academic workloads; (c) technical issues in learning modules; (d) problems with communication, lessons, and instructions; (e) issues with online learning, connectivity, and learning management systems; and (f) external and personal challenges as a student. These challenges were the basis in framing the recommendations of the students in addressing the aforementioned emergent themes.

Keywords: Challenges, distance learning, entrepreneurship, learning module, self-directed, usefulness.

INTRODUCTION

Countries around the world temporarily closed their educational institutions due to the spread of the new coronavirus infection known as COVID-19 (Alea et al., 2020; Escalona, 2022; Punzalan, 2022). For a couple of months, the outbreak turned out to be a global health emergency. Because of this, global leaders strictly imposed travel restrictions and the closure of local and international businesses and commerce, which caused the global economic recession. In connection to this, the World Health Organization (WHO, 2020) advised the conduct of an alternative, remote learning set up as a way to mitigate the virus spread. This, moreover, responds to preventing the loss of learning and provides remote learning opportunities while schools are closed. Moreover, the program gives guiding principles and delivery of online classes and approaches to be given by stakeholders like teachers and parents (World Bank, 2020). In this case, teachers, students, and the school are still adjusting to distance learning education in the Philippines despite the COVID-19 pandemic threat (Camero, 2022; Tugano, 2022).

In the Philippines, face-to-face interactions between students and teachers have also been discontinued. The Philippines, like other Asian nations, is adjusting to the new norm for education. The Department of Education implemented Modular Distance Learning to ensure educational continuity and that every school continues to fulfill its objective and vision of offering high-quality instruction to every Filipino learner

(Borromeo, 2021; Department of Education, 2019; Tabuena et al., 2023). The use of learning modules encourages self-directed study and learning. The improvement of students' self-study or learning skills is one advantage of employing modules for instruction. Students could actively participate in learning a particular idea covered in the program. As they complete the duties outlined in the module, they might also grow in their feeling of accountability. The students could show improvement on their own with little to no help from others. Students learn how to learn in modules (Nardo, 2017).

In addition, modular instruction includes various choices and it is self-paced for students (Alea et al., 2020). Despite the promising effects of modular learning, there are still challenges in the implementation of this modality. It requires more self-control and motivation on the part of students; more preparation time and the absence of tangible rewards on the part of educators; and more administrative resources to track students and run various courses (Dochy, 1989; Joshi et al., 2023). In this light, this study aimed to examine the usefulness and challenges of the developed and implemented clustered self-directed learning modules in entrepreneurship for senior high school distance learning amidst the emerging pandemic.

The clustered self-directed learning modules in entrepreneurship were developed by one of the cluster schools and distributed to all of the schools in Clusters 5 and 6, including Espiritu Santo Parochial School of Manila, Inc., San Pablo Apostol Learning School, St. Joseph School-Gagalangin, Holy Child Catholic School, Manila Cathedral School, and San Rafael Parochial School. Thus, the quality of the learning transfer from this approach primarily relies on the quality, validity, and reliability of the content and instruction included in the provided modules. This was initiated to provide remarkable and substantial feedback in terms of the usefulness, challenges, and recommendations as experienced and perceived by the senior high school students on the use of the clustered entrepreneurship course modules for distance learning, for both modular and online distance learning.

Significance of the Study

This study aims to contribute to the growing body of instructional materials that answer the demands of the K-12 curriculum, particularly student-centered ones, and meet the standards of the curriculum. This study will establish that the entrepreneurship pedagogy could bridge the gap between the demands of the 21st century, especially in various modes of learning, catering to the needs of the students who will not be able to enroll in conventional education and the teaching of entrepreneurship through the developed instructional modules, which will be evaluated by the students. Specifically, this study attempts to prove that the modules will be useful for students and teachers. The content and methods that will be used are adjusted to the students' needs and abilities to be able to equip them with the necessary entrepreneurship competencies and achieve the standards set for them for their future endeavors. Students may clearly understand each lesson through the use of illustrations and links by means of supplementary audio-visual materials. Moreover, students will be involved in various activities in entrepreneurship that will help them develop their social, ethical, psychological, physical, and other values.

On the other hand, creativity among colleagues (entrepreneurship and non-entrepreneurship teachers) will develop in the preparation of the modules and other materials that will be used. There will be professional satisfaction in developing new skills and increased awareness and understanding of the students' abilities. The work is easier with well-prepared lessons in different modules, which can also be used once in a while as a variation for teaching to provide individual instruction to the students in order not to get bored with the usual teaching methods. They will be able to use, and learn how to develop and evaluate their own instructional materials that are shaped in their own classroom settings, which will make the teaching-learning process engaging and meaningful. For non-entrepreneurship teachers, it will serve as an aid or guide to facilitate easier entrepreneurship teaching.

Statement of the Problem

This study aimed to examine the usefulness and challenges of the developed and implemented clustered self-directed learning modules in entrepreneurship for senior high school distance learning amidst the emerging pandemic. Furthermore, it also aimed to address the following probing questions:

1. What is the perception of the senior high school students on the usefulness of the clustered entrepreneurship course modules for distance learning in terms of the following: (a) title, (b) objectives, (c) instructions to the learners, (d) content, (e) illustrations, (f) learning activity materials, (g) evaluative measures, and (h) physical aspects of the module?

2. What are the challenges experienced by the senior high school students in the use of the clustered entrepreneurship course modules for distance learning?
3. What are the recommendations or points for improvement in the clustered entrepreneurship course modules as perceived by the senior high school students?

METHOD

Research Design

The purpose of this research was to investigate the usefulness and challenges of the developed and implemented clustered self-directed learning modules in entrepreneurship for senior high school distance learning. This study used the descriptive-survey research method under the quantitative research design to examine the usefulness and challenges of the developed and implemented clustered self-directed learning modules in entrepreneurship for senior high school distance learning amidst the emerging pandemic. A descriptive research design was used to elicit information regarding current conditions (Tabuena, Hilario, & Buenaflor, 2021). On the other hand, survey research provides a quantitative or numeric description of trends, attitudes, or opinions of a population by studying a sample of that population (Creswell, 2009). Descriptive-survey studies are valuable in playing a large part in the development of instruments for the measurement of many things that would be employed in all types of descriptive-developmental research, such as data-gathering instruments and the formulation of policies at the local, national, or international level (Calmorin, 2010; Tabuena, 2023)—in this case, as a basis to enable entrepreneurial individuals, particularly students, to reach their full potential in the world of traditional and online entrepreneurship.

Participants

The participants of this study were determined through a stratified proportional random sampling technique, where the number of students in each section was proportioned as to the computed given population in each sample distribution (Tabuena, Hilario, & Buenaflor, 2021) among Grade 12 students, representing 30% of the total population (N = 307) of 127 (41.37%) actual samples from the three academic strands, Accountancy, Business and Management (ABM), Humanities and Social Sciences (HUMSS), and Science, Technology, Engineering, and Mathematics (STEM), conducted at Espiritu Santo Parochial School of Manila, Inc. in the school year 2021–2022, as shown in Table 1.

Table 1. Frequency and Percentage Distribution of the Required and Actual Sample

Academic Strand	Grade and Section	Population (N)	Required Sample (30%)	Actual Sample (n)	Percentage
Accountancy, Business and Management	Grade 12 - St. Margaret Clitherow	32	10	24	75.00%*
	Grade 12 - St. Nicholas of Myra	31	10	23	74.19%*
Humanities and Social Sciences	Grade 12 - St. Charles Borromeo	40	12	13	32.50%*
	Grade 12 - St. Vincent de Paul	40	12	12	30.00%*
Science, Technology, Engineering and Mathematics	Grade 12 - St. Alexander of Lyons	44	14	14	31.82%*
	Grade 12 - St. Bernward of Hildesheim	40	12	14	35.00%*
	Grade 12 - St. Isidore of Seville	40	12	12	30.00%*
	Grade 12 - St. Therese of Lisieux	40	12	15	37.50%*
Total		307	94	127	41.37%*

Note. *Within the required sample (acceptable)

Data Collection and Analysis

In terms of data gathering, both quantitative and qualitative methods were implemented in a sequential manner, through survey and open-ended questions, respectively, in the research questionnaire, as shown in Figure 1. The research questionnaire was distributed to Grade 12 senior high school students in all of the aforementioned academic strands from January to April 2022, the Second Semester of the School Year 2021–2022, as the researchers handled the students from different quarters.

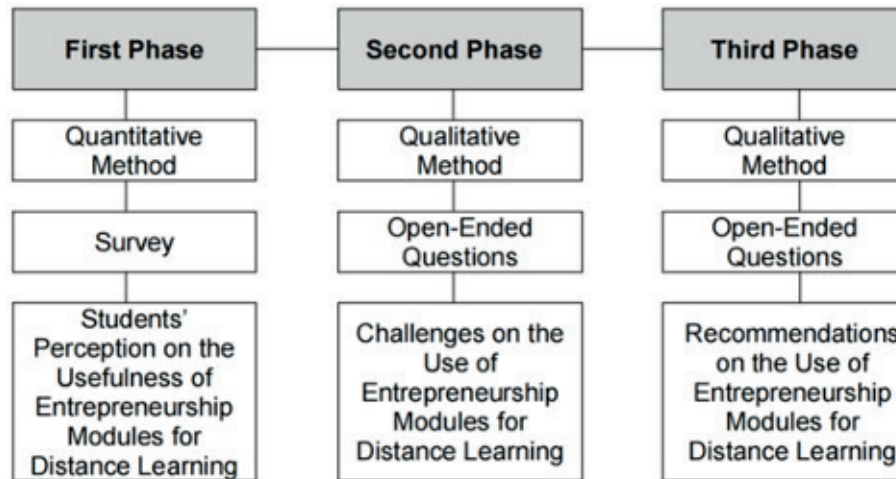


Figure 1. Phases in the Data Collection

The study used both quantitative and qualitative methods of analyzing the data, including descriptive statistics such as frequency and percent distribution, average, weighted mean, and rank, as follows: (a) percentage - a proportion in relation to a whole, which is usually the amount per hundred and often denoted using the sign percent (%)—this will be used to describe the data vividly; (b) average - the the arithmetic mean, the sum of the numbers divided by how many numbers are being averaged; (c) weighted mean - used to compute and to determine the intensity of the response of the respondents to each behavioral indicator; and (d) rank - used to describe the order of data obtained in the research study, usually arranged from highest to lowest (Bravo et al., 2022; Calderon & Gonzales, 2011).

In terms of qualitative data for the open-ended questions in the research questionnaire, the data will be analyzed using language-based analysis, which will include content and thematic analysis of the data. Following this procedure, the researchers examined each response and combined the results into a narrative (Tabuena & Hilario, 2021). These narratives will be directed at the challenges and recommendations by means of the enumeration methodological tool for analyzing qualitative data, the process in which categories and the frequencies of codes, units of analysis, terms, words, or ideas are counted (LeCompte & Preissle, 1993). This will be the basis of a sequence of themes on the matrix (thematic map) on synthesizing the data on the use of clustered entrepreneurship modules for senior high school distance learning.

Research Instrument

There will be one evaluation form prepared to evaluate the usefulness of the clustered instructional modules for the students. The form is based on the guidelines for module writing and on an evaluation form written by Meyer (2016). The evaluation form for the students consists of 20 items that include the following components: (a) Title, (b) Objectives, (c) Instructions to the Learners, (d) Content, (e) Illustrations, (f) Learning Activity Materials, (g) Evaluative Measures, and (h) Physical Aspects of the Module. Items in the research questionnaire followed a four-point Likert scale format to determine the degree of judgment among the senior high school students on the usefulness and challenges of the developed and implemented clustered self-directed learning modules in entrepreneurship for distance learning. These responses will be tabulated through frequency distribution, including the frequency, percentage, weighted mean, and rank.

Rating scales will be analyzed using the following ranges (as shown in Table 2): 3.26 - 4.00 = Very Useful, 2.51 - 3.25 = Moderately Useful, 1.76 - 2.50 = Somewhat Useful, and 1.00 - 1.75 = Not Useful. This research instrument also includes open-ended questions for suggestions and recommendations as a basis for improvements and further revisions.

Table 2. Research Questionnaire Rating Scale

Rating	Range	Description	Interpretation
4	3.26 - 4.00	Very Effective	Very Useful
3	2.51 - 3.25	Moderately Effective	Moderately Useful
2	1.76 - 2.50	Somewhat Effective	Somewhat Useful
1	1.00 - 1.75	Ineffective	Not Useful

Ethical Considerations

In terms of data saturation, non-related, opposite, and/or irrelevant responses were excluded. In addition, the researchers will be responsible for the protection, from any risk and harm, of the students involved through following the proper procedures of the survey-questionnaire method. It will also guarantee the confidentiality and anonymity of the individual participants. In terms of data analysis, potential miscalculations will be prevented through statistical data management and software. Further, there is no future intimate information being disclosed during the data collection process.

FINDINGS

Students' Perception on the Usefulness of Clustered Entrepreneurship Modules for Distance Learning

Based on Table 3, Module 1, with the following topics such as Personal Entrepreneurial Competencies, Introduction to Entrepreneurship, The Salient Features of Entrepreneurship, and Misconceptions on Entrepreneurship, obtained a general weighted mean of 3.472, inferred to be very effective. All indicators in Module 1, such as the title, objectives, instructions, content, illustrations, learning activity materials, evaluative measures, and physical aspects of the module, were very effective. In this case, Module 1 is very useful for students in distance learning. The highest obtained average among the indicators was the physical aspects of the module, with an average of 3.541, inferred to be very effective, which specified that the type used for the text makes it easy to read; there are the right proportions of diagrams and photos; and the text is well arranged on the page so that it is easy to follow. On the other hand, the lowest obtained average among the indicators was the illustrations, with an average of 3.394, inferred to be very effective, which specified that necessary illustrations are included, a concept is provided with clear illustrations and examples, and illustrations are properly sequenced.

Table 3. Usefulness of Clustered Entrepreneurship Modules for Distance Learning in Module 1

Indicators	Average and Weighted Mean	Description	Interpretation
Title	3.528*	Very Effective	Very Useful
The title is interesting.	3.496**	Very Effective	Very Useful
The title is relevant to the subject matter.	3.559**	Very Effective	Very Useful
Objectives	3.520*	Very Effective	Very Useful
The objectives are clearly stated.	3.598**	Very Effective	Very Useful
The objectives are achievable.	3.441**	Very Effective	Very Useful

Instructions	3.512*	Very Effective	Very Useful
The instructions are clear.	3.472**	Very Effective	Very Useful
There are instructions for all activities.	3.551**	Very Effective	Very Useful
Content	3.454*	Very Effective	Very Useful
The ideas in the module are understandable.	3.425**	Very Effective	Very Useful
The ideas in the module are interesting and learning activities are provided.	3.441**	Very Effective	Very Useful
The concepts are supported with learning activities.	3.496**	Very Effective	Very Useful
Illustrations	3.394*	Very Effective	Very Useful
Necessary illustrations are included.	3.402**	Very Effective	Very Useful
A concept is provided with clear illustrations and examples.	3.386**	Very Effective	Very Useful
Illustrations are properly sequenced.	3.394**	Very Effective	Very Useful
Learning Activity Materials	3.417*	Very Effective	Very Useful
Specified materials are available.	3.402**	Very Effective	Very Useful
Learning materials are sufficient.	3.409**	Very Effective	Very Useful
Learning materials are properly sequenced.	3.441**	Very Effective	Very Useful
Evaluative Measures	3.437*	Very Effective	Very Useful
Evaluative measures are congruent to the subject matter.	3.441**	Very Effective	Very Useful
Evaluative measures are worded clearly enough and adjusted to the student's level.	3.433**	Very Effective	Very Useful
Physical Aspects of the Module	3.541*	Very Effective	Very Useful
The type used for the text makes it easy to read.	3.638**	Very Effective	Very Useful
There are right proportions of diagrams and photos.	3.465**	Very Effective	Very Useful
The text is well arranged on the page so that is easy to follow.	3.520**	Very Effective	Very Useful
General Weighted Mean	3.472	Very Effective	Very Useful

Note. N = 127; *Average of the Weighted Means; **Weighted Mean

Among the students' responses in accordance with the illustration component in Module 1 are the following: improvements in terms of clarity in photos and the accuracy of the modules as aligned with the teaching; some illustrations are not easily accessible; and a lack of examples. Some of the notable general remarks of the students are as follows: (a) all of the topics covered in the modules are sufficient, as is the necessary information for learning; however, a few more learning materials must be provided because some are inaccessible; (b) more detailed concepts and instructions are required for it to be self-explanatory; example situations for concepts should also be considered; activities that require more than one day to complete (should only be for evaluation parts such as Mini Performance Tasks or Major Tasks, and others); announcements for module changes should be made a week or two before the module is due to be completed (if any); and (c) to integrate better results with the subject matter, I believe the content should be aligned with the students' strand; let's say for STEM, examples of business connected with this strand should be integrated for better learning comprehension.

Table 4 shows the usefulness of entrepreneurship modules for distance learning in Module 2 with the following topics: The Physical and Societal Environment, Identifying and Recognizing Opportunities, and Business Idea Selection Checklist. The obtained general weighted mean of Module 2 was 3.511, higher than that of Module 1. All indicators in Module 2, such as the title, objectives, instructions, content, illustrations, learning activity

materials, evaluative measures, and physical aspects of the module, were very effective. The obtained general weighted mean of 3.511 was inferred to be very effective and very useful for the students in distance learning. The highest obtained average among the indicators was the physical aspects of the module, with an average of 3.583, inferred to be very effective; the same highest obtained average among the indicators in Module 1. On the other hand, the lowest obtained average among the indicators was the illustrations, with an average of 3.451, inferred to be very effective; the same lowest obtained average among the indicators as well in Module 1.

Table 4. Usefulness of Clustered Entrepreneurship Modules for Distance Learning in Module 2

Indicators	Average and Weighted Mean	Description	Interpretation
Title	3.567*	Very Effective	Very Useful
The title is interesting.	3.520**	Very Effective	Very Useful
The title is relevant to the subject matter.	3.614**	Very Effective	Very Useful
Objectives	3.551*	Very Effective	Very Useful
The objectives are clearly stated.	3.567**	Very Effective	Very Useful
The objectives are achievable.	3.535**	Very Effective	Very Useful
Instructions	3.492*	Very Effective	Very Useful
The instructions are clear.	3.433**	Very Effective	Very Useful
There are instructions for all activities.	3.551**	Very Effective	Very Useful
Content	3.475*	Very Effective	Very Useful
The ideas in the module are understandable.	3.441**	Very Effective	Very Useful
The ideas in the module are interesting and learning activities are provided.	3.472**	Very Effective	Very Useful
The concepts are supported with learning activities.	3.512**	Very Effective	Very Useful
Illustrations	3.451*	Very Effective	Very Useful
Necessary illustrations are included.	3.488**	Very Effective	Very Useful
A concept is provided with clear illustrations and examples.	3.409**	Very Effective	Very Useful
Illustrations are properly sequenced.	3.457**	Very Effective	Very Useful
Learning Activity Materials	3.494*	Very Effective	Very Useful
Specified materials are available.	3.520**	Very Effective	Very Useful
Learning materials are sufficient.	3.449**	Very Effective	Very Useful
Learning materials are properly sequenced.	3.512**	Very Effective	Very Useful
Evaluative Measures	3.496*	Very Effective	Very Useful
Evaluative measures are congruent to the subject matter.	3.504**	Very Effective	Very Useful
Evaluative measures are worded clearly enough and adjusted to the student's level.	3.488**	Very Effective	Very Useful
Physical Aspects of the Module	3.583*	Very Effective	Very Useful
The type used for the text makes it easy to read.	3.654**	Very Effective	Very Useful
There are right proportions of diagrams and photos.	3.535**	Very Effective	Very Useful
The text is well arranged on the page so that is easy to follow.	3.559**	Very Effective	Very Useful
General Weighted Mean	3.511*	Very Effective	Very Useful

Note. N = 127; *Average of the Weighted Means; **Weighted Mean

There were no corresponding points for improvement mentioned by the students in accordance with the illustrations, as this indicator resulted in the lowest obtained average among other components, yet it was very useful and effective. Some of the notable general remarks made by the students in Module 2 are as follows: (a) the given topic/title for this particular module is truly relevant in the entrepreneurship course and the instructions were well discussed to the students in order for them to produce a quality output; (b) this module lacked learning materials to make the activities easier for the students; and (c) the concepts from Module 2 were sophisticated yet interesting, but in our experience, we were not able to fully encounter and grasp the other concepts provided by the constraints in time; just like in Module 1, a more systematically unified module with the concept connected together would be a help for students to understand the module better.

Table 5 shows the usefulness of entrepreneurship modules for distance learning in Module 3 with a topic of Product/Service Feasibility Analysis and Trademark. The obtained general weighted mean of Module 2 was 3.535, higher than that of Modules 1 and 2. All indicators in Module 3, such as the title, objectives, instructions, content, illustrations, learning activity materials, evaluative measures, and physical aspects of the module, were very effective. The obtained general weighted mean of 3.535 was inferred to be very effective and very useful for the students in distance learning. The highest obtained average among the indicators was the objectives, with an average of 3.606, inferred to be very effective, which specifies that the objectives are clearly stated and achievable. On the other hand, the lowest obtained average among the indicators was the illustrations, with an average of 3.488, inferred to be very effective; this was the same lowest obtained average among the indicators as well in the previous modules, Modules 1 and 2.

Table 5. Usefulness of Clustered Entrepreneurship Modules for Distance Learning in Module 3

Indicators	Average and Weighted Mean	Description	Interpretation
Title	3.567*	Very Effective	Very Useful
The title is interesting.	3.528**	Very Effective	Very Useful
The title is relevant to the subject matter.	3.606**	Very Effective	Very Useful
Objectives	3.606*	Very Effective	Very Useful
The objectives are clearly stated.	3.606**	Very Effective	Very Useful
The objectives are achievable.	3.606**	Very Effective	Very Useful
Instructions	3.552*	Very Effective	Very Useful
The instructions are clear.	3.528**	Very Effective	Very Useful
There are instructions for all activities.	3.575**	Very Effective	Very Useful
Content	3.507*	Very Effective	Very Useful
The ideas in the module are understandable.	3.488**	Very Effective	Very Useful
The ideas in the module are interesting and learning activities are provided.	3.520**	Very Effective	Very Useful
The concepts are supported with learning activities.	3.512**	Very Effective	Very Useful
Illustrations	3.488*	Very Effective	Very Useful
Necessary illustrations are included.	3.472**	Very Effective	Very Useful
A concept is provided with clear illustrations and examples.	3.528**	Very Effective	Very Useful
Illustrations are properly sequenced.	3.465**	Very Effective	Very Useful
Learning Activity Materials	3.501*	Very Effective	Very Useful
Specified materials are available.	3.535**	Very Effective	Very Useful
Learning materials are sufficient.	3.496**	Very Effective	Very Useful
Learning materials are properly sequenced.	3.472**	Very Effective	Very Useful

Evaluative Measures	3.516*	Very Effective	Very Useful
Evaluative measures are congruent to the subject matter.	3.535**	Very Effective	Very Useful
Evaluative measures are worded clearly enough and adjusted to the student's level.	3.496**	Very Effective	Very Useful
Physical Aspects of the Module	3.575*	Very Effective	Very Useful
The type used for the text makes it easy to read.	3.598**	Very Effective	Very Useful
There are right proportions of diagrams and photos.	3.551**	Very Effective	Very Useful
The text is well arranged on the page so that is easy to follow.	3.575**	Very Effective	Very Useful
General Weighted Mean	3.535	Very Effective	Very Useful

Note. N = 127; *Average of the Weighted Means; **Weighted Mean

Among the students' responses in accordance with the illustrations component in Module 3 are the following: some examples or guides for our outputs so that we will be able to have an idea and follow the guides for a better output. Even though this indicator resulted in the lowest obtained average among other components, this particular component and the module itself are very useful and effective. Some of the notable general remarks made by the students in Module 3 are as follows: (a) the ideas in this module were easy to understand and relate to. However, there are some activities or the task itself that need to be explained further. In that way, the students can easily identify the needs and most important things in creating a product as well as in service feasibility; (b) this module can help and guide students to assess the factors that can affect a product or service, which could also help them if they are about to start or have a business; (c) as far as I remember, this topic was presented to us in a way that was on-point and clear since our teacher had provided a learning material (PPT). However, it could have been much better if the content of the PPT that was presented to us was also included in the module so that whenever we forgot something, we could always check it. The activities and tasks for this module were engaging and great practice; and (d) the module concept was easy to understand, and everything was essential for us to answer the evaluation.

In Module 4, as shown in Table 6, it shows the usefulness of entrepreneurship modules for distance learning with a topic of Introduction to Business Plan Preparation, with an obtained general weighted mean of 3.532, inferred to be very effective and very useful for the students in distance learning. Compared to other modules, it is higher than Modules 1 and 2, but lower than Module 3, with very minimal differences. The highest obtained average among the indicators was the objectives, with an average of 3.615, inferred to be very effective; the same highest obtained average among the indicators in the previous module, Module 3. On the other hand, the lowest obtained average among the indicators was the illustrations, with an average of 3.443, inferred to be very effective; the same lowest obtained average among the indicators as well in the previous modules, Module 1, 2, and 3.

Table 6. Usefulness of Clustered Entrepreneurship Modules for Distance Learning in Module 4

Indicators	Average and Weighted Mean	Description	Interpretation
Title	3.602*	Very Effective	Very Useful
The title is interesting.	3.535**	Very Effective	Very Useful
The title is relevant to the subject matter.	3.669**	Very Effective	Very Useful
Objectives	3.615*	Very Effective	Very Useful
The objectives are clearly stated.	3.654**	Very Effective	Very Useful
The objectives are achievable.	3.575**	Very Effective	Very Useful

Instructions	3.555*	Very Effective	Very Useful
The instructions are clear.	3.543**	Very Effective	Very Useful
There are instructions for all activities.	3.567**	Very Effective	Very Useful
Content	3.522*	Very Effective	Very Useful
The ideas in the module are understandable.	3.528**	Very Effective	Very Useful
The ideas in the module are interesting and learning activities are provided.	3.480**	Very Effective	Very Useful
The concepts are supported with learning activities.	3.559**	Very Effective	Very Useful
Illustrations	3.443*	Very Effective	Very Useful
Necessary illustrations are included.	3.433**	Very Effective	Very Useful
A concept is provided with clear illustrations and examples.	3.472**	Very Effective	Very Useful
Illustrations are properly sequenced.	3.425**	Very Effective	Very Useful
Learning Activity Materials	3.491*	Very Effective	Very Useful
Specified materials are available.	3.512**	Very Effective	Very Useful
Learning materials are sufficient.	3.472**	Very Effective	Very Useful
Learning materials are properly sequenced.	3.488**	Very Effective	Very Useful
Evaluative Measures	3.496*	Very Effective	Very Useful
Evaluative measures are congruent to the subject matter.	3.496**	Very Effective	Very Useful
Evaluative measures are worded clearly enough and adjusted to the student's level.	3.496**	Very Effective	Very Useful
Physical Aspects of the Module	3.578*	Very Effective	Very Useful
The type used for the text makes it easy to read.	3.638**	Very Effective	Very Useful
There are right proportions of diagrams and photos.	3.520**	Very Effective	Very Useful
The text is well arranged on the page so that is easy to follow.	3.575**	Very Effective	Very Useful
General Weighted Mean	3.532	Very Effective	Very Useful

Note. N = 127; *Average of the Weighted Means; **Weighted Mean

In terms of illustrations in Module 4, the following is the feedback of the students: The business plan provided a clear and comprehensive example of a business plan. However, there were no learning materials provided in this module, which confused the students; additionally, no illustrations were provided. Some of the notable general remarks made by the students in Module 4 are as follows: (a) the content of the module is overall relevant but needs attention when it comes to the objectives achievable since it was a little bit hard to accomplish. For the instructions, it just needs more clarity. The same goes for the necessary illustration; (b) some parts of a business plan were not clearly presented; therefore, students still need definitions to understand the tasks and not just examples; (c) as for this topic, I have learned many insights on business, as it gives me an idea or background on planning and preparing the important things that we should do in opening our own business; and (d) the explanation of each part of the business plan is sufficient for the learner's understanding of how to do the plan.

Lastly, in Module 5, it shows the usefulness of entrepreneurship modules for distance learning with the following topics: The 7Ps of Marketing for New Ventures and Marketing Plan, with an obtained general weighted mean of 3.527, is inferred to be very effective and very useful for students in distance learning, as shown in Table 7. Compared to other modules, it is higher than Modules 1 and 2, but lower than Modules 3 and 4, with very minimal differences. The highest obtained average among the indicators was the physical aspects of the module with an average of 3.588, inferred to be very effective; the same highest obtained average among the indicators in

the previous modules, specifically in Modules 1 and 2; followed by the title component with an average of 3.587, inferred to be very effective, with a very minimal difference of 0.001. On the other hand, the lowest obtained average among the indicators was the illustrations, with an average of 3.467, inferred to be very effective; the same lowest obtained average among the indicators as well in all of the previous modules. There were no corresponding points for improvement mentioned by the students in accordance with the illustrations, as this indicator resulted in the lowest obtained average among other components, yet it was very useful and effective.

Table 7. Usefulness of Clustered Entrepreneurship Modules for Distance Learning in Module 5

Indicators	Average and Weighted Mean	Description	Interpretation
Title	3.587*	Very Effective	Very Useful
The title is interesting.	3.559**	Very Effective	Very Useful
The title is relevant to the subject matter.	3.614**	Very Effective	Very Useful
Objectives	3.548*	Very Effective	Very Useful
The objectives are clearly stated.	3.575**	Very Effective	Very Useful
The objectives are achievable.	3.520**	Very Effective	Very Useful
Instructions	3.512*	Very Effective	Very Useful
The instructions are clear.	3.488**	Very Effective	Very Useful
There are instructions for all activities.	3.535**	Very Effective	Very Useful
Content	3.509*	Very Effective	Very Useful
The ideas in the module are understandable.	3.535**	Very Effective	Very Useful
The ideas in the module are interesting and learning activities are provided.	3.488**	Very Effective	Very Useful
The concepts are supported with learning activities.	3.504**	Very Effective	Very Useful
Illustrations	3.467*	Very Effective	Very Useful
Necessary illustrations are included.	3.472**	Very Effective	Very Useful
A concept is provided with clear illustrations and examples.	3.457**	Very Effective	Very Useful
Illustrations are properly sequenced.	3.472**	Very Effective	Very Useful
Learning Activity Materials	3.501*	Very Effective	Very Useful
Specified materials are available.	3.472**	Very Effective	Very Useful
Learning materials are sufficient.	3.512**	Very Effective	Very Useful
Learning materials are properly sequenced.	3.520**	Very Effective	Very Useful
Evaluative Measures	3.524*	Very Effective	Very Useful
Evaluative measures are congruent to the subject matter.	3.535**	Very Effective	Very Useful
Evaluative measures are worded clearly enough and adjusted to the student's level.	3.512**	Very Effective	Very Useful
Physical Aspects of the Module	3.588*	Very Effective	Very Useful
The type used for the text makes it easy to read.	3.646**	Very Effective	Very Useful
There are right proportions of diagrams and photos.	3.528**	Very Effective	Very Useful
The text is well arranged on the page so that is easy to follow.	3.591**	Very Effective	Very Useful
General Weighted Mean	3.527	Very Effective	Very Useful

Note. N = 127; *Average of the Weighted Means; **Weighted Mean

Some of the notable general remarks made by the students in Module 5 are as follows: (a) developing a business plan teaches me about marketing and how to be strategic; (b) the title is intriguing, and the activities are simple to complete and understand; and (c) the objectives in this module were clearly stated and emphasized. Furthermore, it would be more interesting if the students could create a sample of these ventures so that they could experience and familiarize themselves with the subject; (d) because we rely more on modular learning due to the current situation, I recommend producing more detailed modules, demonstrating many examples, thorough explanations, clearer instructions, activities and reflections that are well-related to the topic, and so on. On the other hand, the overall module (including its activities and tasks) was fun and engaging; and (e) the topic of the module is conceptually interesting and easy to understand because of how the module presented the concepts and activities well. The activities adhered to and utilized the topic, which helped us apply it better.

Overall, the obtained general weighted mean of all the modules was 3.511, inferred to be very effective and very useful for the students in distance learning, as shown in Table 8; the physical aspects of the module as the highest obtained average among the indicators and illustrations as the lowest obtained average among the indicators.

Table 8. Summary Table on the Usefulness of Clustered Entrepreneurship Modules for Senior High School Distance Learning

Indicators	Average of the Weighted Means* and Description					General Weighted Average
	Module 1	Module 2	Module 3	Module 4	Module 5	
Title	3.528	3.567	3.567	3.602	3.587	3.570
	Very Effective	Very Effective	Very Effective	Very Effective	Very Effective	Very Effective
Objectives	3.520	3.551	3.606	3.615	3.548	3.568
	Very Effective	Very Effective	Very Effective	Very Effective	Very Effective	Very Effective
Instructions	3.512	3.492	3.552	3.555	3.512	3.525
	Very Effective	Very Effective	Very Effective	Very Effective	Very Effective	Very Effective
Content	3.454	3.475	3.507	3.522	3.509	3.493
	Very Effective	Very Effective	Very Effective	Very Effective	Very Effective	Very Effective
Illustrations	3.394	3.451	3.488	3.443	3.467	3.449
	Very Effective	Very Effective	Very Effective	Very Effective	Very Effective	Very Effective
Learning Activity Materials	3.417	3.494	3.501	3.491	3.501	3.481
	Very Effective	Very Effective	Very Effective	Very Effective	Very Effective	Very Effective
Evaluative Measures	3.437	3.496	3.516	3.496	3.524	3.494
	Very Effective	Very Effective	Very Effective	Very Effective	Very Effective	Very Effective
Physical Aspects of the Module	3.541	3.583	3.575	3.578	3.588	3.573
	Very Effective	Very Effective	Very Effective	Very Effective	Very Effective	Very Effective
General Weighted Average**	3.472	3.511	3.535	3.532	3.527	3.515
	Very Effective	Very Effective	Very Effective	Very Effective	Very Effective	Very Effective
Interpretation	Very Useful	Very Useful	Very Useful	Very Useful	Very Useful	Very Useful

Note. *Rounded off; **Actual computation

Challenges in the Use of Clustered Entrepreneurship Modules for Distance Learning

Table 9 shows the twenty-five (25) challenges to the use of clustered entrepreneurship modules for distance learning that were identified through content and thematic analysis and coding. Among the enumerated twenty-five (25) theme clusters, there were six (6) emergent themes as follows: (a) difficulties and limitations in theoretical and practical processes, (b) concerns about time constraints and academic

workloads, (c) technical issues in learning modules, (d) problems with communication, lessons, and instructions, (e) issues with online learning, connectivity, and learning management systems, and (f) external and personal challenges as a student.

Table 9. Emergent Themes on the Challenges in the Use of Clustered Entrepreneurship Modules for Distance Learning

Theme No.	Emergent Themes	Theme Clusters	f	%*
Theme 1	Difficulties and Limitations in Theoretical and Practical Processes	(1) Limitations on the Practical Activities (Outcome-based Activities)	10	31.25
		(2) Difficulty in Understanding the Topics or Concepts	8	25.00
		(3) Difficulty in the Thinking Process	7	21.88
		(4) Difficulty in Understanding the Terminologies	4	12.50
		(5) Difficulty in Accomplishing the Activities	2	6.25
		(6) Difficulty on the Learning Retention	1	3.13
		Total	32	100.00
Theme 2	Concerns About Time Constraints and Academic Workloads	(1) Limited Time Allotment	17	70.83
		(2) Unnecessary and Excessive Activities	7	29.17
		Total	24	100.00
Theme 3	Technical Issues in Learning Modules	(1) Limited Illustrations and Examples in the Modules	7	43.75
		(2) Inaccessibility of the Links in the Modules	4	25.00
		(3) Sudden Modifications in the Modules	2	12.50
		(4) Unreadability of the Text in the Modules	1	6.25
		(5) Missing Information or Details in the Modules	1	6.25
		(6) Irrelevant Topics and Activities in the Modules	1	6.25
		Total	16	100.00
Theme 4	Problems with Communication, Lessons, and Instructions	(1) Inconsistencies in the Activities	8	50.00
		(2) Vague and Limited Explanations of Lessons, Instructions, and Activities	5	31.25
		(3) Limited or Lack of Communication	3	18.75
		Total	16	100.00
Theme 5	Issues with Online Learning, Connectivity, and Learning Management Systems	(1) Difficulty in the Distance Online Learning Modality	9	64.29
		(2) Internet Connectivity and Device Issues	3	21.43
		(3) Problems with the Learning Management System Integration	2	14.29
		Total	14	100.00
Theme 6	External and Personal Student Challenges	(1) Learning Distraction and Disinterestedness	2	33.33
		(2) Concerns Regarding the Module Transition	1	16.67
		(3) Difficulty in Collaboration	1	16.67
		(4) Difficulty on an Immediate Compliance	1	16.67
		(5) Irrelevant Topic to the Desired Course	1	16.67
		Total	6	100.00

Note. *Rounded off

Theme 1: Difficulties and Limitations in Theoretical and Practical Processes

Limitations on Practical and Outcome-based Activities: The students experienced difficulties and limitations in theoretical and practical processes such as the following: First, there were limitations on the practical activities (outcome-based activities); students were limited in the execution of their practical activities. This was the most frequent response of the students among the difficulties and limitations in the theoretical and practical processes. Some students stated that based on their experiences back then when they were in Grade 11, there were a lot of challenges that they experienced in the entrepreneurship course, which was a hindrance for them to advertise and run a small company that would be beneficial for them to learn more about the topics that they have gained. It gives them limitations to interact more and show their customers the products or services that they provide. In a likely manner, another challenge that they have experienced before is the lack of practice. Due to the limitations they have experienced, they did not have an opportunity to create and exceed the activities provided. In addition, students did not execute physical activities such as marketing strategies (Ajibade et al., 2023) and other strategies they had as they were in an online setup. It is difficult for them to do things in modules, to put their learning into practice, and to plan their business for creation, management, and sale, especially during pandemics.

Difficulty in Understanding the Topics and Concepts: Second, difficulty in understanding the topics and concepts; students were having difficulty understanding the topics and concepts in the lesson. Some of the students stated that there were certain topics that they would not be able to thoroughly understand. Thus, they may possibly be confused and get pressured. There are no face-to-face classes and the teaching and understanding is quite hard—to have a more uniform understanding of entrepreneurship while knowing that it can be interpreted in different ways depending on the given situation. Some students stated that it was difficult and confusing as it was the first time, especially in understanding some particular topics and some activities on their own. As time passed, they were slowly learning and getting used to it with the help of their teachers and through some additional references and guidelines. Also, the structure of the modules into sub-modules makes it hard to connect the concepts, especially if the given explanation is not thorough and detailed.

Difficulty in the Thinking Process: Third, difficulty with the thinking process; students were having difficulty with their thinking and brainstorming learning processes. Some of the students stated that it is not easy to plan their business; in this situation, they need to think of the most applicable topics and words that relate in accordance with their business or a particular scenario. With the problem of the pandemic, students actually need to brainstorm a lot in order to think about what businesses will be applicable, especially to those who are not into business or not business-minded individuals, requiring thorough research and assistance to master the art of creating a business plan. It is the hard part of entrepreneurship to create an idea and design for the business and how the parts will be allocated for it to be realistic.

Difficulty in Understanding the Terminologies: Fourth, difficulty in understanding the terminologies; students were having difficulty understanding the terminologies in the lesson. Some of the students stated that they found some of the key terms used somehow hard to understand in the module; there were a few of the terms used that were new and unfamiliar to them. Most of the time, students cannot ask their teacher due to a limited time in this case, and sometimes the information provided is lacking.

Difficulty in Accomplishing the Activities: Fifth, difficulty in accomplishing the activities; students were having difficulty in accomplishing the activities. Some of the students stated that activities become more complex on their end because they require even more research and more careful planning before they can actually get it done. According to the students, some activities were harder to accomplish not because of a lack of instructions but because the data gathering and answering processes required were more difficult than the concept given.

Difficulty on the Learning Retention: Lastly, for difficulties and limitations on theoretical and practical processes, there were difficulties with learning retention; students were having difficulties with learning retention. One of the students stated that it was easy to forget some of the topics and some of the activities were challenging to conduct.

Theme 2: Concerns about Time Constraints and Academic Workloads

Limited Time Allotment: The students experienced difficulties and limitations on time frames and academic workloads, such as the following: First, there was a limited time allotment; students experienced a limited time on their schoolwork. This was the most frequent response of the students among the difficulties and limitations on time and academic workloads. Some students stated that they were having a hard time making a business plan or how they focused on their business to work. Despite the fact that the learning materials were well provided and well utilized, they struggled to complete them due to a shortage of time. Due to the nature of distance learning, they felt under pressure to complete the modules as fast as possible, which made it difficult for them to comprehend the material and produce a high-quality product. In addition, since they were in their houses in distance learning mode, there were many distractions—household chores that can result in not finishing tasks on time; more likely, doing business in a pandemic itself is difficult already. Some of the students were also struggling to decide what the first thing to do was, especially when they had a lot of pending requirements due to the length of each module. Managing their time was really a challenging task for them in distance learning—making and managing their business plan for a limited time. It would be helpful for the students if the teachers could combine tasks to save a lot of time.

Unnecessary and Excessive Activities: Second, there were unnecessary and numerous activities; students also perceived that this concern contributed to a challenging distance learning experience. Some students stated that there were tons of requirements that needed to be submitted weekly in the course. Although they understand that all of it is important, it is just that there were many requirements that are due weekly and there were also so many revisions in the activity and evaluation parts that were only announced every online session yet still needed to be submitted before the week ends; the fact that there are still other subjects to lend their attention to. There were also some unnecessary, insignificant, and excessively long activities that consumed the time of the students (especially if they were required but not graded). In addition, there were too many tasks, which led to modifications and confusion for students. Some of the tasks can be quite redundant and unnecessary to accomplish again, such as those regarding business proposals and ventures. In this case, due to the large number of activities, distractions, and lack of attention, the students have experienced self-studying, poor internet connection, a lack of sleep, and a lack of time to answer all of the modules. They perceive that some tasks are really hard for them and the time allotted to finish them is lacking—making it hard for them to focus on other subjects.

Theme 3: Technical Issues in Learning Modules

Limited Illustrations and Examples in the Modules: The students experienced technical issues in the learning modules, such as the following: First, there were limited examples and illustrations in the modules. This was the most frequent response of the students among the technical issues in the learning modules. Some students stated that illustrations to guide them in creating a specific topic were somehow insufficient; examples given from the module were lacking. Thus, it confused students if they were writing it correctly and accurately. The modules' lessons, guidelines, and instructions presented were mostly imprecise and inexact. Due to a lack of examples in some parts of the module, it was difficult for them to understand and conduct an answer. However, the downside of the developed modules, according to the students, is that some activities were not interrelated with some concepts discussed and enumerated in the conceptual part of the modules. In this case, more learning materials should be provided since the subject is kind of complicated to digest.

Inaccessibility of the Links in the Modules: Second, the inaccessibility of the links in the modules; students were unable to access some of the links in the modules. Some students stated that sometimes the link provided is not working. There were materials, like links, that could not be accessed by the students whenever they needed them. In addition, there should be other technical aspects to be remembered (such as the formatting in the business plan) that were not included in the module.

Sudden Modifications in the Modules: Third, the sudden modifications in the modules; students were also challenged regarding the sudden modifications and changes in the modules. Some of the students stated that there were a lot of changes in the modules. There were times that modifications were made for the betterment of the learning process and to help their learning experience be more convenient, but some were not.

Unreadability of the Text in the Modules: Fourth, the unreadability of the text in the modules; students were unable to read some of the text in the modules. One of the students stated that some of the text was blurred. This could contribute to the other challenges of the students, more likely the difficulties and limitations of theoretical and practical processes.

Missing Information or Details in the Modules: Fifth, there was missing information or details in the modules; students were unable to see some of the information or details in the modules pertaining to the lesson. One of the students stated that some details were missing or not presented in the module. This technical issue in the learning modules is more likely the reason why students were having difficulty understanding the terminologies, topics, and concepts.

Irrelevant Topics and Activities in the Modules: Lastly, due to technical issues in the learning modules, there were irrelevant topics and activities in the modules. One of the students stated that there were irrelevant and off-the-topic activities. Thus, there is a need to review and make necessary improvements to the technical issues in the learning modules for distance learning.

Theme 4: Problems with Communication, Lessons, and Instructions

Inconsistencies in the Activities: The students experienced problems with communication, lessons, and instructions, such as the following: First, there were inconsistencies in the activities. This was the most frequent response of the students among the problems with communication, lessons, and instructions. Some students stated that the schedule of a certain activity and the content of the activity itself should be strictly implemented and stick to the topic itself (not subject to change). Based on their narratives, there was one time when their subject teacher changed some activities in the module as the activities were complicated to answer; it was not announced for all the sections, which made other students answer the said activities. It sparked confusion among them as it had to be changed suddenly; it would be better if all the activities that needed to be done were in the module already. There were modules that changed and specified only in their student portal, which made it hard to use. It would be helpful for them if the given modules were changed before the submission, making them do it as well in a short span of time. Altering the module every now and then may cause direct confusion for some students. As the modules were not designed personally by the school (directly by the school administrators or providers), there were a lot of adjustments created and it may have affected the subject flow as well as the students. In this case, as not all students were capable or had the ability to check their portal and/or attend online sessions, they only relied on the modules to learn and keep updated. Whether with great intentions or not, changing the modules with little to no time for adjustments was extremely stressful for them. Although this experience was addressed, the students believe that it would be best if this could be improved in the following school years.

Vague and Limited Explanations of Lessons, Instructions, and Activities: Second, there were vague and limited explanations of lessons, instructions, and activities. Some of the students stated that there were times in which instructions and activities were not properly explained or should be more detailed. Based on their narratives, the activities were not explained properly. That is why it is hard for them to do some of the activities. It was challenging for them because the use of online modules was more likely if certain topics were not understood immediately—questions were not entertained as soon as possible and some were shy about asking questions. In this case, there were some issues with the module, particularly the part about what to answer. The students hope that the instructions will easily elaborate more on the content, especially when it comes to identification (which should only focus on one answer) and imagery instructions.

Limited or Lack of Communication: Third, there was a limited or lack of communication. Based on the students' narratives, there was a lack of communication. Unlike during face-to-face, they could easily ask their teachers, and vice versa. Sometimes, it is hard for them to do the activity as some parts were confusing since they were just using the developed modules; some students were also having a hard time answering the activities. In addition to the inquiries regarding the modules, there were delays in email as well, just in case the online sessions were not available.

Theme 5: Issues with Online Learning, Connectivity, and Learning Management Systems

Difficulty on the Distance Online Learning Modality: The students experienced issues with online learning, connectivity, and learning management systems such as the following: First, there is difficulty in the online learning modality. This was the most frequent response among the students among the issues of online learning, connectivity, and learning management systems. Some students stated that it was difficult for them as not all of the students had a stable signal and not all of them were able to learn during the online set-up. In this online learning modality, some topics were not fully explained and presented. In addition, entrepreneurship is mostly about business and creating plans, strategies, and using other tools to be a successful entrepreneur. It is hard for them to take this subject online since they know that they would be more efficient and teach well if they were not in this set-up. It was difficult for them to understand each concept individually, especially when doing a business plan. The students committed errors unintentionally without knowing where they lacked. Furthermore, some of the activities require more physical contact, which is not available during the online set-up. It was hard for the students at first, but considering the situation, they accomplished it, but with limitations. For the students, it was hard for them to absorb what was just written in the modules; instead, it is fine to have a complete and clear lesson face-to-face, teach the subject in a face-to-face learning modality, and apply it to real situations right there. This transition from traditional (face-to-face) to a distance learning modality was difficult for the students to adjust to immediately. Despite the fact that it has limitations regarding the teaching-learning process, it was difficult for them to keep up in this kind of learning environment.

Internet Connectivity and Device Issues: Second, there were internet connectivity and device issues, as this distance learning requires technological assistance and support. Based on the students' narratives, there were times when they were having trouble communicating with their subject teacher because of the connectivity issue. Most of them experienced connectivity issues and device issues that prohibited them from doing the task, especially those who do not have the capacity to get the hard copy of the modules and just rely on soft copies. Thus, the internet connection contributed to a challenging experience among the students in distance learning.

Problems with the Learning Management System Integration: Lastly, for the issues of online learning, connectivity, and learning management systems, there was too much exposure to technological advancements as the students used the developed modules, that is, the problem of integrating the learning management system. According to the students, they are challenged to use the applications in all aspects of school life. It was very hard to immerse them in that learning process as it was new to them.

Theme 6: External and Personal Student Challenges

Learning Distraction and Disinterestedness: The students experienced external and personal challenges as well, such as the following: First, learning distractions and disinterestedness. This was the most frequent response of the students among the external and personal challenges as students. Some students stated that they get easily distracted or lose interest. Due to the large number of activities, distractions, and lack of attention, they have experienced self-study, poor internet connection, a lack of sleep, and a lack of time to answer all of the modules.

Concerns Regarding the Module Transition: Second, there were concerns about the transition to the use of modules. Based on the narratives of the students, they were still adjusting to the use of modules compared to the traditional mode of learning where the teachers were the ones who gave and facilitated the content of the subject.

Difficulty in Collaboration: Third, there was difficulty in collaborating. According to the students, this had been their problem since the start of online classes. It is difficult for them to keep up with other students, especially if the nature of the task requires a group effort. The participation and contributions of the group members were limited, but they maximized them as needed as it is part of the teaching-learning process.

Difficulty in Immediate Compliance: Fourth, there was difficulty with immediate compliance. Some of the students were not the same when it came to absorbing immediately the topic or lesson being discussed by the teacher. Since not all individuals are fast learners, there were difficulties in complying with the requirements. As aforementioned, in terms of collaboration, there were delays in submitting their part or parts of the requirements. In addition, this could result in the delay of submission, whether submitted individually or by group.

Irrelevant Topic to the Desired Course: Lastly, for external and personal challenges as a student, there were irrelevant topics to the desired course. This means a particular topic is not suitable for other fields of disciplines or professions in the future. The students in this case struggled to learn about the course subject because they were not good at business or it was not their career to be an entrepreneur.

Recommendations on the Use of Clustered Entrepreneurship Modules for Distance Learning

There were identified twenty-one (21) recommendations or points for improvement on the use of entrepreneurship modules for distance learning through content and thematic analysis and coding process as shown in Table 10. Among the twenty-one (21) theme clusters, there were six (6) emergent themes, as follows: (a) dealing with issues in communication, lessons, and instructions; (b) dealing with concerns about time constraints and academic workloads; (c) dealing with difficulties and limitations in theoretical and practical processes; (d) dealing with technical issues in learning modules; (e) dealing with issues in online learning, connectivity, and learning management systems; and (f) dealing with external and personal challenges as a student.

Table 10. Emergent Themes on the Recommendations on the Use of Clustered Entrepreneurship Modules for Distance Learning

Theme No.	Emergent Themes	Theme Clusters	f	%*
Theme 1	Addressing the Problems with Communication, Lessons, and Instructions	(1) Provide More Examples and Resources	25	60.98
		(2) Provide Detailed and Clear Instructions	8	19.51
		(3) Avoid Interchanging Activities	3	7.32
		(4) Avoid Sudden Modifications in the Activities	3	7.32
		(5) Make Efficient Communication	2	4.88
		Total	41	100.00
Theme 2	Addressing Time Constraints and Academic Workload Concerns	(1) Provide Adequate Time Allotment	11	84.62
		(2) Adjust the Length of the Activities	2	15.38
		Total	13	100.00
Theme 3	Addressing the Difficulties and Limitations in Theoretical and Practical Processes	(1) Provide Outcome-based and Practical Activities	6	50.00
		(2) Help the Students to Make a Practical Business	2	16.67
		(3) Relate Activities and Evaluations to Concepts	2	16.67
		(4) Include a Definition of Terms Before the Concepts	2	16.67
		Total	12	100.00
Theme 4	Addressing the Technical Issues in Learning Modules	(1) Provide Illustrations and Visual Representations	5	41.67
		(2) Review, Revise and Finalize the Learning Modules	3	25.00
		(3) Provide an Answer Sheet	2	16.67
		(4) Focus on Significant Concepts and Learning	2	16.67
		Total	12	100.00
Theme 5	Addressing the Issues with Online Learning, Connectivity, and Learning Management System	(1) Maximize the Time Frame for Online Sessions	3	42.86
		(2) Consider the Teaching-Learning Process for Distance Learning	2	28.57
		(3) Give Fair Assessment and Evaluation	2	28.57
		Total	7	100.00
Theme 6	Addressing the External and Personal Student Challenges	(1) Make the Module Course Interesting	5	71.43
		(2) Interconnect the Concepts and Activities	1	14.29
		(3) Allot Schedule for Other Modes of Submission	1	14.29
		Total	7	100.00

Note. *Rounded off

Theme 1: Addressing the Problems with Communication, Lessons and Instructions

The following are the recommendations for addressing the problems in communication, lessons, and instructions: (a) provide more examples and resources - more examples and further explanations regarding business matters (from planning to implementation), visual-based learning resources for learners to better comprehend ideas, more sites or links that may help in answering the modules, lesson references, example output as a point of reference, and more materials that would be beneficial for students to explore more, gain knowledge, and find the course interesting; (b) provide detailed and clear instructions—more detailed, clear, and complete subject presentation; fixed and step-by-step instructions; detailed information; and make things simple and understandable for students, as not all of them can cope quickly; (c) avoid interchanging activities: avoid interchanging activities to do, keep the tasks within the modules as they are (no separate tasks given without prior announcement or instruction), and ensure that the activities in the module are the ones that should be answered; (d) avoid sudden modifications in the activities - it would be better to give modifications or corrections before the start of the week and not in the middle of the week; and (e) make efficient communication - students need better communication to understand the activities.

Theme 2: Addressing Time Constraints and Academic Workload Concerns

The following are some suggestions for dealing with time constraints and academic workloads: (a) provide adequate time allotment—give more time to finish the modules, more time on online sessions, minimize the tasks assigned to students while maintaining the objectives; some requirements require extensive time when it can be shortened; it would be helpful if teachers could cooperate and make the tasks easier for the students to adjust their time in answering and submitting them on time; it would be appreciated if the modules had fewer activities and evaluations; and (b) adjust the length of the activities - adjust the length of the activities to better cater the submission requirements, each module has too many activities which makes it harder for the students to adjust their time in answering and submitting it on time, it is appreciated if the modules will have lesser activities and evaluations—better if the relevant parts will be included and exclude the ones that are not that significant.

Theme 3: Addressing the Difficulties and Limitations in Theoretical and Practical Processes

The following are the recommendations for addressing the difficulties and limitations in theoretical and practical processes: (a) provide outcome-based and practical activities—more learning activities; allow students to conduct business in other locations for a large number of target markets and people who require products and services in rural areas; continue performance tasks that are engaging and great practice; reduce the use of essays; and try to incorporate activities and games that are related to the topic that may help the students understand and remember the lesson; (b) help the students to make a practical business - not every student has the ability or desire to start their own business. It is recommended to help the students improve their skills in business; more examples to help students comprehend the material better and to motivate them to complete their tasks; (c) relate activities and evaluations to concepts - each part of the module should be related to the concept part and create a more systematized module, especially the interconnection of the concepts and activities; and (d) include a definition of terms before the concepts - give the students a definition of terms before proceeding to the discussion of the qualities of an entrepreneur. It may not be difficult for some to understand and learn from the definitions of terms, but there are students who are not into vocabulary that may cause confusion, especially in this distance learning modality.

Theme 4: Addressing the Technical Issues in Learning Modules

The following are the recommendations for addressing the technical issues in the learning modules: (a) provide illustrations and visual representations: more detailed, clear, and complete presentation of subjects, learning activities, or graphic organizers are helpful to have a better understanding in the entrepreneurship course, as it helps the student to have an organized knowledge about the topics in the course; having illustrations attracts students and makes it easier for them to visualize what was being stated; module that is only filled with text would make the students lose interest in the topic; (b) review, revise, and finalize the learning

modules - review the modules first before finalizing on what the students must do. Make sure that the modules are up-to-date and finalized before they are given to the students. It is recommended to proofread the module first before distributing it to the students; (c) provide an answer sheet - provide an answer sheet so that it would be easy for the students to track which activity should be done and to avoid confusion on how it should be done, and to have a bigger space for answering; and (d) focus on significant concepts and learning - it is recommended that the modules will be less wordy and emphasize only the important things—better if only the important parts are included and leave out the less important ones.

Theme 5: Addressing the Issues with Online Learning, Connectivity, and Learning Management System

The following are the recommendations for addressing the issues of online learning, connectivity, and learning management systems: (a) maximize the time frame for online sessions—more time on online sessions so that the activities are well explained; more hours of online sessions on different days; and minimize the tasks assigned to students because the time allotted is insufficient for how many tasks should be completed; and (b) consider the teaching-learning process for distance learning—both teachers and students should go along during the distance learning so that they can easily understand each other and be successful; and (c) give fair assessment and evaluation - give the students to present their business proposal so the teacher can give them feedback with their output, it is also recommended that teachers would not grade the student based on how other students did well—if other students' work did not caught or appeal the teacher's eyes, then try to focus on the students' work content alone.

Theme 6: Addressing the External and Personal Student Challenges

The following are the recommendations for addressing the external and personal challenges as a student: (a) make the module course interesting - make the students interested in the course subject because this will help them to answer the modules and tasks with what they have learned; more interesting activities and learning experiences for the students to discover other things about the course; (b) interconnect the concepts and activities - create a more systematized module, especially the interconnection of the concepts and activities; and (c) allot schedule for other modes of submission - have a schedule for submitting the hard copies of the modules to other distance education learning modalities.

DISCUSSIONS AND CONCLUSION

This study aimed to contribute to the growing body of instructional materials that respond to K-12 demands, particularly student-centered demands, and meet curriculum standards. This study established that entrepreneurship pedagogy could bridge the gap between the demands of the twenty-first century, particularly in various modes of learning, catering to the needs of students who will be unable to enroll in traditional education and the teaching of entrepreneurship through developed instructional modules evaluated by the students. In this case, this study aimed to examine the usefulness and challenges of the developed and implemented clustered self-directed learning modules in entrepreneurship for senior high school distance learning amidst the emerging pandemic. In essence, the obtained general weighted mean of all the modules was inferred to be very effective and very useful for the students in distance learning; the physical aspects of the module as the highest obtained average among the indicators; and illustrations as the lowest obtained average among the indicators. According to Jaramillo (2002), teachers are aware that learning occurs when students are motivated. We should constantly work to create a rich learning environment and retain the students' high level of interest in order to achieve this goal. We should employ a range of instructional methods, resources, and incentive strategies to achieve this. Utilizing these resources increases students' interest in and enthusiasm for learning.

In contrary to its effectiveness and usefulness, there were identified twenty-five (25) challenges on the use of clustered entrepreneurship modules for distance learning through content and thematic analysis and coding process. There were six (6) emergent themes among the twenty-five (25) theme clusters enumerated: (a) difficulties and limitations on theoretical and practical processes; (b) concerns on time frame and academic workloads; (c) technical issues in the learning modules; (d) problems with communication, lessons, and instructions; (e) issues with online learning, connectivity, and learning management systems; and (f) external and personal challenges as a student. These challenges were the basis for framing the recommendations of the students in addressing the aforementioned emergent themes on the use of clustered entrepreneurship modules for distance learning.

All aspects of teaching and learning in many institutions are altered by online education (Ajibade et al., 2022; Rochina-Chisag & Tabuena, 2022); there have been numerous empirical studies to look at problems with offering online courses, but few have combined earlier research and given an overview of these problems (Kebritchi et al., 2017). One of its challenges, according to Arthur-Nyarko et al. (2020), is the potential of mobile device use in distance learning. It argues that, despite issues with low access levels and expensive internet, distance education institutions can implement other policies in which distance learners use personally owned devices to access digital content to support their learning.

Aside from this, according to a study (Luaña, 2021), parents' malpractice in answering their kids' homework is a result of the challenges they face, including: their kids' poor reading and writing skills; their limited time due to work and housework; having too many kids to take care of; having difficult lessons and subjects; and having too many learning activities in the modules. If these issues are not resolved, modular learning will fail, and there won't be any learning at all. The author emphasized that parents should therefore be equipped and empowered to properly assist learning at home since they are the learning facilitators. In addition, the most reported challenges were lack of sufficient time for study, difficulties in access and use of ICT, ineffective feedback, and lack of study materials (Musingafi et al., 2015).

The following are the recommendations from the emergent themes of the study on the use of clustered entrepreneurship modules for distance learning: (a) in addressing the problems with communication, lessons and instructions: provide more examples and resources, provide detailed and clear instructions, avoid interchanging activities, avoid sudden modifications in the activities, and make efficient communication; (b) in addressing time constraints and academic workload concerns: provide adequate time allotment and adjust the length of the activities; (c) in addressing the difficulties and limitations in theoretical and practical processes: provide outcome-based and practical activities, help the students to make a practical business, relate activities and evaluations to concepts, and include a definition of terms before the concepts; (d) in addressing the technical issues in learning modules: provide illustrations and visual representations, review, revise and finalize the learning modules, provide an answer sheet, and focus on significant concepts and learning; (e) in addressing the issues with online learning, connectivity, and learning management system: maximize the time frame for online sessions, consider the teaching-learning process for distance learning, and give fair assessment and evaluation; and (f) in addressing the external and personal student challenges: make the module course interesting, interconnect the concepts and activities, and allot schedule for other modes of submission.

Planning classroom instructional materials, tests, and assessments requires determining what is to be measured and then defining it precisely so that tasks can be constructed that require the intended knowledge, skills, and understanding while the process of assessments is taking place, as it reflects various relevant measures in learning outcomes (Tabuena, Morales, & Perez, 2021). Since most institutions' assessment and evaluation practices heavily depend on students' perceptions, keeping track of students' expectations and performance is an essential quality control measure. In environments where students are the focus, quality monitoring systems are essential for enabling the monitoring and evaluation of critical outcomes such as those in this study.

BIODATA and CONTACT ADDRESSES of AUTHORS



Dr. Almighty Cortezo TABUENA is an Adjunct Professor (Lecturer) at the College of Arts and Sciences, Pamantasan ng Lungsod ng Valenzuela (University of the City of Valenzuela), Valenzuela City and a Senior High School Research Teacher in the High School Department, Espiritu Santo Parochial School of Manila, Inc., Philippines. He gained his Doctor of Philosophy (PhD) in Humanities Education at Lawrence Bible Institute, accredited by California University (USA), in 2023. He graduated Cum Laude from the Philippine Normal University (Philippines) in 2017 with a Bachelor's degree in Secondary Education, Major in Music Education and successfully completed all academic requirements for his Master of Arts in Education with a Specialization in Music Education at the same university. He also obtained his Master of Arts in Humanities Major in Music and Art Studies degree at Oceania Polytechnic and Technological University (New Zealand) in 2021; his Master of Education degree at Harvest Mission International University (USA) in 2022; and his Master of Arts in Social Sciences degree at the School of Business and Trade (Switzerland) in 2023. Furthermore, he is currently pursuing a Master in Project Management degree at the Universidad Isabel I (Spain) and his Doctor of Philosophy (PhD) in Leadership Major in Humanities at the West Visayas School of Theology (Philippines). His research primarily focuses on action research, assessment and evaluation, culture and the arts, educational research, humanities and social sciences, material development, and music. He has presented papers at institutional, local, and international conferences and published research articles in various local and international journals indexed in the ASEAN Citation Index (ACI), Web of Science (WoS), and Scopus. He is also invited as a resource speaker in different seminars related to education, music, and research and contributes to various international journals as a reviewer and editorial board member.

Almighty Cortezo TABUENA
Senior High School, High School Department
Address: Espiritu Santo Parochial School of Manila, Inc., Manila, Philippines
Email: almighty.tabuena@gmail.com



Elena Garcia VILLAREAL has been the Student Behavior Management Head at Espiritu Santo Parochial School of Manila, Inc. since 2022. Previously, she held various positions, including coordinator roles in the Araling Panlipunan (Social Studies) Department for both the Grade School and Junior High School. Additionally, she taught business and management-related courses in the Senior High School Department. She earned her Bachelor of Science in Secondary Education, Major in Social Studies, Minor in English, from San Pablo Colleges, Laguna, in 2000. Currently, she is pursuing a Master of Arts in Social Studies (with units) at Roosevelt College (Far Eastern University), Cainta, and a Master of Arts in Education Major in Educational Leadership and Management at St. Paul University, Manila. Her diverse interests include poetry, music, case analysis, theater arts, curriculum planning, educational management, and supervision.

Elena Garcia VILLAREAL
Student Behavior Management Head, High School Department
Address: Espiritu Santo Parochial School of Manila, Inc., Manila, Philippines
E-mail: elena.villareal.esps@gmail.com

REFERENCES

- Ajibade, O. O., Leon-Gomez, R., Tabuena, A. C., Alase, P. O., Huaman, J. T., Adediran, A. O., & Ayaz, M. (2023). New Insights into the Research of Social Media Marketing and Consumer Behaviour: A Scientometric Analysis of a Decade. In *2023 IEEE International Conference on Automatic Control and Intelligent Systems (I2CACIS)* (pp. 143-148). IEEE.
- Ajibade, S. S. M., Oyeboode, O. J., Dayupay, J. P., Gido, N. G., Tabuena, A. C., & Kilag, O. K. T. (2022). Data classification technique for assessing drug use in adolescents in secondary education. *Journal of Pharmaceutical Negative Results*, 971-977.
- Alea, L. A., Fabrea, M. F., Roldan, R. D. A., & Farooqi, A. Z. (2020). Teachers' Covid-19 awareness, distance learning education experiences and perceptions towards institutional readiness and challenges. *International Journal of Learning, Teaching and Educational Research*, 19(6), 127-144.
- Arthur-Nyarko, E., Agyei, D. D., & Armah, J. K. (2020). Digitizing distance learning materials: Measuring students' readiness and intended challenges. *Education and Information Technologies*, 25(4), 2987-3002.
- Bravo, C. D. S., Dimalanta, F. D. R., Jusay, K. A. P., Vitug, M. Y., & Tabuena, A. C. (2022). Inclination state on the Philippine culture and arts using the appraisal theory: Factors of progress and deterioration. *Participatory Educational Research*, 9(1), 388-403.
- Borromeo, O. J. (2021). Profile and competence of learning facilitators in modular distance learning. *International Journal of Advanced Multidisciplinary Studies*, 1(3), 67-79.
- Calderon, J. F., & Gonzales, E. C. (2011). *Methods of research and thesis writing*. Mandaluyong City, Philippines: National Books Store.
- Calmorin L. P. (2010). *Research and statistics with computer*. Mandaluyong City, Philippines: National Books Store.
- Camero, A. M. (2022). Poverty as a factor affecting the society during the COVID-19 pandemic in the case of selected students in the Philippines: Impact and interventions. *International Journal of Academic and Practical Research*, 1(2), 90-99.
- Creswell, J. W. (2009). *Research design: Qualitative, quantitative, and mixed methods approaches* (3rd ed). SAGE Publications, Inc.
- Department of Education (2019). *Alternative delivery mode learning resource standards*. Pasig City, Philippines: Department of Education.
- Dochy, F. J. R. C. (1989). *Modularisation and student learning in modular instruction in relation with prior knowledge*. Open University, Heerlen (Netherlands): Centre for Educational Technological Innovation.
- Escalona, G. M. S. (2022). A case study of the common difficulties experienced by small entrepreneurs amidst the coronavirus outbreak. *International Journal of Academic and Practical Research*, 1(2), 68-76.
- Jaramillo, N. R. (2002). *Enriching classroom instruction through the use of supplementary materials*. The Educators Diary, Manila: SIBS Publishing House Incorporated.
- Joshi, P., Singh, P., Tabuena, A. C., & Galapate, W. L. (2023). Role of corporate social responsibility in talent acquisition and retention: A cross-sectional study. *Journal of Informatics Education and Research*, 3(1).
- Kebritchi, M., Lipschuetz, A., & Santiago, L. (2017). Issues and challenges for teaching successful online courses in higher education: A literature review. *Journal of Educational Technology Systems*, 46(1), 4-29.
- LeCompte, M. & Preissle, J. (1993). *Ethnography and qualitative design in educational research* (2nd ed). Academic Press.

- Luaña, J. P. (2021). Why do parents answer their children's modules? A closer look on parental practices and challenges in modular distance learning. *International Journal of Global Community*, 4(1), 1-16.
- Meyer, R. G. (2016). *Modules from design to implementation*. Singapore: Colombo Plan Staff College for Technician Education.
- Musingafi, M. C., Mapuranga, B., Chiwanza, K., & Zebron, S. (2015). Challenges for open and distance learning (ODL) students: Experiences from students of the Zimbabwe Open University. *Journal of Education and Practice*, 6(18), 59-66.
- Nardo, M. T. B. (2017). Modular instruction enhances learner autonomy. *American Journal of Educational Research*, 5(10), 1024-1034.
- Punzalan, D. J. C. (2022). Advertisement as a factor affecting bankruptcy and its impact on consumer buying behavior during the COVID-19 pandemic. *International Journal of Academic and Practical Research*, 1(1), 8-16.
- Rochina-Chisag, A. G., & Tabuena, A. C. (2022). Online learning as an alternative learning modality in Ecuador's education institutions amidst crises and outbreaks: A SWOT analysis. *Journal of Learning for Development*, 9(3), 475-491.
- Tabuena, A. C. (2023). Learning, doing, and teaching teacher research: On understanding the teaching-research nexus. *International Journal of Academic and Practical Research*, 2(1), 1-7.
- Tabuena, A. C., Schmitt, C. E. S., Lauber, O., Gomez, A., & Tabuena, Y. M. H. (2023). The impact of the Excellence in Teacher Education Act on the cultivation of a research-oriented culture: A brief review report of the Republic Act No. 7784 in the Philippines. *International Journal of Academic and Practical Research*, 2(1), 95-102.
- Tabuena, A. C., Morales, G. S., & Perez, M. L. A. C. (2021). Music assessment techniques for evaluating the students' musical learning and performance in the Philippine k-12 basic education curriculum. *Harmonia: Journal of Arts Research and Education*, 21(2), 192-203.
- Tabuena, A. C., & Hilario, Y. M. C. (2021). Research data analysis methods in addressing the K-12 learning competency on data analysis procedures among senior high school research courses. *International Journal of Recent Research and Applied Studies*, 8(3), 1-7.
- Tabuena, A. C., Hilario, Y. M. C., & Buenaflor, M. P. (2021). Overview and exemplar components of the research methodology on the research writing process for senior high school students. *International Journal of Trend in Scientific Research and Development*, 5(3), 117-126.
- Tugano, M. S., Tria, J. Z., & Tonio, J. Z. (2022). Modular Learning amidst COVID-19 Pandemic: Satisfaction Among Students in a Higher Education Institution. *International Journal of Professional Development, Learners and Learning*, 4(2).
- World Bank. (2020). *Remote Learning, Distance Education and Online Learning During the COVID19 Pandemic*. eLearning World Bank. Retrieved June 1, 2022 from <https://doi.org/10.1596/33499>
- World Health Organization (WHO). (March, 2020). *Coronavirus disease 2019 Report (COVID-19), Situation Report – 59*. Retrieved June 1, 2022 from https://www.who.int/docs/defaultsource/coronaviruse/situation-reports/20200319-sitrep-59-covid19.pdf?sfvrsn=c3dcdef9_2

INVESTIGATING TEACHERS' EXPERIENCES WITH DIGITAL CLASSROOM MANAGEMENT AND INCORPORATING SOCIAL AND EMOTIONAL LEARNING

Dr. Figen KARAFERYE

ORCID: 0000-0003-3449-032X

Emet Vocational School

Kutahya Dumlupinar University

Kutahya, TURKIYE

Received: 27/11/2022 Accepted: 23/03/2023

ABSTRACT

The research on classroom management in general is numerous, yet the connection between digitization, classroom management, and Social and Emotional Learning (SEL) has been understudied. The current study explored how primary school teachers managed their digital classrooms while incorporating social and emotional learning into their classroom management practices in the remote teaching period. The study not only examined the classroom management strategies and procedures employed but also investigated teachers' beliefs and perceptions about managing digital classrooms. The study was carried out with 145 primary school teachers teaching in school grades 1st-4th from five different public schools by adopting stratified random sampling. The data were collected via written responses of the participants with the closed, fixed-response, and standardized open-ended forms developed by the researcher. Descriptive analysis and content analysis were used in the analysis of quantitative and qualitative data respectively. The findings revealed that the majority of teachers led online classroom management processes similar to their face-to-face experiences but were less effective concerning the developmental needs of each student in the digital classroom. Furthermore, the study yielded insight into the stress factors and protective factors within the context of classroom management incorporating SEL, and it provided direction for future implementations concerning teachers' professional learning needs and expectations.

Keywords: Classroom management, digital/online classroom management, social and emotional learning, stress factors, protective factors.

INTRODUCTION

Classroom management is a fundamental skill set for teachers to facilitate learning for students. It is essential to the work of teaching and learning (Aldrup et al., 2018; Cho, Mansfield & Cloughton, 2020). Yet, although classroom management has been considered one of the basic tasks of teachers in teaching and learning processes and is a key predictor of student success (Marquez et al., 2016), the research shows that some teachers or schools find it difficult to maintain orderly and productive learning environments (Cho, Mansfield & Cloughton, 2020; Paramita, Anderson & Sharma, 2020). Adding complexity to the issue, recent scholarship has raised concerns that, despite the transformation of teaching and learning environments into technology-rich environments, particularly as a result of remote education experiences, teachers tend to manage their classrooms in a teacher-centered manner. Yet, a more constructivist approach is needed where digital technologies are viewed more holistically with their influence on classroom dynamics and culture (Bolick & Bartels, 2015; Jöhler et al., 2022).

Another concern is that Social and Emotional Learning (SEL) might fall behind while the focus is more on academic instruction and academic curriculum-related educational goals, particularly in the digital classroom. However, as in Evertson and Weinstein's (2006) definition of classroom management, promoting the development of students' social and emotional skills (e.g., self-awareness, self-regulation, social awareness)

is an important goal in classroom management. Moreover, in classroom management, particularly with lower grades such as primary school level, academic, social, emotional, cognitive, and behavioral aspects merge in such a manner by interacting and contributing to the learning process that individual achievements are often a result of the blend of these. Weak development in one domain undermines healthy development in others (Carter & Doyle, 2006; Johler et al., 2022; Jones & Kahn, 2017).

A rigorous body of evidence has shown that children are more likely to reach their social-emotional, and academic potential in a safe, supportive, and collaborative learning environment (Jones & Doolittle, 2017). By taking this into account, when Programme for International Student Assessment (PISA) results are examined, it is seen that across the Organisation for Economic Cooperation and Development (OECD) countries, just about two in three students reported that they are satisfied with their lives, and that percentage shrank by five percentage points between 2015 and 2018. Some 6% of students reported always feeling sad. From a gender perspective, in almost every education system, girls expressed greater fear of failure than boys, even when they outperformed boys in reading by a large margin. Regarding students' self-perception, in one-third of countries and economies that participated in PISA 2018, more than one in two students said that intelligence was something about them that they couldn't change very much. Unfortunately, those students are unlikely to make the necessary investments in themselves to succeed in school and life (OECD, 2019). This data shows that a more positive classroom and school climate is needed while supporting students' self-awareness, social awareness, and responsible decision-making to lead their lives.

Adding more complexity and urgency to the issue, recent research has also raised concerns about the consequences of the COVID-19 pandemic, such as a widening learning and achievement gap among students, a deterioration in students' well-being, weak support for students' social and emotional competences, exacerbated social class academic disparities, and so on. To handle these issues, the intervention policy and strategies involve strengthening the social and emotional perspective in the classroom and school implementations, promoting teachers' digital competencies, and developing digital infrastructures in schools (Bzdok & Dunbar, 2022; Goudeau et al., 2021; Karaferye, 2022; Zancajo, Verger & Bolea, 2022).

In light of these, there is a pressing need to address the context of classroom management through the perspective of social and emotional learning with the involvement of digital technologies. This is especially so when considering that there is an urgent need to support the professional growth of teachers concerning contemporary aspects of the teacher's role as a classroom manager in technology-rich learning environments (Johler et al., 2022). As a result, the purpose of this research is to explore how primary school teachers managed their digital classrooms while incorporating social and emotional learning into their classroom management practices. The following research questions guided the study:

- What SEL-focused classroom management strategies did teachers employ in their digital classrooms?
- What factors of stress did teachers experience with interpersonal communication processes in digital classroom management?
- With what strategies could teachers deal with stress factors in digital classroom management through the SEL perspective?

To address classroom management strategies incorporating SEL, the researcher focused on the specific areas for teachers in managing the classroom effectively to support social & emotional aspects based on the theoretical background of the study. The researcher designed and structured the study rationale accordingly. Addressing these questions involved examining not only the classroom management strategies and procedures employed but also revealing teachers' beliefs and perceptions about managing digital classrooms. Furthermore, it yielded insight into the stress factors and protective factors within the context of classroom management incorporating SEL, and it provided direction for future implementations concerning teachers' professional growth.

THEORETICAL FRAMEWORK

Classroom Management through the SEL Perspective

The Social and Emotional Learning (SEL) framework, largely evolved from research on prevention and resilience in the 1990s (Zins & Elias, 2007), and was articulated by compelling conceptual and empirical

research in the years ahead (DePaoli, Atwell & Bridgeland, 2017; Durlak et al., 2011), involves processes of developing social and emotional competencies in children from self-awareness to responsible decision-making (CASEL, 2003; Zins et al., 2004). The “framework targets a combination of behaviors, emotions and cognitions” through the enhancement of social and emotional competencies (Coelho, Sousa, & Figueira, 2016: 434). Social and emotional competencies involve the abilities “to understand, manage, and express the social and emotional aspects of one’s life in ways that enable the successful management of life tasks such as learning, forming relationships, solving everyday problems, and adapting” to the things happening in life (Elias et al., 1997: 2). Thus, SEL is defined as an integral part of education and human development. It is the process through which individuals acquire and apply knowledge, skills, attitudes, and values to develop healthy identities, manage emotions achieve personal and collective goals, feel, and show empathy for others, establish, and maintain supportive relationships, and make responsible and caring decisions (Fundamentals of SEL, CASEL).

Classroom management, either face-to-face or digital, taking an SEL approach starts with creating a positive classroom climate with supportive relationships and collaborative practices in which learning is challenging, engaging, and meaningful in the classroom (Iaosanurak, Chanchalor & Murphy, 2016; Jennings et al., 2021; Zins, Maurice & Elias, 2007). Through those processes and in such a positive learning environment, children get a chance to develop their social and emotional competencies. Evertson and Weinstein’s (2006) definition of effective classroom management involves the perspective of social and emotional learning by emphasizing the ongoing interaction between teachers and students (as interpersonal communication in the classroom) and referring to the actions teachers take to create a supportive environment for students’ academic and social-emotional learning (Evertson & Weinstein, 2006; Korpershoek et al., 2016).

For teachers to manage both a digital classroom and a face-to-face classroom effectively and support social & emotional aspects, there are some specific areas to focus on (Levin & Nolan, 2013; Prior, 2015):

- Developing relationships / Building rapport for a positive climate in the classroom
- Supporting interpersonal communication processes (starting with teaching communication skills explicitly)
- Establishing clear expectations and consequences (proactive classroom management) and offering support
- Creating a fun, engaging, and stimulating classroom environment
- Being consistent and persistent in behavior toward students
- Varying instructional approaches in the classroom to support academic learning and social & emotional learning.

Benefits of Incorporating SEL

Effective SEL practices begin in preschool and continue through primary school, secondary school, high school, and beyond; and most importantly, they meet the needs of both learners and adults (DePaoli, Atwell & Bridgeland, 2017). The research on students who benefit from integrated SEL practices in and out of the classroom shows a positive impact on those listed below (Blair & Raver, 2014; CASEL online; DePaoli, Atwell & Bridgeland, 2017; Durlak et al., 2011; Gueldner et al., 2020; Taylor et al., 2017):

- Academic achievement increases
- Supports the process of minimizing the learning gap
- Positive attitudes about self, others, and school increase
- SEL helps students manage stress and depression
- Connection to school and sense of belonging increase
- Positive increase in motivation and self-advocacy
- Positive increase in attendance, focus, participation, and task/work completion
- Teacher job satisfaction and self-efficacy
- Enhanced student and family relationships

- SEL shows an impact on development across all demographics and backgrounds including disadvantaged groups
- School climate and reputation
- College, university, and career readiness
- Positive increase in life outcomes

In a study by DePaoli, Atwell, and Bridgeland with CASEL (2017), 98% of school principals said they believe students from all backgrounds (both affluent and poor) would benefit from learning SEL skills in the classroom. This finding also correlates with the PISA results. It is stated that while students from well-off families often find a path to success in life, those from disadvantaged families have generally only one single chance in life, which is a great teacher and a good school (OECD, 2019). Teachers in a school climate with high literacy of social and emotional skills are more likely to leave no child behind. Moreover, teachers in a school climate with high literacy of social and emotional skills can much more easily create and sustain better relationships with students; they experience a decrease in student disruptive behavior and a decrease in teacher burnout, all of which lead to a higher level of teacher self-efficacy and job satisfaction (Levin & Nolan, 2013).

METHOD

The study adopted a survey research design, which allows a researcher to study a sample of the population with “a quantitative or numeric description of trends, attitudes, or opinions of a population” (Creswell, 2014: 249) via the use of questionnaires, scales, and/or interviews (Fowler, 2014). The current research, utilizing both quantitative and qualitative instruments, studies a sample of primary school teachers to investigate their digital classroom management experiences. There is no comprehensive research on how primary school teachers managed their classrooms by considering the intentional implementation of social and emotional elements in teaching and learning. Moreover, the researcher explored the challenges/sources of stress and coping strategies of primary school teachers in managing their digital classrooms by utilizing both quantitative and qualitative techniques to examine multiple sources of evidence.

Participants

The data were gathered from 151 primary school teachers from 5 different public schools in Turkiye in the educational year 2021-2022 by applying stratified (by grade) random sampling. With the stratified sampling, teachers from all four grades were involved in the study “to enrich the details and have a holistic understanding” with the use of this sampling technique (Yildirim & Simsek, 2008: 106-107). Primary school teachers from all grades (grades 1st to 4th) were chosen as a bounded context for this study. Primary school teachers from different schools were invited to participate in the study to compile the sample of primary school teachers with the intention of transferability and to increase the generalizability of the research results (Merriam, 1998). After analyzing/detecting any missing data in the responses of the participants (n=151), the study continued with the data of 145 primary school teachers. The participants were distributed across all primary school grades from the 1st to the 4th. Following the analysis of the missing data, the data obtained from teachers teaching in the 1st grade (n= 31), 2nd grade (n= 40), 3rd grade (n=, 38), and 4th grade (n= 36) were involved for further analysis in the study. Table 1 depicts the demographics of the research participants.

Table 1. Demographics

Gender	<i>f</i>	%	Age	<i>f</i>	%	Teaching experience	<i>f</i>	%	Education level	<i>f</i>	%
Female	71	49,0	22-29	13	9,0	First 5 years	9	6,2	Bachelor's degree	134	92,4
Male	74	51,0	30-34	23	15,9	6-10	22	15,2	Master's	11	7,6
			35-39	31	21,4	11-15	33	22,8			
			40-44	30	20,7	16-20	26	17,9			
			45-49	18	12,4	21-25	30	20,7			
			50-54	19	13,1	26-30	10	6,9			
			55-59	10	6,9	31 years and above	15	10,3			
			60 and above	1	0,7						

The question of whether participants had completed specific training on online teaching was considered important in interpreting their responses. Of the respondents, only 41,4% stated that they completed specific training on online teaching, as Table 2 depicts. Another question to learn more about the characteristics and the environment of the participants' digital/online classroom management processes, which was believed to affect social & emotional aspects of the classroom, was addressed to teachers about their classroom populations.

Table 2. Teachers' training on online teaching & student populations in digital/online classroom

Completed training on online teaching	<i>f</i>	%	Classroom population	<i>f</i>	%
Yes	60	41,4	Max. 10 students	9	6,2
No	85	58,6	11-20	66	45,5
Total	145	100	21-30	55	37,9
			31-40	15	10,3

Data Collection & Instruments

In the study, the data were collected via written responses of the participants with the "closed, fixed-response" and "standardized open-ended" forms developed by the researcher. As M.Q. Patton (2002: 349) suggests in standardized open-ended interviews "the exact wording and sequence of questions are determined in advance. All interviewees were asked the same basic questions in the same order." By doing so, the respondents answered the same questions, which increased the comparability of responses. The advantage of this approach is that it reduces interviewer effects and bias (Fowler, 2014: 5; 112). This way, it also "facilitates organization and analysis of the data" (Patton, 2002: 349). On the other hand, with the use of a closed, fixed-response interview, the questions and response categories were determined in advance, and the respondents were expected to choose from among the given fixed responses. This way, in the data analysis stage, "responses can be directly compared and easily aggregated; many questions can be asked in a short time" (Patton, 2002: 349). Using more than one approach in data collection is targeted to enrich the database and increase the validity and reliability of the research (Creswell, 2014). Therefore, with the use of both approaches in the study, that is standardized open-ended interview and closed, fixed-response interview, the researcher aimed to capture the complexities of participants' perceptions and experiences via open-ended questions and to get systematic information from the participants to compare the responses.

Accordingly, the form consisted of close-ended (dichotomous and Likert scale-type) and open-ended questions:

- 7 of which concerned the participant's demographics and background, eg., age, gender, teaching experience
- 10 questions (dichotomous and open-ended) concerned the participant's instructional practices and interpersonal communication-related practices of digital classroom management,

eg., I spare time to build rapport in my online classrooms (1), I am good at preventing disruptions proactively with routines and procedures (7). Each statement required choosing either an Agree/Disagree alternative, and a further explanation box to detail the chosen alternative with examples/reasons, etc.

- 7 Likert scale-type questions concerned stress factors in digital classroom management, eg., using the right technology fitting the needs (1), lack of interaction with students (5).
- 2 open-ended questions concerned the stress factors, their effects, and protective factors in digital classroom management, eg., Please describe how you manage the challenges that you face in classroom management.
- and 1 open-ended question concerned the participant's intention to adopt professional development opportunities regarding the subject matter.

The form was developed by the researcher upon reviewing the relevant studies in the literature (Eddy, Herman & Reinke, 2019; Edison & Geisler, 2003; Harmsen, Helms-Lorenz, Maulana & van Veen, 2018; Sokal, Trudel & Babb, 2020a; 2020b; Trudel, Sokal & Babb, 2021). To investigate teachers' experiences thoroughly in the study, the questions were presented in an orderly fashion that an open-ended section followed each close-ended question part to let the participants respond to the questions in detail in a free manner. The data were collected via online tools in the 2021-2022 educational year.

Data Analysis

Descriptive statistics and descriptive analysis were used in the analysis of the quantitative data. SPSS Statistics 28.0.0 program was used. For dichotomous and Likert scale-type questions, frequency, mean, and standard deviation values were examined. The qualitative data (from open-ended coded questions) were interpreted through content analysis using the MAXQDA 2022 program. In content analysis, the researcher followed 4 steps of qualitative analysis (Yildirim & Simsek, 2008: 228-239): Coding data in meaningful units (1), categorizing the codes to reach themes (2), organizing, and defining data according to the codes and themes (3), interpreting findings (4). In other words, the researcher examined the sentences to the words, created codes, categorized the codes which are in relation, synthesized them into themes, organized the themes, and finally interpreted them.

Validity and Reliability

For validity and reliability requirements, reliability was obtained through Cronbach's alpha $\alpha=,76$ by exceeding the satisfactory level (Pallant, 2007: 98-99) for the quantitative instrument. For validity, KMO (Kaiser-Meyer-Olkin Measure) and Bartlett's test were done for the items and the result was adequate ,68 (Sig.=,00). KMO value ranges between 0-1 and generally the recommended value is ,60 and above (Pallant, 2007), which suggested acceptability and adequacy to proceed with data analysis in the study. Also, item loadings were computed, and values were observed above $>,60$ (ranging from ,61 to ,87). In the analysis of the total variance, the main themes converged and added to the validity. Moreover, expert opinion was sought for relevance, clarity, and sufficiency purposes to construct content validity. Two experts working in the educational sciences field were consulted. Following the expert opinion stage for wording, clarity, and sufficiency purposes (both for the quantitative and qualitative parts), piloting was conducted for further feedback to the researcher.

Secondly, Lincoln and Guba's (1985) trustworthiness criteria and techniques were applied. Accordingly, the criteria of credibility (internal validity), transferability (external validity), dependability (reliability), and confirmability (objectivity) were applied to be met as follows. To increase credibility and dependability and to eliminate any inconsistencies in one single approach, two approaches of interviews were used in the study. Moreover, the responses were collected in written form from the participants without adding any researcher insights/bias to the answers or avoiding missing data, which increased credibility, dependability, and confirmability (Creswell, 2014; Patton, 2002; Yildirim & Simsek, 2008). The data were gathered from primary school teachers from different schools to increase transferability. Moreover, saturation amongst all

data collection and thick descriptions in the study added to the transferability and dependability (Merriam & Tisdell, 2016: 257). Another technique that was taken to ensure reliability was following Miles and Huberman's (1994) reaching a consensus of experts for reliability in qualitative research criteria. Thus, external expert opinion and reaching mutual agreement criteria were sought for the analysis and interpretation of the data. With the agreement of %94, it showed a satisfactory level of reliability to continue with the study. Upon the consensus of the study fulfilling reliability and validity requirements, the study continued.

Ethical Considerations

The ethical approvals required for the implementation and publication of the research were obtained from Kutahya Dumlupinar University Ethics Commission dated 30.12.2021 and numbered E.69390. To keep the anonymity of the participants, pseudonyms (P1, P2, etc.) were used in the analysis results.

FINDINGS

Findings are presented under the guidance of the research questions.

What Classroom Management Strategies did Teachers Use in Incorporating SEL into their Digital/Online Classrooms?

Table 3 depicts classroom management strategies that participants (Ps) used in their digital/online classrooms. Frequency values are given in the table showing the number of participants who used the strategies and the number of participants who did not use the strategies. Furthermore, depending on the responses to the use of the strategies, the participants (stating having used the strategy) were asked to detail how they used the strategy, why they chose to use it, and what they did, in examples if possible. On the other hand, the participants who stated that they did not use the strategy were asked to detail why they chose not to use or experienced not using the strategy, and what they experienced in the process accordingly. In the analysis of the responses to those detailing open-ended questions, themes were created, which are given in each strategy in Table 3.

Table 3. Teachers' strategies incorporating SEL in digital/online classroom management

Strategies used in digital/online classroom management	Ps who used the strategy	Themes obtained from open-ended coded questions	Ps who did not use the strategy	Themes obtained from open-ended coded questions
	f		f	
Sparing time to build rapport	134	<ul style="list-style-type: none"> • Preparation before the lesson (activities, materials) • Daily talk/exchanges • Out-of-lesson time activities • Q&A • Caring 	11	<ul style="list-style-type: none"> • Time & Curriculum constraints • Difficulty of bonding in the online environment
Providing a setting based on positive interpersonal relations	136	<ul style="list-style-type: none"> • Setting classroom rules together (verbal and non-verbal language) • Role-modeling • Rewarding positive behavior • Communication-focused processes (with a caring approach) 	9	<ul style="list-style-type: none"> • Not possible in the online environment
Practicing & reinforcing routines in classroom transactions	120	<ul style="list-style-type: none"> • In a similar fashion to face-to-face classroom • Q&A 	25	<ul style="list-style-type: none"> • Favoring out-of-routines in the online classroom

Letting students evaluate teaching & learning processes to discover more about their perceptions	132	<ul style="list-style-type: none"> • Having a choice about what activity to do • Supporting self-evaluation in learning • Using rubrics, questionnaires, Q&A 	13	<ul style="list-style-type: none"> • Need for support on how to do that
Using both formative and summative feedback effectively	130	<ul style="list-style-type: none"> • Using summaries • Online assessment tools • Using symbols • Q&A 	15	<ul style="list-style-type: none"> • Not easy to do in online teaching
Preventing disruptions proactively with routines and procedures	117	<ul style="list-style-type: none"> • Focusing on behavior with its consequences • Promoting desirable behavior • Setting rules and routines from the beginning • Role-modeling 	28	<ul style="list-style-type: none"> • Need for parent support • No consistent results in the online classroom
Responding to occurring disruptions with strategies	113	<ul style="list-style-type: none"> • Solving problems in class • Rewards & Consequences • Supporting empathy 	32	<ul style="list-style-type: none"> • Need for support on this • No long-term effects
Using various communication techniques from being assertive to negotiation	100	<ul style="list-style-type: none"> • Empathy • Listening • Sustaining dialogue with students and their parents • Positive attitude 	45	<ul style="list-style-type: none"> • Need to develop effective communication skills • Need to develop negotiation techniques • Need to improve active listening skill • Need to manage interpersonal communication better

Findings revealed that most of the participating teachers used classroom management strategies in the online environment as they used them in their face-to-face classroom management. Some participants shared that using similar strategies helped both teachers and their students. That is, their students felt less alienated in the digital platform seeing that it was their classroom and similar classroom routines again; and teachers felt more effective by beginning with something they already mastered, yet in an unknown area to discover more. However, they also reported even though they tried to use similar strategies as they had been accustomed to, the effectiveness of the strategies was diverse in the process since the practices of in-person teaching did not directly translate into digital teaching. Most of the participants reported they used the strategy of providing a setting based on positive interpersonal relations. An answer to the question of how they provided the setting included several topics from setting classroom rules together with the use of both verbal and non-verbal languages to communication-focused processes with a caring approach. The participants stated that they paid attention to talking about the classroom rules together with students in the beginning and decided together what to do and what not to do in the classroom – whether online or face-to-face.

P (Participant) 34: I believe in the importance of encouraging students to talk about their expectations, explain my expectations to them and understand each other. This helps them know/ expect what's coming in the lesson and they feel more comfortable.

Moreover, participants shared that digital/online classrooms had their distinctive features that required to talk about, such as a healthy body position (e.g., with a sitting/lying position) during a lesson, and how to respond to each other or ask for permission. Thus, they decided how to do those in the online classroom together including the use of verbal & nonverbal language in the classroom. This kind of approach helped students feel safe to talk and act in the classroom by knowing that they were in a caring and safe environment, in the teachers' beliefs. Regarding role modeling, teachers reported that to sustain positive interpersonal relations in the classroom, they needed to be a role-model to their students; for instance, how they acted and reacted toward students' behavior. Rewarding positive behavior was another theme under this strategy.

It helped teachers sustain positive interpersonal relations, motivated students and reminded them about the rules and expectations that they talked about and decided together in the beginning. Communication-focused processes with a caring approach were the final theme. Teachers mostly mentioned that speaking and listening to each student with a caring approach helped them a lot. They also mentioned that they used storytelling and gave examples to students about positive/expected behavior for healthy communication, especially to raise awareness of the skill of empathy.

The second most used strategy that participants reported was sparing time to build rapport in the digital/online classroom. The responses revealed that they mostly did so, such as by sparing time for daily talk/exchanges and out-of-lesson time activities. They mentioned Q&A almost in all their responses as a practical technique to use, using both oral and written forms (e.g., they used the Q&A technique through instant messaging on the platform). Moreover, they emphasized the importance of preparing before the lesson with activities and materials suitable for the online classroom. Lastly, teachers reported that they valued caring as a crucial part of their classroom to let students know that they cared.

P27: If I don't allow them to feel that they are cared for and noticed in the classroom, they start losing concentration and interest in the lessons.

P118: We sing together or draw together... I give 1 minute to each student to share their thoughts and feelings.

The next strategy that teachers reported using was letting students evaluate teaching & learning processes to discover more about their perceptions. Teachers believed that presenting choices to students about what to learn or how to study motivated them more and increased their willingness to take an active part. Therefore, they tried to encourage their students to choose from the alternatives they prepared for the online classroom. Another topic that teachers found very valuable in learning was encouraging students to self-evaluate themselves. They used simple tools for that, such as self-checklists and Q&A sections at the end of the lessons. Lastly, in that strategy, the use of rubrics, questionnaires, and Q&A was emphasized. They used those tools to learn about students' perceptions of how the lesson was going on, and any need to vary the methods/techniques at the time. Besides, they also gathered the ideas of parents from time to time.

P14: I ask which lessons they like more. We talk about the reasons. I ask them to evaluate my way of instruction. Fast or slow, what other examples could be given?

The next strategy of using both formative and summative feedback effectively included using summaries, online assessment tools, symbols, and Q&A techniques in the digital classroom. Teachers reported that they found using summaries very practical and effective for feedback. They used different ways of summarizing, e.g., writing with/without visuals, using mind maps, and giving an oral summary. Under the other theme: online assessment tools, they shared that they found ready quizzes/tests very practical and helpful, especially the ones they could find on the Education Information Network (EIN). It is also known as EBA, which is an educational content network in Türkiye, founded by the Ministry of National Education. Another theme was using symbols (stars, ticks, emojis). Teachers reported that their students liked getting and giving such symbols as a show of feedback to themselves or others. Lastly, the Q&A technique, as the most preferred technique in all stages of classroom management was concluded to be very helpful and practical for revision, and applicable at any stage of the lesson.

Concerning the next strategy of practicing & reinforcing routine classroom transactions, teachers reported that they managed their classroom routines and transactions similarly to their face-to-face classrooms as much as possible. That is, they used the whiteboard in a certain way, spared time for the revision of the previous lesson in a similar way, and checked assignments at the beginning or the end of the lesson. They believed this approach helped both them and their students to know what to do and what to expect in the classroom with a known feeling. In addition, the Q&A technique was found practical and effective in practicing classroom routines, such as motivating, giving feedback, or reinforcing.

P77: I checked attendance, did a revision of the previous lesson, checked homework, and started my lesson, just like I did in face-to-face classrooms.

Concerning the strategy of preventing disruptions proactively with routines and procedures, teachers reported that they gave importance to explaining to students what consequences the behavior might bring, what purpose it held, and what it could lead to. They believed focusing on the behavior and the consequences helped students see the bigger picture, and eventually, it helped behavior management processes in the classroom. Under the theme of promoting desirable behavior, they reported it was important for students to see examples of good behavior and how it was appreciated. Also, teachers stated that they often gave feedback on desirable behavior, including informing parents about it.

P12: I closely follow their behavior and when it is desirable, I express it and appreciate the behavior right at the time.

The next two themes were setting rules & routines from the beginning, and role-modeling. Most of the participants stated that to be able to prevent disruptions proactively with routines and procedures, it was necessary to set the rules and routines from the start but also reinforce them in the process. Otherwise, it would be a difficult basis to proceed. They stressed that the teacher as a role model was also vital, e.g., the way s/he responded to problems or complicated issues, the way of expression, etc.

P81: I try not to react to a problem with a negative attitude. I try to empathize with the student, let the student think about his/her behavior, and give a chance to express him/herself better. Later, in the same way, when something happens between students, I encourage them to empathize and try to understand each other calmly and patiently. It is more difficult online, though.

For the strategy of responding to occurring disruptions with strategies, teachers reported that they gave importance to solving problems in class with affection and discussing and deciding together, without postponing, ignoring, or looking for a solution elsewhere. This kind of approach helped their students feel a sense of community in their classroom and find solutions together as a class. Another theme included teachers rewarding the positive behavior of students, sometimes directly themselves as teachers and sometimes by voting for *the best ... of the class* about a subject among students. For consequences of inappropriate behavior, teachers mostly used not to involve a student in a game/activity and use the online waiting room/lobby as a reflection area/period for students to reflect on their behavior. Lastly, supporting empathy was about hearing out the feelings and thoughts of each student and proceeding concerning each other's point of view. Some teachers stated that they spared time for empathy exercises to support their students in the practice.

Using various communication techniques from being assertive to negotiation was the final strategy that teachers employed. Under the empathy theme, teachers reported that understanding children was the key to working with children, e.g., understanding how they were feeling, what thoughts they had, why they believed so, etc. Listening to students carefully and actively was also stated as a key thing to do. Besides, since they were primary school-aged children, teachers believed that sustaining a healthy dialogue not only with the students but also with their parents was essential. Thus, showing a positive attitude towards students and their parents encouraged them to speak in open communication without hesitation.

P46: I believe it is important for my students and their parents to know that I value our teacher-student bond and continuing communication between us.

On the other hand, as Table 3 depicts, some participants reported they did not employ those aforementioned strategies in digital classrooms with further explanations. The strategy using various communication techniques from being assertive to negotiation was the least employed in the digital classroom. The participants who did not employ the strategy (n=45) explained their points of view and reported their desires to improve their communication skills. Their responses included the difficulty of using communication skills online and their desire to improve communication & leadership skills both in face-to-face and online classrooms. Concerning developing effective communication skills, teachers emphasized that they wanted to use better verbal and nonverbal language. Moreover, using I-language, being assertive, expressing oneself better, and having the confidence to use effective communication skills were stated.

P37: I believe I need an effective communication skills course. I want to express myself better, speak more confidently, give relevant examples easily while talking, and attract people's attention.

Concerning negotiation techniques, teachers believed that it was important to use the skill to have better relationships with students in class, with the parents when they got in touch, and with peers/fellow teachers

at school. The participants added that to influence a student, a teacher needed to listen purposefully/actively to better understand and guide the student more skillfully. However, it was not easy in practice, thus, they needed to improve their skills in doing so.

P57: It's easy to say but not easy to do, I guess. OK, I listen to my students, but I'm not sure if I'm doing it right. Especially in remote education, I couldn't do that online. For example, I asked something to a student and if the answer didn't come, I continued with another student who was willing to speak.

Concerning the needs and desires to manage interpersonal communication better, participants expressed that there were and would be differences among students, naturally. However, in classroom management noticing those differences at any time and managing them were difficult tasks at times. For example, maybe a student in the classroom was feeling disappointed that day or another student had negative feelings towards a topic in the unit. Then, if the teacher didn't notice those and asked for task fulfillment from everyone through standard guidance, it might not work for all learners at once. For effective interpersonal communication management, one should notice those differences and manage them without any learning loss in the classroom. Teachers also reported that they needed to improve their classroom management skills by benefiting from technology more and using the drama technique. Responding to occurring disruptions with strategies was the second least used strategy in the online classroom. The participants reported that they did not employ the strategy because they needed support on how to respond to disruptions in the online classroom. Moreover, they believed they would not be able to make changes to students' behavior through online intervention.

P125: My students easily got distracted or got bored by negative/distracting behavior. I felt I often failed in managing disruptions, and sometimes I didn't know the answer to what to do against unwanted behavior in the classroom.

P7: I got some help from the counseling teacher at our school, but still, I couldn't succeed with the difficult students, especially in the online classroom. It was like impossible to succeed.

The participants reported not having used the strategy of preventing disruptions proactively due to various reasons. They reported that even though they tried their best, developing behavior in children still heavily relied on parents and the atmosphere at home. With the shift to remote education, it was much more difficult for teachers to support behavior development in children from a distance. Therefore, during the online teaching & learning period, they needed more support from the parents. However, when/if they couldn't reach the support they needed, they just focused on academic instruction/knowledge transfer in the online classroom with a few precautions, such as turning off the microphone of the student who created distractions. They also emphasized that it was easier to manage in-person classrooms since students were physically present in the same environment. However, in the online classroom due to several factors in students' house environments (technical, social-emotional, physical, etc.), teachers felt that sometimes it was not possible at all to obtain consistent results with learners regarding behavior management. Presenting a similar context, some teachers reported that they did not use the strategy: of using both formative and summative feedback since they found it not easy in online teaching. Since they taught young learners, they also needed to communicate and collaborate with their parents. Particularly while giving and receiving feedback, they needed stronger parental support. Thus, when they got lower support than they expected, this had a negative effect on their feedback practice. As a result, they mostly used only summative feedback, when possible. It is obvious that particularly with lower-level learners in K-12, the interaction and collaboration with parents influenced the learners' online teaching & learning processes.

Concerning the responses of not practicing & reinforcing routines in classroom transactions, teachers stated that managing the online learning environment was something new, which formed something opposite to routines. Thus, it was difficult for them to practice and reinforce routine classroom transactions in this new setting. Instead, they preferred varying the processes to see what would work or would not work. Similarly, the responses revealed that the reason for not employing the strategy: of letting students evaluate teaching & learning processes involved the need for support on how to do that in the online environment. Since teachers mostly relied on their observation of students, such as how they reacted to a question or a task in the face-to-face classroom, they could not similarly observe their students in the digital environment, and

they lacked other techniques. Yet, since teaching & learning is a relational process - observing, noticing, acting/re-acting, it is a need in classroom management and interpersonal communication processes to have alternative techniques and tools to evaluate and improve the interaction/engagement.

Concerning not sparing time to build rapport, the explanations mostly included the constraints and difficulties of the digital/online environment in comparison to the in-person one. Due to teaching online, they reported that keeping up with the curriculum was more difficult than before. We can conclude that since it was a quick shift into the online teaching & learning environment without proper preparation in advance, teachers had difficulties in adjusting to the use of the system themselves first. Lastly, concerning the responses of not providing a setting based on positive interpersonal relations, some teachers experienced it as impossible to do in the online environment. There were diverse thoughts, such as not being an essential strategy in the online classroom, or not possible to do it in the online environment since students were easily distracted or not very active in the process. We can conclude that even though all teachers valued building positive relationships in the classroom as their responses to open-ended questions showed, not all of them believed this could be done in the online environment. Yet still, it will be right to say either in online or face-to-face teaching & learning environments, learning and development are supposed to continue for the learners – not only academically, but also social-emotionally.

To validate the findings above and to learn more about the digital/online classroom management experiences of teachers, their stress factors in online classroom management were sought through Likert scale-type questions in the next section.

What Sources/Factors of Stress did Teachers Experience about Interpersonal Communication Processes in Digital/Online Classroom Management?

The opinions of teachers about the sources/factors of stress concerning interpersonal communication processes in online classroom management are presented below with frequency, mean, and standard deviation values.

Table 4. Teachers' opinions on the sources of stress in classroom management

	not at all (1)	to a small extent (2)	to some extent (3)	significantly (4)	extremely (5)	Mean	SD
	f	f	f	f	f		
Using the right technology fitting the needs	10	26	61	32	16	3,75	,73
Social isolation	19	25	61	30	10	3,77	,75
Monotony in teaching	22	43	51	24	5	3,83	,71
Lack of interaction with students	29	55	32	20	9	4,05	,68
Lack of interaction among students	20	42	44	29	10	3,90	,71
Dealing with behavioral problems	7	23	42	54	19	3,89	,67
Setting a positive climate for all students	5	17	47	52	24	3,87	,71
N: 145							

Out of 145 participating teachers, 61 teachers stated that using the right technology fitting their needs was a source of stress to some extent, neither high nor low. Yet, 32 teachers found it a source of stress significantly, and 16 teachers stated it as extremely. This finding could be associated with the usage of EBA as mentioned before in the study. Teachers stated in their open-ended responses that they could easily find materials,

quizzes, and tests on EBA to promote academic learning in their classrooms. However, regarding the social-emotional dimension and behavior management, they emphasized that it was difficult to set and sustain it in online classroom management. Social isolation in a similar way and monotony in teaching were other sources of stress slightly pointing the needle higher and pointing to weaker social & emotional connections in online teaching & learning environments. They affect motivation, interaction, and engagement. Lack of interaction with students and lack of interaction among students as the sources of stress for teachers in online classroom management processes were obtained as the highest-level sources. Following them, dealing with behavioral problems, and setting a positive climate for all students were reported as close to high-level sources of stress for teachers in online classroom management.

Following the section, findings from open-ended coded questions concerning stress factors and protective factors in online classroom management are presented below.

With what Strategies could Teachers deal with the Sources/Factors of Stress in Digital/ Online Classroom Management Processes through The SEL Perspective?

In this section, from participants' open-ended responses, one source of stress was additionally obtained: learning gaps & adaptation problems. Teachers stated that due to several reasons during the remote education period, the differences among students regarding academic knowledge and skills, social-emotional skills, and cognitive skills grew. The ability to adapt to novel conditions also differed from student to student, which also influenced classroom management processes. The learning gap continued growing over time, and this brought novel problems into the teaching & learning environment. Furthermore, the adaptation problem grew concerning that. Other than the widening learning gaps & adaptation problem, the same sources of stress were reported as presented in the previous section. The protective factors and the strategies that teachers used to deal with the stress factors are presented in Table 5 under themes:

Table 5. Experiences of teachers in online classroom management processes taking the SEL perspective: Protective factors and strategies

Main themes: Protective factors	<i>f</i>	%	Sub-themes: Strategies taken
Sustaining communication	64	34,22	Keeping a positive & affectionate attitude Using a positive language Having one-to-one conversation Sparing time for classroom conversation Getting in touch with the parent
Rules & Expectations	57	30,48	Setting rules & expectations clearly Role modeling Using rewards and consequences Prioritizing the necessary steps (e.g., curriculum focused)
Motivating & Encouraging	48	25,66	Using an encouraging language Showing good examples (stories, videos, etc.) Reinforcing behavior Giving responsibilities (accomplishable)
Keeping hopeful	18	9,62	Using favorable techniques & tools (videos, games, songs, etc.) Feeling and showing hope Having and showing patience Expanding into time (especially due to learner adaptation differences/learning gaps) Getting continuous support from the counseling teacher
<i>Total</i>	187	100	

Sustaining communication, rules, and expectations, motivating and encouraging, and keeping hopeful were the protective factors against the stress factors given previously. However, teachers' responses showed that even though teachers believed those protective factors were effective, there were differences in their

perceptions regarding how well they implemented those in the online teaching & learning environment. Some teachers shared that they felt luckier if their class at the time of the remote education period was the same as the previous year. They stated that it made things easier for them to manage and lead because they already had an ongoing bond. Furthermore, those teachers stated that they experienced protective factors that worked better in those classes.

Finally, to the question inquiring about the willingness of teachers to participate in professional development opportunities regarding the subject matter; 76 participants stated that they wanted to benefit from any Professional Development (PD) activities/courses/programs on (online) classroom management and interpersonal communication processes whereas 69 participants stated that they did not want to take the PD activities. Teachers shared their desire to take the PD courses concerning the findings above, such as to better communicate with their learners, parents, and peers at school using both verbal and non-verbal languages effectively and making use of practical technological/digital tools. On the other hand, the teachers who shared that they did not want to take any PD courses stated their reasons as feeling exhausted after the experience of discovering/learning something in a limited time and then implementing it in the classroom, experiencing burnout after the remote education.

DISCUSSIONS AND CONCLUSION

Research on the consequences of the COVID-19 pandemic on K-12 and higher education levels together with the increasing use of digital technologies in education emphasize the need for more research on specific levels of education, courses, specific dimensions of teaching & learning, such as classroom management, and curriculum design (Wu, 2021) by prioritizing learners' competency and life skills development (Cho, Mansfield & Claughton, 2020; Johler et al., 2022).

The findings of the research questions are discussed below under two titles.

Classroom Management Strategies Incorporating SEL into Digital/Online Classroom Management

As an answer to how primary school teachers managed their digital classrooms by incorporating social and emotional learning in their classroom management practices, it was observed that most of the participants used the strategies above. The results indicated that most of them similarly led online classroom management processes to their face-to-face experiences. However, in their perceptions, even though they tried to use similar strategies, their effectiveness concerning each student in the class was diverse, e.g., less student focus and engagement. Teachers were not as satisfied with the outcomes of the strategies in the online classroom as they would have been in the face-to-face one since the nature of the online environment was different and the situation was difficult at the time. This could be explained by the urgent and unplanned shift to online education. This finding correlates with the findings of the other studies. That is, teachers found themselves in an urgent situation to conduct their lessons online, and they had to do it in a similar way to the face-to-face ones because that was what they knew best. In addition, differences among teachers and learners regarding technology use, infrastructure, digital literacies, and techno-pedagogy added to the problem (Addimando et al., 2021; Cardullo et al., 2021; Sari & Nayir, 2020). Thus, the findings in the study point to the need for promoting teachers' digital competencies and developing digital infrastructures in schools which allow for strengthening the social and emotional perspective in classroom management (Bzdok & Dunbar, 2022; Zancajo, Verger & Bolea, 2022). That would promote meeting the diverse needs and expectations of learners. Moreover, this kind of approach would increase the effectiveness of the teacher in digital classrooms positively impacting student engagement, focus, and achievement (Durlak et al., 2011; Gueldner et al., 2020) whether in case of a remote education need or not.

Findings showed that most participants worked hard to provide a setting based on positive interpersonal relations in the online classroom and spared time to build rapport by preparing before the lesson with activities and materials. From a sociological perspective, since teaching and learning processes involve connecting and building relationships in the classroom as a micro-system of society, teachers need to maintain a high level of motivation and student engagement in addition to the didactic and formal learning aspects of the classroom

with certain procedures and materials (Addimando et al., 2021; Zimmerman, 2020). Having in mind that “clear rules and routines have been a classroom management cornerstone as long as classroom management has existed” (Johler et al., 2022: 9), and according to the participants in this study, connecting classroom management rules to digital/online classroom incorporating SEL wasn’t much different from their traditional classroom practices. Thus, the participants in the study spared time to provide a classroom setting both for and with their students even though they could not get the desired outcomes. Another specific point here, getting prepared for online classrooms with enriched materials and activities might take a much longer time according to research papers and exchanges with professionals. In this context, two issues are highlighted to be considered. Firstly, while getting prepared for the lesson, one shouldn’t lose focus on “developing an online learning experience” for learners rather than just doing online content delivery (Basilaia & Kvavadze, 2020). Secondly, this kind of experience creation needs system support, peer support, and the support of the school culture (Kern & Wehmeyer, 2021). In this regard, it can be expressed that ready-to-use materials, as provided by EBA, could support teachers’ work if they continue to be provided through diverse channels, such as on a nationwide level (e.g., supported by EBA), local level (supported by the directorate of national education), or on a school level among peers with the support of the school administration. Those materials could be varied and enriched by meeting various needs occurring in classrooms, that is, not only for academic gains but also for the social & emotional development of the learners.

The findings indicated that the use of online ready-to-use materials and activities made processes easier and more effective for teachers. However, as mentioned above, the differences among teachers regarding technology use in the profession and elements of techno-pedagogy created differences among implementations which influenced student learning (Senturk et al., 2021). It can be explained that supporting teachers “to adopt educational leadership through new perspectives to learning” to foster “students’ motivation, engagement, self-regulated learning skills, and academic achievement” in online learning environments could be helpful (Duzgun, 2022: 12). As another strategy related, using both formative and summative feedback effectively was effective in teaching and learning (Adarkwah, 2021). The participating teachers mostly tried to implement the strategy in their online classrooms. However, when they reflected upon their performance, they found themselves more effective with the strategy in traditional/face-to-face classrooms compared to online management. Here, it can be claimed that teachers’ act of reflecting upon their performances plays an important role in their professional growth. In the data obtained from open-ended coded questions, teachers mostly referred to their face-to-face classroom practices by comparing them with their digital management processes. While this was not the main goal of the study, it was examined and included in the study since it helped describe the complexities of the process with the strengths and weaknesses of teachers as they perceived. Besides, to improve competencies in digital classroom management, research highlights some necessary skills and attitudes of teachers, such as reflecting upon their performances, being open to becoming learners themselves, taking some risks, and adopting a curious attitude (Johler et al., 2022), practice, and collaboration in a community (Desimone, 2009), which defines the cycle of continuous learning and improving.

Preventing disruptions in the classroom proactively without disrupting teaching & learning was a crucial part of classroom management (Baker, Gentry & Larmer, 2016). Most of the participating teachers reported trying to prevent any disruptions with routines and procedures by setting rules and routines from the beginning, role-modeling, promoting desirable behavior, and focusing on the behavior itself with its consequences. However, it was not easy in the online classroom due to the lack of digital skills’ mastery. They reported there were small distractions and inappropriate use of technology at times, and no serious recurring problems. This finding corresponds to Johler et al. (2022)’s findings in the Norwegian context that with clear structures, instructions, and routines, disruptions decrease. However, in the current study, participants still reported they felt a lack of some skills to promote behavioral development in digital/online teaching and learning environments. Another similar yet crucial strategy in classroom management to create and sustain a nourishing learning environment was responding to occurring disruptions with strategies. In this one, again, it was seen that participants were not feeling as confident and competent in behavior management in the online classroom as they did in the face-to-face ones. The research shows that the development of social-behavioral skills in learners is associated with positive relationships with others and higher active learning engagement (Bierman et al., 2018; Dolighan & Owen, 2021). However, it was more challenging to support

interpersonal relations and engagement in online classroom management as it is gleaned from remote education experiences (Brooks et al., 2020; Sari & Nayir, 2021). Teachers in the study had some difficulties in promoting and sustaining interaction among students in the classroom climate. This is a notable finding that in a systematic review of the past and future technology in classroom management and school discipline (Cho et al., 2020), it was revealed that more papers on classroom management incorporating SEL are needed in the literature to improve the practices of this school of thought. The emotional awareness of teachers is a contributing factor to effective teaching & learning (Duzgun, 2022), hence, it impacts social and emotional literacy and the climate of the online classroom.

Concerning the use of communication techniques from being assertive to negotiation, even though the question focused on the practices in online classroom management, the findings also included face-to-face ones. Besides, some teachers did not or could not use the techniques due to difficulties and the need for support on how to implement them in the digital classroom. This can be explained by the fact that the digital classroom management context is novel to many teachers and schools let alone using effective management strategies incorporating SEL. A systematic review on causes, prevention, and interventions regarding classroom disruptions in digital teaching (Meinokat & Wagner, 2022) which examined articles from the last 20 years revealed that even though “the research on classroom management, in general, is numerous, the connection between digitization and classroom disruptions has received little attention so far”. Moreover, developing students’ behavior, developing interpersonal relations, and dealing with disruptions cannot be handled independently from the social and emotional dimension of classroom management either face-to-face or digital/online classroom. Therefore, having Evertson and Weinstein’s (2006) effective classroom management in mind, which depicts classroom management as the actions teachers take to create an environment that supports and facilitates both academic and social-emotional learning, the strength of the current study lies in connecting and focusing on digital/online classroom management with the perspective of SEL.

Lastly, in the study, approximately one-third of the participants stated that they needed to develop their classroom management competencies and manage interpersonal communication better. They specifically stated that they would like to strengthen their communication skills, negotiation techniques, and classroom management and leadership skills. This finding can also be interpreted concerning the novel context of digital teaching and learning by many teachers and schools. However, not only in the remote education period, research in the last 10 years has highlighted the up-front problem of communication and interpersonal relations in digital classroom management (Boyaci, 2010; Cho et al., 2020; Johler et al., 2022). As a notable finding in the study, this is not a case experienced with novel teachers in the profession since the current study included participants from different groups, such as teachers in the early years of the profession or experienced teachers in the profession. Upon the analysis, teachers from different groups such as from the early, middle, and later years of the profession, all reported that they would like to strengthen those aforementioned skills concerning interpersonal communication in digital classroom management. The question of how it can be achieved could have several answers, such as through various professional development opportunities including simulations. Technology-rich content in digital/online classroom management could be effective in teacher training and professional learning, such as videos, databases, and interactive simulations (Cho et al., 2020). To detail, interactive simulations could be varied, for example, using scales on student misbehavior (Li & Titsworth, 2015), and managing virtual classrooms with students of different needs (Muir et al., 2013; Pas et al., 2016).

Protective Factors and Strategies against Stress Factors in Digital/Online Classroom Management

Following classroom management strategies incorporating SEL, stress factors in managing and leading classrooms & interpersonal communication processes, and the protective factors with strategies that teachers adopted were investigated. Those sources of stress that teachers experience affect classroom management, teachers’ self-efficacy, and student outcomes (Marquez et al., 2016). Hence, protective factors and strategies are needed. Findings in the study indicated that using some protective factors and strategies helped teachers manage a positive online classroom climate in the process. Yet, managing and leading an online classroom

brought a novel context to the teaching and learning paradigm. Besides, the situation and conditions were somewhat not planned and not desirable when schools and teachers first met in digital classrooms in the context of the pandemic. That is why the stress factors in the current study included various topics from physical elements to abstract notions (Sokal, Trudel & Babb, 2020a; 2020b; Stamatis, 2021; Trudel, Sokal & Babb, 2021). To cope with the stress factors, teachers turned to some protective factors, such as sustaining communication, fostering rules, motivating continuously, and keeping hopeful. Even though teachers were not as satisfied with the process and outcomes regarding online classroom management as they would have been in their face-to-face classrooms, this can be concluded as a silver lining to the need and acceptance of further improvement in online classroom management processes.

Reflection on the future of education and learning proposes learning from the COVID-19 pandemic “to fundamentally rethink and innovate education systems”, which highlights that there is going to be “an integrated and balanced way of learning” (OECD, 2021). This approach includes learning academic skills, social and emotional skills, and other life skills such as digital skills in the school years in a balanced and integrated way. As another notable finding, apart from negative associations between pandemic time and online teaching experiences, it can be concluded from the study that primary school teachers are open to improving their competencies in managing online teaching.

Overall, the current study utilizing both quantitative and qualitative data explored how primary school teachers managed their digital classrooms while incorporating social and emotional learning into their classroom management practices. Based on the findings, further research is recommended to explore how to create a positive teaching and learning environment online taking the SEL approach with practical guidelines and applicable/transferrable tools. It is also recommended to explore classroom management incorporating SEL at different school levels. Moreover, it is recommended in the study that training, workshops, and peer communities can be arranged on different levels as PD opportunities for teachers. For school-level implementations, it is recommended that school leaders and teachers focus on the specific needs and expectations in their schools; they can set SMART steps to plan and proceed on how to better make use of digital technologies in their schools. As Banoglu and Gumus (2022) state, creating “a vision and strategies for ICT integration in teaching and learning” on the school level by collaborating with the stakeholders might be very helpful. On a higher level, supporting teachers with ready-to-use materials for each lesson/course on nationwide online networks/platforms, such as the EBA platform, could continue to be enriched since teachers find this kind of online platform very practical and helpful. Furthermore, it is recommended for all levels (school level and higher) and to researchers that content and tools for developing social & emotional skills, and behavioral skills of primary school students can be enriched, varied, and increased.

Acknowledgements: This study is prepared as part of the Erasmus+ Project DigiSEL - Digitally Improving Social and Emotional Skills of Primary School Teachers, with the Project number 2020-1-TR01-KA226-SCH-098576. The author would like to thank the project group, education professionals, and all participants of the study.

BIODATA and CONTACT ADDRESSES of AUTHOR



Dr. Figen KARAFERYE is an Assistant Professor of Educational Management and Leadership at Kutahya Dumlupinar University. With her background which brings pedagogies, foreign language teaching, and educational management & leadership together, she has designed and led Professional Development (PD) programs for academicians in universities; and taken active roles in national/international PD programs (distance, hybrid, and in-person) for school managers and teachers. Dr. Karaferye has worked for various national and international research projects focusing on the improvement of teaching, learning, and leadership processes in schools and universities, including the projects *MOCAT: Modernising Competences of Academic Teachers*, *Stay Well: Innovative Web Approach for Advancing and Sustaining VET Learners' Wellbeing*, and *English Together for K-12 level English language teachers*.

Figen KARAFERYE
Kutahya Dumlupinar University, Emet Voc. School
Address: Emet Voc. School Campus, 43700, Kutahya, Turkiye
Phone: +90 274 4430413
E-mail: figen.karaferye@dpu.edu.tr

REFERENCES

- Adarkwah, M. A. (2021). The power of assessment feedback in teaching and learning: a narrative review and synthesis of the literature. *SN Soc Sci*, 1(75), 1-44.
- Addimando, L., Leder, D., & Zudini, V. (2021). Teaching and learning in the Covid-19 era: the experience of an Italian primary school class. *The Turkish Online Journal of Educational Technology*, 20(1), 60-67.
- Aldrup, K., Klusmann, U., Ludtke, O., Gollner, R., & Trautwein, U. (2018). Student misbehavior and teacher well-being: Testing the mediating role of the teacher-student relationship. *Learning and Instruction*, 58, 126-136.
- Baker, C., Gentry, J., & Larmer, W. (2016). A Model for online support in classroom management: perceptions of beginning teachers. *Administrative Issues Journal: Connecting Education, Practice, and Research*, 6(1), 22-37.
- Banoglu, K., & Gumus, S. (2022). Supporting technology integration in schools: in pursuit of new skills for school managers in the post-pandemic Era. In J. Glanz (Ed.) *Managing today's schools: new skills for school leaders in the 21st century* (pp. 37-50). London: Rowman & Littlefield.
- Basilaia, G., & Kvavadze, D. (2020). Transition to online education in schools during a SARS-CoV-2 Coronavirus (COVID-19) pandemic in Georgia. *Pedagogical Research*, 5(4), em0060.
- Bierman, K. L., Mathis, E. T., & Domitrovich, C. E. (2018). Serving the needs of young children with social, emotional, and behavioral needs: a commentary. *School Mental Health*, 10(3), 254-263.
- Blair, C. & Raver, C. C. (2014). Closing the achievement gap through modification of neurocognitive and neuroendocrine function: results from a cluster randomized controlled trial of an innovative approach to the education of children in kindergarten. *PLoS ONE* 9(11), e112393.
- Bolick, C. M., & Bartels, J. T. (2015). Classroom management and technology. In E. Emmer & E.J. Sabornie (Eds.) *Handbook of Classroom Management* (pp. 479-495). New York: Routledge.
- Boyaci, A. (2010). Pre-service teachers' views on web-based classroom management. *Turkish Online Journal of Distance Education*, 11(2), 208-234.
- Brooks, S. K., Webster, R. K., Smith, L. E., Woodland, L., Wessely, S., Greenberg, N., & Rubin, G. J. (2020). The psychological impact of quarantine and how to reduce it: rapid review of the evidence. *The Lancet* 395(10227), 912-920.

- Bzdok, D., & Dunbar, R. I. M. (2022). Social isolation and the brain in the pandemic era. *Nat Hum Behav*, 6, 1333-1343.
- Cardullo, V., Wang, C., Burton, M., & Dong, J. (2021). K-12 teachers' remote teaching self-efficacy during the pandemic. *Jrnl of Rsrch Inno Teach & Lrn.*, 14(1), 32-45.
- Carter, K., & Doyle, W. (2006). Classroom management in early childhood and elementary classrooms. In C.M. Evertson & C.S. Weinstein (Eds.) *Handbook of Classroom Management* (pp.373-406). Mahwah, NJ: Lawrence Erlbaum.
- [CASEL] Collaborative for Academic, Social, and Emotional Learning (2003). *Safe and sound: An educational leader's guide to evidence-based Social and Emotional Learning (SEL) programs*. Chicago, IL: Author.
- Cho, V., Mansfield, K. C. & Claughton, J. (2020). The past and future technology in classroom management and school discipline: A systematic review. *Teaching and Teacher Education*, 90, 103037.
- Coelho, V. A., Sousa, V., & Figueira, A. P. (2016). The effectiveness of a Portuguese elementary school social and emotional learning program. *The Journal of Primary Prevention*, 37(5), 433-447.
- Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches*. London: Sage.
- DePaoli, J. L., Atwell, M., & Bridgeland, J. (2017). *Ready to lead: a national principal survey on how social and emotional learning can prepare children and transform schools*. A Report for CASEL. Washington, DC.
- Desimone, L. (2009). Improving impact studies of teachers' professional development: toward better conceptualizations and measures. *Educ. Res.*, 38, 181-199.
- Dolighan, T. & Owen, M. (2021). Teacher efficacy for online teaching during the COVID-19 pandemic. *Brock Education Journal*, 30(1), 95-116.
- Durlak, J. A., Weissberg, R. P., Dymnicki, A. B., Taylor, R. D., & Schellinger, K. B. (2011). The impact of enhancing students' social and emotional learning: A meta-analysis of school-based universal interventions. *Child Development*, 82(1), 405-432.
- Duzgun, S. (2022). Exploring teachers' views on emotion transfer in virtual classrooms during emergency remote teaching. *Turkish Online Journal of Distance Education-TOJDE*, 23(4), 1-19.
- Eddy, C., Herman, K., & Reinke, W. (2019). Single-item teacher stress and coping measures: Concurrent and predictive validity and sensitivity to change. *Journal of School Psychology*, 17-32.
- Edison, S. W., & Geissler, G. L. (2003). Measuring attitudes towards general technology: Antecedents, hypotheses and scale development. *Journal of Targeting, Measurement and Analysis for Marketing*, 12(2), 137-156.
- Elias, M. J., Zins, J. E., Weissberg, R. P., Frey, K. S., Greenberg, M. T., Haynes, N. M., et al. (1997). *Promoting social and emotional learning: Guidelines for educators*. Alexandria: ASCD.
- Evertson, C. M. & Weinstein, C. S. (Eds.). (2006). *Handbook of classroom management: Research, practice, and contemporary issues*. Mahwah, NJ: Lawrence Erlbaum.
- Fowler, F. J. (2014). *Survey research methods*. London: Sage Publications.
- Goudeau, S., Sanrey, C., Stanczak, A. Manstead, A., & Darnon, C. (2021). Why lockdown and distance learning during the COVID-19 pandemic are likely to increase the social class achievement gap. *Nat Hum Behav* 5, 1273-1281.
- Guildner, B. A., Feuerborn, L. L. & Merrell, K. W. (2020). *Social and emotional learning in the classroom: Promoting mental health and academic success*. The Guilford Press.
- Harmsen, R., Helms-Lorenz, M., Maulana, R., & van Veen, K. (2018). The relationship between beginning teachers' stress causes, stress responses, teaching behaviour and attrition. *Teachers and Teaching*, 24(6), 626-643.

- Iaosanurak, C., Chanchalor, S., & Murphy, E. (2016). Social and emotional learning around technology in a cross-cultural, elementary classroom. *Educ Inf Technol* 21, 1639-1662.
- Jennings, P. A., Hofkens, T. L., Braun, S. S., Nicholas-Hoff, P. Y., Min, H. H., & Cameron, K. (2021). Teachers as prosocial leaders promoting social and emotional learning. *Advances in Motivation and Achievement*, 21, 79-95.
- Johler, M., Krumsvik, R. J., Bugge, H. E., & Helgevold, N. (2022). Teachers' perceptions of their role and classroom management practices in a technology rich primary school classroom. *Front. Educ.*, 7(841385).
- Jones, S. M., & Doolittle, E. J. (2017). Social and emotional learning: Introducing the issue. *The Future of Children*, 27(1), 3-11.
- Jones, S. M. & Kahn, J. (2017). *The evidence base for how we learn: supporting students' social, emotional, and academic development*. The Aspen Institute National Commission on Social, Emotional, and Academic Development.
- Karaferye, F. (2022). Kriz zamanlarinda egitim liderlerinin ogretmenlerin mesleki iyi olus halini desteklemedeki rolune bakis. *Alanyazin*, 3(1), 125-138.
- Kern, M. L. & Wehmeyer, M. L. (Eds.). (2021). *The Palgrave handbook of positive education*. Palgrave Macmillan.
- Korpershoek, H., Harms, T., de Boer, H., van Kuijk, M., & Doolaard, S. (2016). A metaanalysis of the effects of classroom management strategies and classroom management programs on students' academic, behavioral, emotional, and motivational outcomes. *Review of Educational Research*, 86(3), 643e680.
- Levin, J. & Nolan, J. F. (2013). *Principles of classroom management: a professional decision-making model*. Boston: Pearson.
- Li, L., & Titsworth, S. (2015). Student misbehaviors in online classrooms: scale development and validation. *American Journal of Distance Education*, 29(1), 41-55.
- Lincoln, Y. S. & Guba, E. G. (1985). *Naturalistic inquiry*. Newbury Park: Sage.
- Marquez, B., Vincent, C., Marquez, J., & Pennefather, J. (2016). Opportunities and challenges in training elementary school teachers in classroom management: initial results from classroom management in action, an online professional development program. *J. Technol. Teach. Educ.*, 24, 87-109.
- Meinokat, P., Wagner, I. (2022). Causes, prevention, and interventions regarding classroom disruptions in digital teaching: A systematic review. *Educ Inf Technol* 27, 4657-4684.
- Merriam, S. (1998). *Qualitative research and case study applications in education*. San Francisco: Jossey-Bass.
- Merriam, S. B., & Tisdell, E. J. (2016). *Qualitative research: A guide to design and implementation*. San Francisco: Jossey Bass.
- Miles, M.B., & Huberman, A.M. (1994). *Qualitative data analysis*. Thousand Oaks: Sage.
- Organisation for Economic Co-operation and Development (OECD), 2019. *PISA 2018 results (Volume III): What school life means for students' lives*. Retrieved May 5, 2022 from <https://www.oecd.org/pisa/publications/pisa-2018-results-volume-iii-acd78851-en.htm>
- Organisation for Economic Co-operation and Development (OECD), 2021. *Building the future of education*. Retrieved May 5, 2022 from <https://www.oecd.org/education/future-of-education-brochure.pdf>
- Muir, T., Allen, J. M., Rayner, C. S., & Cleland, B. (2013). Preparing pre-service teachers for classroom practice in a virtual world: a pilot study using second life. *Journal of Interactive Media in Education*, 18(1), 1-17.
- Pallant, J. (2007). *SPSS survival manual*. New York: McGraw Hill Open University Press.
- Paramita, P.P., Anderson, A., & Sharma, U. (2020). Effective teacher professional learning on classroom behaviour management: a review of literature. *Australian Journal of Teacher Education*, 45(1).

- Pas, E. T., Johnson, S. R., Larson, K. E., Brandenburg, L., Church, R., & Bradshaw, C. P. (2016). Reducing behavior problems among students with autism spectrum disorder: Coaching teachers in a mixed-reality setting. *Journal of Autism and Developmental Disorders, 1e13*.
- Patton, M.Q. (2002). *Qualitative research and evaluation methods*. Thousand Oaks: Sage Publications.
- Prior, J. (2015). What makes a good teacher? Models of effective teaching. In F. W. English (Ed.) *Educational leadership and management* (pp. 55-70). Thousand Oak: Sage.
- Sari, T., & Nayir, F. (2020). Challenges in distance education during the (Covid-19) pandemic period. *Qualitative Research in Education, 9*(3), 328-360.
- Senturk, S., Ucar, H. T., Gumus, I. & Diksoy, I. (2021). The relationship between individual innovativeness and techno-pedagogical levels of school administrators and teachers. *Education Quarterly Reviews, 4*(1).
- Sokal, L., Trudel, L. E., & Babb, J. (2020a) Canadian teachers' attitudes toward change, efficacy, and burnout during the COVID-19 pandemic. *International Journal of Educational Research Open, 1*(100016), <https://doi.org/10.1016/j.ijedro.2020.100016>.
- Sokal, L., Trudel, L. E., & Babb, J. (2020b). Supporting teachers in times of change: The job demands-resources model and teacher burnout during the Covid-19 pandemic. *International Journal of Contemporary Education, 3*(2), <http://redframe.com/journal/index/php/ijce/issue/view/243>.
- Stamatis, P. J. (2021). Impact of COVID-19 on teaching and classroom management: thoughts based on current situation and the role of communication. *European Journal of Education and Pedagogy, 2*(1), 57-63.
- Taylor, R. D., Oberle, E., Durlak, J. A., & Weissberg, R. P. (2017). Promoting positive youth development through school-based social and emotional learning interventions: A meta-analysis of follow-up effects. *Child Development, 88*(4), 1156-1171.
- Trudel, L. G. E., Sokal, L. J., & Babb J. C. (2021). Teachers' voices: pandemic lessons for the future of education. *Journal of Teaching and Learning, 15*(1), 4-19.
- Wu, S.Y. (2021). How teachers conduct online teaching during the Covid-19 pandemic: a case study of Taiwan. *Front. Educ., 6*(675434).
- Yildirim, A. & Simsek, H. (2008). *Sosyal bilimlerde arastirma yontemleri*. Ankara: Seckin Kitabevi.
- Zancajo, A., Verger, A. & Bolea, P. (2022). Digitalization and beyond: the effects of Covid-19 on post-pandemic educational policy and delivery in Europe. *Policy and Society, 41*(1), 111-128,
- Zins, J. E., Bloodworth, M. R., Weissberg, R. P., & Walberg, H. J. (2004). The scientific base linking social and emotional learning to school success. In J. E. Zins, R. P. Weissberg, M. C. Wang, & H. J. Walberg (Eds.), *Building academic success on social and emotional learning: What does the research say?* (pp. 3-22). Teachers College Press.
- Zins, J. E., & Elias, M. J. (2007). Social and emotional learning: promoting the development of all students. *Journal of Educational & Psychological Consultation, 17*(2-3), 233-255.
- Zimmerman, J. (2020, March). "Coronavirus and the great online-learning experiment, chronicle of higher education". Retrieved from <https://www.chronicle.com/article/coronavirus-and-the-great-online-learning-experiment/>

AN EVALUATION OF VIRTUAL LEARNING ENVIRONMENTS IN THREE OPEN UNIVERSITIES IN ASIA

Kamran MIR

ORCID: 0000-0001-7399-7807

Institute of Geographical Information Systems
School of Civil and Environmental Engineering
National University of Sciences and Technology
Islamabad, PAKISTAN

Dr. Roberto B. FIGUEROA JR.

ORCID: 0000-0002-6981-0090

Faculty of Information and Communication Studies
University of the Philippines Open University
Los Banos, PHILIPPINES

Dr. Aminudin ZUHARI

ORCID: 0000-0003-4603-7338

Faculty of Teacher Training and Education
Universitas Terbuka Indonesia
Tangerang Selatan, INDONESIA

Received: 15/12/2022 **Accepted:** 24/04/2023

ABSTRACT

Open universities have provided quality higher education through open and distance education to serve learners who could not attend traditional in-person universities. While open universities vary in terms of providing their services to learners at a distance, many have shifted to e-learning using cost-effective platforms. A common platform that is essential for online teaching and learning is the learning management system (LMS). While there are common processes observed among open universities in the way they use their LMS, there are also subtle differences caused by each institution's unique and special context. Their contextual challenges often drive them to develop technologies or techniques that may easily be adopted by others. Thus, benchmarking activities are often recommended for mutual improvement. In this regard, a comparative study of open universities in Indonesia, the Philippines, and Pakistan was conducted for decision-makers to understand how they could improve in providing quality education to their learners through Moodle, which is their primary LMS. The Delone and Mclean Model was used to systematically compare system, information, and service quality in e-learning delivered through their LMS. The authors hope that the results and recommendations from this study may help other educational institutions overcome similar challenges in their learning platforms.

Keywords: Learning Management System, Moodle, Delone and McLean Model.

INTRODUCTION

One of the United Nations' sustainable development goals is quality education, which means "ensuring inclusive and equitable quality education and promoting lifelong learning opportunities for all" (Hanemann, 2019). However, traditional higher education institutions, especially in Asia, are struggling to meet this goal. Their attempts to ensure inclusiveness and equity in education are often deemed insufficient due to various geopolitical and economic challenges. Therefore, open universities have become instrumental in widening people's access to education and promoting lifelong learning in Asia by providing more options

for disadvantaged learners. Furthermore, open universities are known to be implementers and promoters of open educational resources (OER) and free online courses. Many of these universities are members of the Asian Association of Open Universities (AAOU).

AAOU, founded in 1987 is a non-profit organization of universities that are primarily engaged in open and distance learning (ODL). This association aims to promote ODL and strive for quality education and access for all. It strives to allow people from all walks of life gain access to the vast wealth of knowledge that these institutions, together with their partners, possess.

Among various platforms for teaching and learning, the learning management system (LMS) stands out as one of the most essential technologies in ODL due to its affordances that are apt for addressing challenges related to the spatial distance between students and the educators. Since open universities have increasingly reported successful and innovative LMS implementations, the interest in utilizing them even among traditional universities as a virtual learning environment (VLE) for blended or fully online learning has been gradually increasing. In ODL contexts, students face more administrative and technical problems than students in traditional universities. Furthermore, as an open university's LMS largely facilitates online learning transactions, ensuring quality in its implementation and management is extremely crucial. Being a type of information system (IS), the success of implementing an LMS can be measured using an IS success model proposed by DeLone and McLean (2003). Comparing the success indicators of ODL institutions (i.e., open universities) implementing the same LMS could help improve certain aspects of their operations and serve as an effective benchmarking activity.

REVIEW OF RELATED LITERATURE

The literature is plentiful, with papers describing and comparing LMS implementations across universities. However, most of them were comparisons between *Moodle* and other learning management systems like Blackboard, *LAMS* and *ATutor* (see Bower & Wittmann, 2011; Carvalho, Areal, & Silva, 2011; Lengyel, Herdon, & Szilagyi, 2006), and other platforms like Facebook (see Jeljeli, Alnaji, & Khazam, 2018). Even more abundant were evaluations of Moodle in a single university like the ones done in Sri Lanka (Marikar & Jayarathne, 2016), Jordan (Hasan, 2019), and the Netherlands (Conijin, Snijders, Kleingeld, & Matzat, 2016). The authors have not found any published study that systematically and comprehensively compared the success of LMS implementations of the same platform as Moodle among open distance Learning (ODL) institutions like open universities from different cultural and geographical contexts. The closest to this criterion was the work of Wang, Tseng, & Chang (2013). They compared student perceptions of Moodle between a university in Taiwan and Portugal. However, these were residential universities that used the LMS for blended learning. The gap in literature led the authors to ask five research questions:

1. What are the general and technical differences among ODL universities implementing the same LMS platform?
2. How different is user satisfaction among ODL universities implementing the same LMS platform?
3. How different are users' intentions to use and net benefits among ODL universities using the same LMS platform?
4. How different are the quality of LMS implementation among ODL universities using the same LMS platform?
5. How is the quality of LMS implementation related to users' intention to use and user satisfaction in these universities?

THEORETICAL FRAMEWORK

To analyze and compare the successful implementation of Moodle in three universities, a multidimensional model was chosen as the research framework. According to Wu & Wang (2006), DeLone and McLean IS success model is one of the multi-dimensional models used in many different fields. However, the concept of measuring the success of information systems is still not very mature. This model is based on six dimensions. This comparative study will primarily subscribe to the DeLone and Mclean Information Systems Success

Model, which investigates the system quality, information quality, service quality, user satisfaction, intention to use, and net benefits. The model was recently proven valid and reliable (Sirsat & Sirsat, 2016).

Figure 1 shows the components of the DeLone and McLean IS success model and their hypothesized directional relationships.

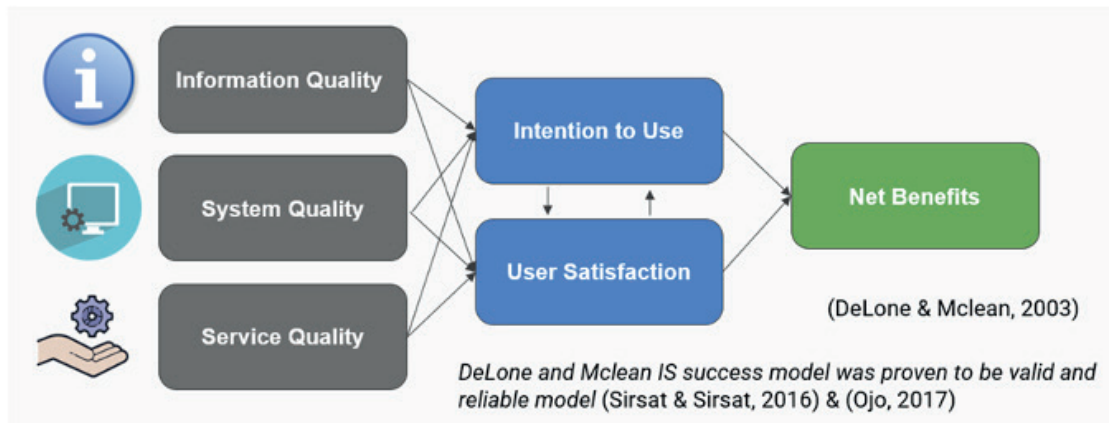


Figure 1. DeLone and McLean IS success model

System Quality

System Quality measure focuses on the usability of the system, and it also covers the performance characteristics of the system under investigation. System quality may cover access, convenience, customization, data accuracy, ease of learning, ease of use, response time, reliability, interactivity, system accuracy and system features, etc.

Information Quality

This measure of success is more related to output. The output required by the user and the output generated by the IS. The closer these two are, the higher the success rate and satisfaction of the user.

Service Quality

In this measure of success factor, technical support or help provided by the IT department is covered. This may include assurance, empathy, flexibility, interpersonal quality, and responsiveness of the support team.

User Satisfaction

It covers the level of satisfaction while using an IS. It is a very important measure of success. User satisfaction is not an isolated measure as it is interlinked with other measures like service quality.

Intention to Use

This measure indicates the frequency, usage, or intention of the user in utilizing the system. This also includes actual use, daily use, nature of use, number of transactions, etc.

Net Benefits

This measure is the summary of all previously mentioned measures. This is closely related to the benefits of all stakeholders involved (Urbach & Muller, 2012).

METHODOLOGY

The study was primarily conducted at the University of the Philippines Open University when two of the authors stayed in the Philippines as visiting researchers in 2019. The study followed the Delone and Mclean IS Success Model as a framework but added general and technical comparisons to investigate further factors that could have contributed to differences in relevant variables. This section starts with a restatement of the research questions into research objectives, followed by the recruitment of participants, a description of instruments, data collection methods, and analysis performed to answer each research question.

Research Objectives

This comparative study aimed to achieve the following objectives:

- To compare the general and technical aspects of Moodle implementations in AIOU, UPOU & UT.
- To compare user satisfaction from LMS implementations across the three universities.
- To compare users' intention to use and net benefits across the three universities.
- To compare the quality of LMS implementations across the three universities.
- To determine associations between quality dimensions, satisfaction, intention to use, and net benefits.

Participants

The authors interviewed ICT Directors of each university to collect data regarding general and technical aspects of their Moodle infrastructure. The survey was given to participants who were either faculty members or students of the three universities. There were a total of 15,566 respondents. Figure 2 shows bar plots that illustrate the distribution of participants in various categories. UT had the most respondents ($n = 14,526$), followed by AIOU ($n=775$), and UPOU ($n = 265$). There were 13,372 students and 2,194 faculty members among the participants. There were 8,757 females and 6,785 males among the participants, while 24 were identified as neither of the two. Finally, most of the participants were between 21 and 30 years old, while the least number of participants were those that were older than 50.

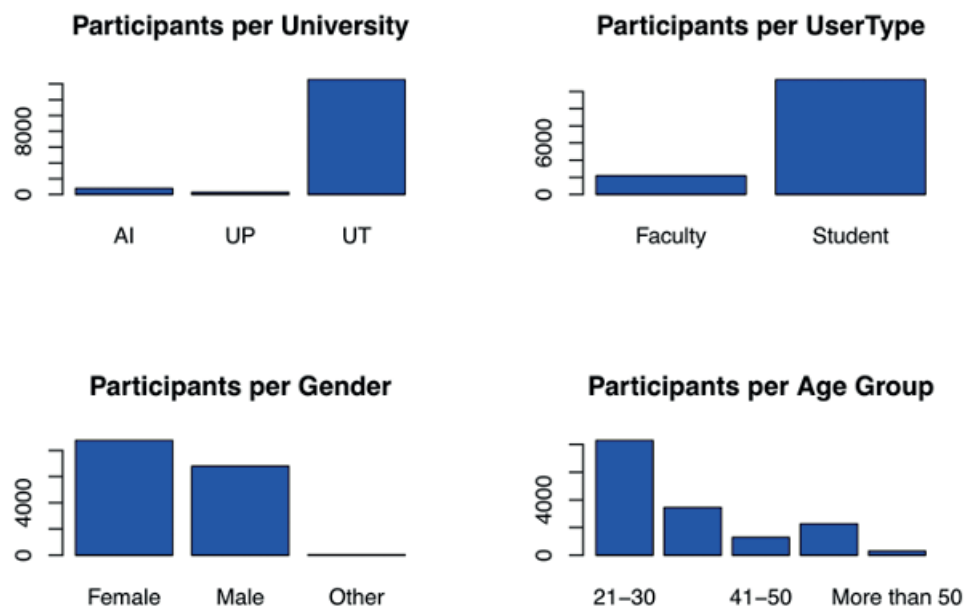


Figure 2. Bar plots of survey participants

Data Collection

Two major instruments were used to collect data. The first instrument was an interview protocol containing questions categorized in three areas: general, LMS-technical, and LMS-academic. General questions included university-related details such as the year it was founded, the number of programs, the number of study centers, and when they started using their LMS. LMS (MOODLE) technical questions included

server details such as the server RAM and operating system, as well as Moodle installation details such as the theme, version, and the availability of some plug-ins like learning analytics or the mobile application. LMS (MOODLE) academic questions were just a checklist of available academic activities that the LMS provided, such as badges, forums, exams, feedback, quizzes, and attendance. These interview protocols were used to interview the three ICT directors.

The second instrument was a survey questionnaire containing the Delone and McLean IS success model items. The online survey was distributed among students and faculty members of the three universities. Each item was operationalized as a Likert-type statement with 1 representing strong disagreement and 5 representing strong agreement.

Data Analysis

Data from the interview was summarized by the authors. Meanwhile, survey data were processed using R-Studio using the R standard libraries (R Core Team, 2012) for statistical analysis and additional libraries like *dplyr* (Wickham, Francois, Henry, & Muller, 2022) for data manipulation and *ggplot2* (Wickham, 2016) for sophisticated plotting. The mean and standard deviation of participants from the three universities were computed for descriptive statistics, while an analysis of variance was used to compute statistical significance. The post-hoc method used to carry out pair-wise comparisons was Tukey's honest significant difference (HSD) as sample sizes were unequal among the three universities.

FINDINGS

We present the findings according to our research objectives.

General and Technical Differences among Universities

The summarized data regarding the general details of each university is presented in Figure 3. AIOU is the oldest among the three universities, while UPOU is the youngest. AIOU is also considered a mega-university with approximately 600,000 enrollments per term, while UPOU only got about 4,000 enrollments. The figure also shows that UT had the most students and faculty members using the learning management system.

General Comparison	AIOU Pakistan	UPOU Philippines	UT Indonesia
Founded	1974	1995	1984
Online / Using MOODLE since	2012	2007	2003
Per Semester Student Enrollments	~ 600000	~4000	302484
No. of Programs	200+	31	38+
No. of Courses	~ 2000	2767	1170
Regional Campuses / Centers	48	3	39 + 1 for Overseas Students
Study / Exam Centers	~ 1172	-	-
Registered Part-time Tutors / Faculty Incharge	~ 96000	445	12000
Online / e-Tutors	464	445	5000
Registered Students on MOODLE	2130	16503	267863
Active Students on MOODLE	1670	6962	120000-150000
Active Tutors on MOODLE	338	253	5000
MOODLE Local Name	OLIVE / AAGHI	MyPortal	UT Online

Figure 3. General information on AIOU, UPOU, UT

The summary in Figure 4 presents data regarding the technical details of the LMS implementation of each university. Both UPOU and UT used the 3.5 version of Moodle while AIOU used 3.3.1 during the data collection period. AIOU was using an Ubuntu Linux distribution while UPOU and UT were both using CENTOS. Among the three universities, UPOU's server utilized the lowest RAM at 24 GB and hard disk space at 192 GB. It was the only university that used outsourced technical support services regarding server

management of the LMS instance. However, it was only AIOU who used their in-house physical servers to host their LMS. Moreover, it was interesting to note that AIOU had its university website developed using ASP classic while UPOU and UT both utilized content management systems like WordPress and Drupal. Mobile applications for their Moodle instance were available for UPOU and UT. Plagiarism plug-ins like Turnitin were in full implementation only in UPOU. None of the three universities had an accessibility or support plug-in for differently-abled students.

	AIOU Pakistan	UPOU Philippines	UT Indonesia
MOODLE Technical			
MOODLE Version	3.3.1	3.5	3.5
MOODLE Server Type	Physical	Virtual	Virtual
MOODLE Server OS	Ubuntu 16.04	CentOS	Centos 7.5
MOODLE Server RAM	32 GB	24 GB	4x128GB for DB & 4*64GB Web
MOODLE Server HDD	900 GB / 1 TB	192 GB	6TB
MOODLE Learning Analytics	No	No	Yes
MOODLE Mobile Application	No	Yes	Yes
Turnitin / Plagiarism on MOODLE	No	Yes	Limited
MOODLE Technical Administration	In-house	Out-sourced	In-House
MOODLE Hosting	In-house	Cloud	Cloud
Technical Staff Managing the MOODLE	4	1	3
Univarsity Website Platform	Classic ASP / SQL Server	Wordpress / PHP / MySQL	Drupal / PHP / MySQL
Accessibility/ Support for Special Students in MOODLE	No	No	No
MOODLE Theme	Standard	Standard	Customized

Figure 4. Technical details of LMS implementation in AIOU, UPOU, UT

The summary in Figure 5 presents data regarding academic details of the LMS implementation of each university.

	AIOU Pakistan	UPOU Philippines	UT Indonesia
MOODLE Academic			
MOODLE Video Conferencing	BBB	Zoom, Google Hangouts	BBB, Skype4Business, MS Teams
MOODLE Badges	No	No	No
MOODLE Competencies	No	No	No
MOODLE Attendance	Yes	No	Yes
MOODLE Quizzes	No	Yes	Yes
MOODLE Assignments	Yes	Yes	Yes
MOODLE Chat	No	Yes	Yes
MOODLE Forums	Yes	Yes	Yes
MOODLE Exam	No	Yes	No
Standardization of Learning Resources	No	No	Yes
Liberty for Tutors to reuse or create their own learning resource	Yes	Yes	Limited
Student Feedback on MOODLE	No	No	Yes
Tutor Feedback on MOODLE	No	No	Yes

Figure 5. Academic details of LMS implementation in AIOU, UPOU, UT

AIOU solely used Big Blue Button (BBB) as the primary tool for synchronous meetings. UT offered Skype for Business and MS Teams as additional tools while UPOU offered Zoom and Google Hangouts. Only UT provided student and tutor feedback via the LMS.

Satisfaction among LMS Users in Three Universities

Figure 6 shows the boxplot of user satisfaction among three universities.

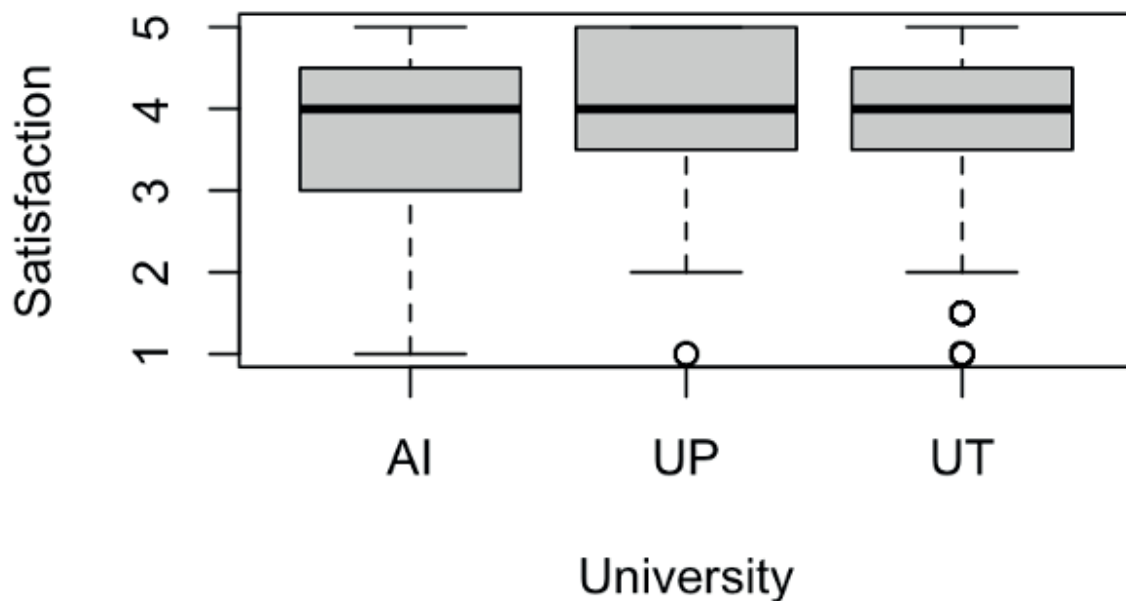


Figure 6. Boxplots of user satisfaction in LMS implementation among three universities

The analysis of variance resulted in a statistically significant difference in the satisfaction ratings among the three universities [$F(2, 15,563) = 75.57, p < .01$]. Post hoc comparisons using the Tukey HSD test indicated that the mean of satisfaction ratings given by participants in UPOU ($M = 3.98, SD = 0.94$) and UT ($M = 3.98, SD = 0.78$) were significantly higher than the mean of satisfaction ratings from AIOU ($M = 3.54, SD = 1.26$) both at $p < 0.01$.

However, the mean satisfaction ratings from UPOU did not significantly differ from the mean ratings from UT.

Intention to Use and Net Benefits among LMS Users in Three Universities

Figure 7 shows the boxplot of intention to use and net benefits among three universities. The analysis of variance resulted in a statistically significant difference in the intention to use ratings among the three universities [$F(2, 15,563) = 12.76, p < .01$]. Post hoc comparisons using the Tukey HSD test indicated that the mean of satisfaction ratings given by participants in UPOU ($M = 3.88, SD = 0.83$) and UT ($M = 3.68, SD = 0.79$) was significantly higher than the mean of ratings from AIOU ($M = 3.60, SD = 1.07$) at $p < 0.01$ and $p < 0.05$, respectively.

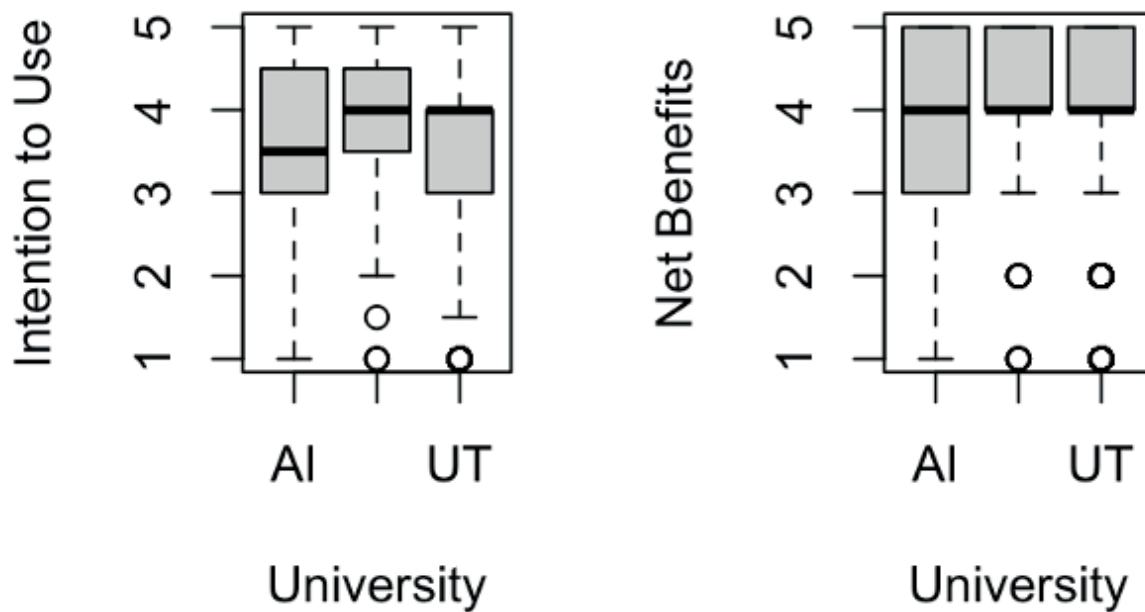


Figure 7. Boxplots of intention to use and net benefits in LMS implementation among three universities

However, the mean intention to use ratings from UPOU did not significantly differ from the mean ratings from UT.

The analysis of variance resulted in a statistically significant difference in the net benefits ratings among the three universities [$F(2, 15,563) = 57.49, p < .01$]. Post hoc comparisons using the Tukey HSD test indicated that the mean of satisfaction ratings given by participants in UPOU ($M = 4.07, SD = 0.96$) and UT ($M = 4.07, SD = 0.82$) were significantly higher than the mean of ratings from AIOU ($M = 3.73, SD = 1.35$) both at $p < 0.01$.

However, the mean net benefits ratings from UPOU did not significantly differ from the mean ratings from UT.

Quality among LMS Users in Three Universities

Figure 8 shows the boxplots of information quality, service quality, and system quality in three universities.

The analysis of variance resulted in a statistically significant difference in the information quality ratings among the three universities [$F(2, 15,563) = 29.17, p < .01$]. Post hoc comparisons using the Tukey HSD test indicated that the mean of satisfaction ratings given by participants in UPOU ($M = 4.06, SD = 0.85$) and UT ($M = 4.00, SD = 0.75$) were significantly higher than the mean ratings from AIOU ($M = 3.79, SD = 1.08$) both at $p < 0.01$.

However, the mean information quality ratings from UPOU did not significantly differ from the mean ratings from UT.

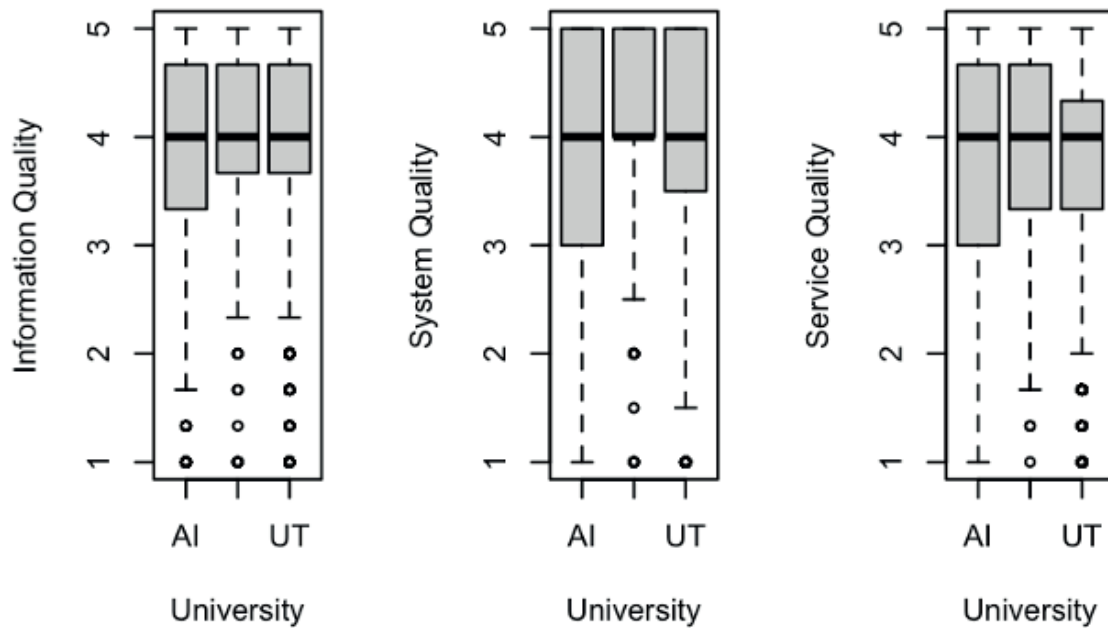


Figure 8. Boxplots of quality in LMS implementation among three universities

The analysis of variance resulted in a statistically significant difference in the service quality ratings among the three universities [$F(2, 15,563) = 8.40, p < .01$]. Post hoc comparisons using the Tukey HSD test indicated that the mean of satisfaction ratings given by participants in UPOU ($M = 3.96, SD = 0.82$) and UT ($M = 3.80, SD = 0.76$) were significantly higher than the mean ratings from AIOU ($M = 3.73, SD = 1.09$) at $p < 0.01$ and $p < 0.05$, respectively. Furthermore, mean service quality ratings from UPOU were statistically significantly higher than ratings from UT at $p < 0.01$.

The analysis of variance resulted in a statistically significant difference in the system quality ratings among the three universities [$F(2, 15,563) = 85.4, p < .01$]. Post hoc comparisons using the Tukey HSD test indicated that the mean satisfaction ratings given by participants in UPOU ($M = 4.14, SD = 0.92$) and UT ($M = 4.05, SD = 0.77$) were significantly higher than the mean ratings from AIOU ($M = 3.67, SD = 1.21$) both at $p < 0.01$.

However, the mean system quality ratings from UPOU did not significantly differ from the mean ratings from UT.

Relationship between Quality, Intention to Use, and Satisfaction

Figure 9 shows a table of effect sizes of correlations between variables. Satisfaction was found to be positively and strongly correlated with information quality, $r(15,564) = 0.70, p < 0.01$; service quality, $r(15,564) = 0.76, p < 0.01$; and system quality, $r(15,564) = 0.69, p < 0.01$.

Intention to use was found also to be strongly and positively correlated with information quality, $r(15,564) = 0.55, p < 0.01$; service quality, $r(15,564) = 0.62, p < 0.01$; and system quality, $r(15,564) = 0.69, p < 0.01$.

Finally, net benefits ratings were found to be strongly and positively correlated with information quality, $r(15,564) = 0.63, p < 0.01$; service quality, $r(15,564) = 0.66, p < 0.01$; and system quality, $r(15,564) = 0.62, p < 0.01$.

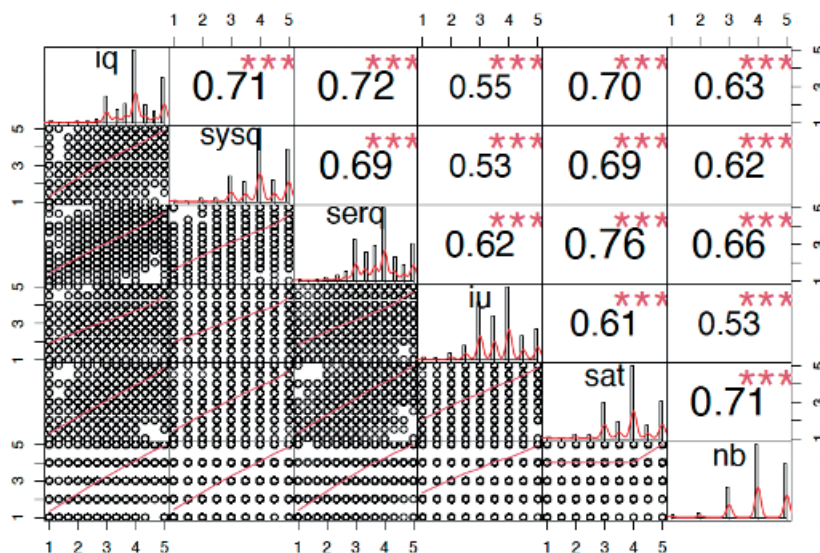


Figure 9. Correlational table of variables

DISCUSSION AND CONCLUSION

This study investigated the implementation of a learning management system among three open universities in Asia before the COVID-19 pandemic began. It highlighted general and technical differences that may have explained the varying degrees of information quality, service quality, system quality, user satisfaction, intention to use, and net benefits which are indicators of the successful implementation of their learning management system.

The general and technical comparison showed that while UPOU was a relatively younger university than AIOU, it was found to be more successful in implementing the LMS based on the significantly higher ratings in all IS success indicators. This could be brought about by the scale by which UPOU started implementing online learning. Rogers (2003) identified time as an important factor for the successful diffusion of innovation like an LMS. Innovativeness or the type of adopters in a university may have determined the success of its LMS implementation. Since UPOU started with the LMS early in 2007, the innovation might have reached the late majority and laggards. The same could be said for UT, which started adopting the LMS in 2003. As for AIOU, they started only in 2012. This could mean that the innovation must have only reached the early adopters which was reflected by the huge difference between the number of users who registered in their LMS (2,130) and their total enrollment per semester (~600,000).

Another factor may have been the in-house implementation of the LMS. Even with a good team, the internet connectivity issues in all three countries may have caused the system quality to suffer. This may have been the case for AIOU in 2019. UPOU and UT used virtual servers that offered redundancy and outsourced maintenance for their LMS. Finally, the service quality ratings of UPOU were significantly higher than those of AIOU and UT which may have been explained by the outsourced technical administration of the LMS. UPOU's ICT center had key people who handle the system administration of the LMS instance. However, its provider was able to help with other technical issues that the university's staff might be too busy to manage. The balance between data privacy and service quality may have been ensured using data privacy, non-disclosure, and other legal agreements. It may also be explained by the population of the university. Both UT and AIOU have been serving a larger population than UPOU. Effective scaling may be a lesson that the smaller university could learn from its more established counterparts.

Moreover, the strong correlations supported the model that was proposed by Delone and McLean. This can be further validated using confirmatory factor analysis and structural equation modeling which are currently outside of the scope of the study

The study showed that AIOU, UPOU, and UT may collaborate to develop or enhance their Learning Management System user interface and user experience. Furthermore, accessibility needs to be enhanced.

Authors' Note: This article has been presented in the 5th International Open & Distance Learning Conference- IODL 2022.

BIODATA and CONTACT ADDRESSES of AUTHORS



Kamran MIR is an EdTech researcher. He is a PhD student at the National University of Science and Technology and has been Assistant Director IT at Allama Iqbal Open University (AIOU), Pakistan, a mega open university, for over 10 years. He earned his Master's in GIS from Pakistan's National University of Science and Technology (NUST), which is ranked #1 in Pakistan and in the top 100 Asian universities by QS World University Ranking 2023. His research focuses on GIS, Spatial Learning Analytics, and Distance Education. He is an energetic young researcher who loves EdTech, research, and teaching. The Asian Association of Open Universities (AAOU) awarded him a Gold Medal and three Silver Medals, and he has published over 20 research papers in international journals and conferences.

Kamran MIR

Institute of Geographical Information Systems, School of Civil and Environmental Engineering, National University of Sciences and Technology

Address: National University of Sciences and Technology, Islamabad 44000, Pakistan

Phone: +923225348823,

E-mail: kmir.phd21igis@student.nust.edu.pk



Dr. Roberto B. FIGUEROA Jr. is an Associate Professor at the Faculty of Information and Communication Studies, University of the Philippines - Open University. Dr. Figueroa gained his Ph.D. in Educational Technology in March, 2023 at the International Christian University in Tokyo, Japan. He serves as the director of a research program on immersive open pedagogies and one of the deputy directors of the Center of Open and Digital Teaching and Learning. His research interests include immersive learning and emerging technologies for learning.

Roberto B. FIGUEROA Jr., PhD

Faculty of Information and Communication Studies, University of the Philippines - Open University

Address: University of the Philippines - Open University, 4031, Los Baños, Philippines

Phone: +6349 536 6001

E-mail: rbfigueroa1@up.edu.ph



Dr. Aminudin ZUHAIRI is a Professor of Open and Distance Education at Universitas Terbuka (UT), Indonesia. Dr. Zuhairi gained his PhD in Administrative, Higher and Adult Education Studies at the University of New England, NSW, Australia in 1995. He has nearly 40 years of experience as an academic and administrator of a large scale open university system in Indonesia. He has conducted research and served in various responsibilities in the areas of course and program development, quality assurance, operations, information systems and student services of open and distance education.

Aminudin ZUHAIRI PhD

Universitas Terbuka, Indonesia.

Address: Faculty of Teacher Training and Education, Universitas Terbuka, Jalan Cabe Raya, Pamulang, Tangerang Selatan 15418, Indonesia.

Phone: +62 21 7490941.

E-mail: aminz@ecampus.ut.ac.id

REFERENCES

- Armstrong, B., Fogarty, G. J., Dingsdag, D., & Dimpleby, J. (2005). Validation of computer user satisfaction questionnaire to measure IS success in small business. *Journal of Research and Practice in Information Technology*, 37(1), 27-42.
- Bower, M., & Wittmann, M. (2011). A comparison of LAMS and MOODLE as learning design technologies—teacher education students' perspective. *Teaching English with Technology*, 11(1), 62-80.
- Carvalho, A., Areal, N., & Silva, J. (2011). Students' perceptions of Blackboard and Moodle in a Portuguese university. *British Journal of Educational Technology*, 42(5), 824-841.
- Conboy, K., Golden, W., Acton, T., & Halonen, R. (2009, April). DeLone & McLean success model as a descriptive tool in evaluating the use of a virtual learning environment. *International Conference on Organizational Learning, Knowledge and Capabilities (OLKC)*. Conference conducted in Amsterdam, the Netherlands.
- Conijn, R., Snijders, C., Kleingeld, A., & Matzat, U. (2016). Predicting student performance from LMS data: A comparison of 17 blended courses using Moodle LMS. *IEEE Transactions on Learning Technologies*, 10(1), 17-29.
- DeLone, W. H., & McLean, E. R. (2003). The DeLone and McLean model of information systems success: A ten-year update. *Journal of Management Information Systems*, 19(4), 9-30.
- Hanemann, U. (2019). Examining the application of the lifelong learning principle to the literacy target in the fourth Sustainable Development Goal (SDG 4). *International Review of Education*, 65(2), 251-275.
- Hasan, L. (2019). The usefulness and usability of Moodle LMS as employed by Zarqa University in Jordan. *JISTEM-Journal of Information Systems and Technology Management*, 16.
- Jeljeli, R., Alnaji, L. A., & Khazam, K. (2018). A comparison between Moodle, Facebook, and paper-based assessment tools: Students' perception of preference and effect on performance. *International Journal of Emerging Technologies in Learning*, 13(5).
- Lee-Post, A. (2009). e-Learning success model: An information system perspective. *Electronic Journal of e-Learning*, 7(1), 61-70.
- Lengyel, P., Herdon, M., & Szilagyi, R. (2006). Comparison of Moodle and ATutor lms. Marikar, F. M., & Jayarathne, N. (2016). Effectiveness of Moodle in education system in Sri Lankan University. *International Journal of Modern Education and Computer Science*, 8(2), 54.
- Puri, G. (2012). Critical success factors in e-Learning - An empirical study. *International Journal of Multidisciplinary Research*, 2(1), 149-161.
- Rana, N. P., Dwivedi, Y. K., & Williams, M. D. (2013). Examining the factors affecting intention to use of, and user satisfaction with online public grievance redressal system (OPGRS) in India. *International Federation for Information Processing*, 240-260.
- R Core Team. (2012). R: A language and environment for statistical computing. *R Foundation for Statistical Computing*. Vienna, Austria.
- Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). New York, NY: Free Press.
- Sirsat, S. S., & Sirsat, M. S. (2016). A validation of the DeLone and McLean model on the educational information system of the Maharashtra State (India). *International Journal of Education and Learning Systems*, 1, 9-18.
- Sun, P.-C., Tsai, R. J., Finger, G., & Chen, Y.-Y. (2007). What drives a successful e-Learning? An empirical investigation of the critical factors influencing learner satisfaction. *Computers & Education*, 1-20.
- Urbach, N., & Muller, B. (2012). The updated DeLone and McLean model of information system success. In Y. Dwivedi, M. Wade, & S. Schneberger (Eds.), *Information system theory* (pp. 1-18). New York, NY: Springer.

- Wang, Y. H., Tseng, Y. H., & Chang, C. C. (2013, October). Comparison of students' perception of Moodle in a Taiwan university against students in a Portuguese university. In *International Conference on Web-Based Learning* (pp. 71-78). Springer, Berlin, Heidelberg.
- Wickham, H. (2016). Data analysis. In *ggplot2* (pp. 189-201). Springer, Cham.
- Wickham, H., Francois, R., Henry, L., & Muller, K. (2022). dplyr: A grammar of data manipulation. R package version 0.4.3. *R Foundation for Statistical Computing*. Vienna, Austria.
- Wu, J. H., & Wang, Y. M. (2006). Measuring KMS success: A respecification of the DeLone and McLean's model. *Information and Management*, 43(6), 728-739.
- Zolait, A. H. (2010). An examination of the factors influencing Yemeni Bank users' behavioural intention to use Internet banking services. *Journal of Financial Services Marketing*, 15(1), 76-94.
- Zolait, A. H., & Mattila, M. (2009). UIBR - An approach to innovations acceptance. *Journal of Internet Banking and Commerce*, 1-17.

E-LEARNING IN MATHEMATICS EDUCATION: A BIBLIOMETRIC ANALYSIS (2012-2022)

Dr. Deniz KAYA

ORCID: 0000-0002-7804-1772
Faculty of Education
Nevsehir Haci Bektas Veli University
Nevsehir, TURKIYE

Dr. Tamer KUTLUCA

ORCID: 0000-0003-0730-5248
Faculty of Education
Dicle University
Diyarbakir, TURKIYE

Received: 07/02/2023 **Accepted:** 20/03/2023

ABSTRACT

This study aims to create a comprehensive bibliometric map of published scientific articles on e-learning in mathematics education (ME). We used Web of Science (WoS) database to analyzed 341 articles published by 1018 authors representing 79 countries between 2012 and 2022. In this context, we examined scientific articles in terms of scientific production, network analysis, trend topics, thematic change, and conceptual structure. Bibliometric analysis was performed in the study. According to findings, the number of published articles differ according to the years, but the number of citations is constantly increasing. Albano, and Dello Iacono are the most prolific authors. The most productive institutions are Salerno and Black Sea Technical Universities. China, USA, and Russia lead the countries of the corresponding authors. According to the network analysis, the journals of Computers & Education and Computers in Human Behavior form strong links. The most used keywords are students, technology, and mathematics. The pandemic, covid, reality, and process are trend topic titles. It determined that the best size reduction obtained in the conceptual analysis constituted approximately 31% of the total variability. We presented some suggestions based on the findings obtained at the end of the research.

Keywords: Bibliometric analysis, e-learning, mathematics education, Web of Science (WoS) database.

INTRODUCTION

As information and communication technologies (ICTs) continue to develop, the priorities of social development and the roles expected from individuals differ. Therefore, in the digital transformation era, it is essential to be a society that produces information rather than consuming it but also to raise individuals who use technology consciously and effectively (European Commission-EACEA-Eurydice, 2019). The continuity of unpredictable progress, especially in the internet and access to information, necessitates nations to keep up with the digital transformation. Along with this progress, the widespread and effective use of information technologies in different fields is also increasing. Undoubtedly, one of the areas where ICTs is widely used in education. The interaction between technology and learning environments is increasing exponentially daily, and technology is essential for all levels of education (Wang et al., 2017). Although technological developments take their place in education, it is also essential that an education approach integrated with innovations is sustainable. Because knowledge is a significant value that needs to be constantly updated for educational institutions and individuals, it is the most effective way to respond to necessities of the age. With this understanding, raising individuals integrated with technological competencies is shown as one of the main goals in the curriculum of many nations, and strong steps are being taken in this direction (Common Core State Standards Initiative [CCSSI], 2016; European Commission-EACEA-Eurydice, 2011; Ministry

of National Education [MoNE], 2018; National Council of Teachers of Mathematics [NCTM], 2016; Organization for Economic Co-Operation and Development [OECD], 2022). The most important reason for this situation is that education is now associated with technology, and the importance of technology for an effective learning environment is increasing (Bal, 2015). Because it has become inevitable for 21st-century individuals to face a learning approach with technological equipment and resources (Gulbahar, 2022; NCTM, 2000; Wang, 2011). In particular, the fact that ICTs encourage innovative pedagogical actions and facilitate the creation of new learning areas has also caused nations to turn more towards the co-operation of education and technology (Garrote-Rojas, 2018).

Not only in the curricula but also in the reports published by many institutions and organizations, emphasizing the importance of education and technology, the necessity of equipping future generations with technological competencies is frequently stated. In the report published by the OECD in 2019, skills positioned on technology have been compiled for the digital business world, skills for the digital society, and learning in the digital environment. Therefore, the importance of integrating digital tools into the teaching process to develop the skills individuals will need in the future has been clearly emphasized (OECD, 2019). The fact that technology offers attractive opportunities for new approaches to teaching and therefore, to learning across the curriculum necessitates the increasing digitalization of education and the more efficient use of technology in the learning environment (Cullen et al., 2020; Mishra & Mehta, 2017; MoNE, 2018; NCTM, 2014; Pierce et al., 2007). In the report published by the International Society for Technology and Education [ISTE] in 1998 and revised in 2007 and 2008, it was stated that the importance of using technologies in educational environments should be transferred to the learning environment (ISTE, 2008). Similarly, the framework published by the Partnership for 21st Century Skills (P21) includes learning outcomes, including information-media-technology skills, and emphasizes the importance of information-communication-technology literacy (P21, 2019). The digital technological competencies of individuals were discussed within the scope of the project, which started with the Learning and Technology World Forum organized in 2009 with the cooperation of Cisco, Intel, and Microsoft (Scardamalia et al., 2012). The Assessment and Teaching of 21st Century Skills (ATC21S) project aims to encourage schools to help students gain qualifications necessary for their careers, modern life, and working life (Lamb et al., 2017). Among the 21st-century skills determined in the ATC21S project, information-communication technologies literacy was evaluated under a separate heading, and its importance between technology and learning environments was stated (Binkley et al., 2012). In the report published by the World Economic Forum (WEF) in 2016, it was stated that students need more than traditional academic education in order to develop further in the century we live in and that students' information-communication-technology skills should be at a sufficient level (WEF, 2016).

Effective and widespread use of technology, a reality of today, is essential in mathematics education (ME) in many disciplines. Since mathematics plays a vital role in the educational and developmental wishes of any country worldwide, the importance of the relationship between mathematics and technology is increasing day by day (Ahn & Edwin, 2018; Moreno-Guerrero et al., 2020). It is also essential that such a valuable branch of science establishes good relations with technology. Aware of this situation, many countries have made radical changes in their mathematics programs, placing technology at the center of their curriculum and shaping their programs in this direction (CCSSI, 2016; MoNE, 2018; NCTM, 2014). Moreover, they have opened the door to a short evolution towards new generation learning understandings with technology content in their curricula. In this context, it is noteworthy that countries focus on approaches to create more qualified educational environments (Jamali et al., 2022; Juan et al., 2012; Hung et al., 2014). So much so that in visionary statements that focus on the idea that technology has the potential to support mathematics teaching, it has been stated that ICTs plays functional roles in improving mathematics learning (OECD, 2019). Because the use of technological resources is a very convenient discipline especially for ME (Oksuz & Ak, 2010). Drawing attention to this situation, NCTM emphasized the importance of using technological tools in ME and school mathematics principles and standards; it stated that "technology is essential in teaching and learning mathematics, it affects the mathematics taught and improves student learning" (NCTM, 2000, p. 11). Therefore, digital technologies provide valuable contributions to learn mathematics effectively. With the efficient use of mathematical e-learning, the taught subject can be more exciting, and students can understand mathematics better (Ahn & Edwin, 2018). Thanks to this learning technology,

a more functional understanding of learning can be developed from a static mathematics teaching that changes rapidly. The e-learning approach is progressing by renewing itself day by day and keeping up with the changes.

In the digital age, which we are only living in the first quarter, although skills based on performances come to the fore, digital technology literacy makes itself felt more distinctly unlike other century skills (Trilling & Fadel, 2009). So much so that today “digital technology has changed the very notion of what being a human means” (Borba et al., 2016, p. 589). Together with The Fourth Industrial Revolution (4IR), today’s focus is on organizing tools based on artificial intelligence (AI), machine learning (ML), and algorithms (Chaka, 2020). Therefore, today’s education systems need to be reorganized and developed (Gonzalez-Perez & Ramirez-Montoya, 2022). In this context, ICTs have provided invaluable contributions to the continuation of educational activities, especially during the pandemic (Almarzooq et al., 2020). Considering the increase in studies on ICTs, knowing what to expect in future research is possible by understanding current research trends. Therefore, studies on the transfer of technological tools to learning environments are essential sources of information for future research. In this study, the e-learning approach in ME was discussed, and related literature were examined in detail. Thanks to the study aim to create a valuable resource for the related field and present new ideas to researchers who will work on this subject.

E-LEARNING AND USE IN MATHEMATICS TEACHING

In the face of the dizzying speed of ICT, the concept of e-learning is constantly renewing itself. As digital platforms have become a part of our lives, some concepts have been given different meanings by adding the suffix “e-” (e-academy, e-commerce, e-government, e-school, e-campus etc.), which is the first letter of the word electronics (Gokdas & Kayri, 2005). This situation corresponds to electronic learning (e-learning) in the education sector. E-learning approach; a method that adds diversity to learning environments and has the practicality of being accessible from anywhere. Unlike traditional teaching approaches, this approach, a trend in recent years, offers individuals more opportunities for learning experiences, lacks control and implementation mechanisms and allows individuals to learn independently (Wang, 2011, 2014). There are no time and place restrictions in this learning style, and the same learning outcome can be repeated more than once. It includes many advantages in terms of reducing the cost of learning and providing diversity in the content type. The beginning of these advantages is that teachers and students in different locations can communicate actively, students have the opportunity to take lessons from educational institutions in many different countries, and students develop a collaborative working environment (Altıparmak et al., 2011). E-learning, which also supports lifelong learning, includes technology in a broad perspective, such as radio, TV, CD-ROM, DVD, computer-assisted education, video conferencing, virtual and online education networks. It is also a roof concept as it includes many innovative approaches (mobile-smart learning, etc.). In this learning style, knowledge and skills expected to be acquired by individuals are transferred to the recipient with the help of technological tools. Computers, intranets, and internet (local and wide area networks), www (world wide web) and ftp internet services, TV and radio (telecommunication tools), and satellite broadcasting tools used in audio and video transmission are some of the technological tools used for e-learning (Gulbahar, 2022). In short, e-learning; is the process of learning knowledge and skills at any time and place with the help of media such as the internet, intranet, audio, video tapes, television broadcasts, and CD-DVD (Govindasamy, 2002). In this way, it aims to continue teaching activities through internet technologies without requiring instructors and participants to be simultaneously in the same environment.

Today, the speed of access to information is an essential need for educational institutions. Educational institutions that provide access to information in the fastest and most reliable way go one step ahead and have a say in directing change. These systems are also one of the most effective and quick ways to acquire knowledge. In particular, thanks to the widespread use of mobile phones, tablets, laptops, the strengthening of the internet network structure, the cheapening of the internet cost, and the ongoing developments in communication and information technologies, individuals and institutions can access information more quickly and reliably, and disseminate information to large masses (Gonzalez-Perez & Ramirez- Montoya, 2022). In addition, the e-learning ensures that teaching activities are based on ICTs and provides students with equal opportunities with their peers from elsewhere in the world, accessing different types of materials and meeting with instructional information technologies (Ekesionye & Okolo, 2011). Thanks to e-learning,

since the contents are easily accessible, learning environments can be created without the need to distribute physical materials, and the learner can determine the appropriate time for learning activities and provide flexibility to the instructors (Cheong, 2002; Hung et al., 2014; Wang, 2014). With e-learning, it allows access to all data, not only to the registered student group but also to all segments of society, from anywhere (Altiparmak et al., 2011). E-learning is a digital process and a social phenomenon based on interactions between individuals. Therefore, the rapid dissemination of e-learning environments today requires getting to know the characteristics of individuals studying in these learning environments and organizing online learning environments efficiently (Kurnaz & Ergun, 2019). Because the e-learning method can prevent individuals from being motivated and determined by creating a spatial and temporal gap (Cerezo et al., 2020; Hung, 2012; Moubayed et al., 2020). Also the fact that the use of information technologies is not as common as in developed countries, e-learning may not have the desired effect on educational learning (Karkar et al., 2020; Yaniawati et al., 2020). There may also be some disadvantages, such as problems with an internet connection, limited level of direct discussion, students having to look at digital tools constantly, and problems in working time and maintaining self-discipline (Altiparmak et al., 2011; Pujiasih, 2020). Therefore, such negativities may cause individuals to have low skills, especially in applied courses that require skills such as mathematics (Rohendi et al., 2023).

Many essential online teaching tools have been developed and implemented using digital infrastructure in mathematics teaching (Umoh & Akpan, 2014). For example, printed media, special digital publications, TV programs, radio, e-mails, computer-assisted teaching applications (power-point, CD-ROM, lecture videos, DVD, animated videos, simulation graphics, lecture applications, video conferencing, e-journals, e-books, enriched course materials, e-smart book, interactive interfaces, e-library, e-encyclopedia, e-text, etc.), web extension or teaching tools including virtual learning environments (Modular-Object-Oriented-Dynamic-Learning-Environment [MOODLE], Blackboard-Learning-Management-Systems [BLMS], MEI, WEBCT, MUMIE, WebALT, software [Google Meet, Microsoft Teams, Zoom, Skype, WebEx, etc.], Home-Work-System, MatLab, Mathwiki, Open-Courseware) have been made available to students in order to provide information flow to individuals (Albano, 2012; Awodele et al., 2010; Ayanda et al., 2012). In addition, Web 2 tools (Matific, Geogebra Software, Daum-Equation-Editor, MyScript Calculator, MathManiac, KidsMath, MathFormulary, MathPractice Flash Cards, Kids Numbers, MathLite etc.) are used in teaching mathematics. Mathematics e-learning is making mathematics teaching more functional by using hardware, software or the internet (Juan et al., 2012; Ozyurt et al., 2013). In this respect, many different instructional tools, including mathematics e-learning, have been made available to students today, and progress is continuing.

REVIEW OF RELEVANT LITERATURE

Depending on technological developments, the content and number of studies on e-learning are increasing. Especially with the Covid-19 epidemic, which has affected the whole world, many countries have made serious investments in e-learning. Significant steps have been taken in many areas, from changes made in curricula to improvements in technological infrastructure. Many countries are making serious efforts to make digital learning platforms more functional, both to prevent future generations from falling behind in teaching activities and to provide them with skills required by the age (Gonzalez-Perez & Ramirez-Montoya, 2022). In this age, where time is flowing towards digital learning, valuable studies are also carried out on e-learning. When the studies in the literature, which were carried out similar to the study are examined, it is seen that the effect of e-learning and design studies in mathematics teaching have gained weight (Bali et al., 2022; Bringula et al., 2021; Kramarski & Gutman, 2006; Kumari, 2021; Moreno-Guerrero et al., 2020; Mutlu et al., 2019; Ozyurt et al., 2013). In these studies, it has been reported that e-learning developed students improve their problem-solving and strategies (Sacristan, 2017; Kramarski & Gutman, 2006), improve their math manipulatives production (Sulistyaningsih et al., 2019), increase their participation in the lesson, deep learning, attention to the lesson, success, attitude, motivation, creativity, communication, performance, self-efficacy, and self-control (Allen et al., 2004; Bernard et al., 2014; Borba, 2012; Hung et al., 2014; Lin et al., 2017; Mulqueeny et al., 2015; Uzunboylu et al., 2020; Uzel & Ozdemir, 2012; Yaniawati et al., 2020). On the other hand, there are study findings that students are inadequate in terms of ICTs skills, test anxiety and software limitations of mathematical symbols (Bringula et al., 2021; Irfan et al., 2020; Umoh & Akpan, 2014).

When the findings of studies conducted in a similar direction are looking, the research findings differ in specific periods. For example, in Djeki et al. (2022), 12,272 articles on e-learning between the years 2015-2020 were examined. While USA, Spain, England and China are the most productive countries in e-learning, the most represented journals are *Computers in Human Behavior*, *Computers & Education*, and *International Journal of Emerging Technologies in Learning*. The countries of the corresponding authors are generally reported to be England, USA and China. It was determined that the cooperation between universities and countries on e-learning is weak and the pandemic has an impact on e-learning. Tibana-Tibana-Herrera et al. (2018), 39,244 scientific studies indexed in the Scopus and SCImago Institutional Rankings databases were analyzed. The study covers the years 2003-2016. In studies with e-learning content, it was determined that USA produced most of the works at the country level and had the largest international cooperation. The University of Hong Kong was determined to be the most productive institution. National Taiwan University of Science and Technology was determined to have the most extensive cooperation. Chen et al. (2021b) examined 555 scientific articles on innovative learning from the Scopus database. It was determined that while China is the most productive country in smart learning, Tsinghua University is the most productive institution. It has been reported that the main research topics include mobile learning, blended learning for smart learning, internet of things (IoT), cloud-computing, environmental-intelligence, and ecosystem. In the study by Goksu (2021), 5167 mobile learning-related studies in the WoS database as of September 2019 were examined. The research covers the years 2015-2019. In the research, it has been reported that the trending topics are generally educational technologies. It has also been reported that more specific trend topics are tablets, mobile phones and learning strategies. Hwang G. J. was determined to be the most influential researcher, and the National Taiwan University of Science and Technology was the most productive. It has been reported that the most preferred research topics are augmented reality, higher education, and mobile learning with a smartphone focus. The journals that contributed the most were *Computers & Education*, the *British Journal of Educational Technology*, and *Educational Technology & Society*. Cheng et al. (2014) 324 articles and prooceedig published between 2000 and 2012 were analyzed. According to the findings of the research, e-learning themes came to the fore in continuing education, professional development, health sector, social media and knowledge management. In the study conducted by Delen (2021), 475 postgraduate theses on e-learning in Turkiye were examined. It has been reported that academic achievement, creation of e-learning environments and students' attitudes towards these learning environments are the leading issues associated with e-learning. In another study, trends in e-learning research in Turkiye were examined. In the study conducted by Parlakkilic and Gulduren (2019), it was reported that the research subjects are mostly tool and content-oriented applications. It was determined that the studies were mainly carried out in university institutions. In another study by Hung (2012), the longitudinal trends of e-learning research using text mining techniques were discussed. Between 2000 and 2008, 698 articles and papers were retrieved from the SCI-SSCI database and reviewed. In the study, it was reported that there was an increase in the number of e-learning studies between 2000 and 2008, and computer science and education subjects were dominant. England, USA, Taiwan, and China were the most productive countries. The most productive journals on e-learning are *Lecture Notes in Computer Science*, *Computers & Education*, the *British Journal of Educational Technology*, and *Educational Technology & Society*. The prominent topics were the systems and models, teaching and learning strategies, and factors and case studies. Today, e-learning tools offer many alternatives for teaching systems, such as distance, mixed, synchronous, or asynchronous online education models, increasing their impact and prevalence with each passing minute (Allen et al., 2004; Bernard et al., 2014; Wang, 2014). One of the goal of e-learning is to ensure that education and training programs are of higher quality, to serve more people, to increase accessibility to education, and to offer education opportunities independent of place and time (Gurcan & Ozyurt, 2020). Therefore, it is essential to examine the studies on e-learning in more depth and know the trends in the field. Although there are many studies on e-learning in the related literature, it is evident that more studies are still needed. Because in the face of the progress of technology, learning environments should progress at a similar pace and offer a safer education and understanding of the future by catching up with technology.

IMPORTANCE OF THE STUDY

The changes in the 21st-century information age bring a series of innovations. There is a rapid evolution in the education, health, industry, commerce, and information sectors, especially in working life. Technology has an unavoidable impact not only on the industry but also on individuals. Access to information is realized quickly, and the capability to respond to the needed knowledge and skills quickly and effectively necessitates different learning approaches. The fact that it is more economical and sustainable in terms of cost and time increases the need for e-learning environments. One of the main reasons why e-learning is getting more and more attention day by day is the rapid spread of information with the effect of globalization and the desire of individuals to access information faster. Therefore, the spread of e-learning is inevitable due to increased education demands. Due to the increase in the population in need of education, the problems experienced in classrooms and learning materials accelerate the need for e-learning. Due to the crowded classrooms, the interaction between the student and the teacher remains limited. Thanks to digital learning platforms such as e-learning, limitations that seem difficult to overcome are eliminated, and the interaction between students and instructors increases (Altıparmak et al., 2011). Therefore, it is essential to know the existence of learning tools such as e-learning at a time when the whole world is transforming towards technology. It is essential to know how the studies in this field have changed and the trends in the field.

Undoubtedly, scientific studies conducted in many disciplines have significant benefits in the relevant field. In the improvement and development of today's education programs, the outputs of scientific studies are taken into account, and steps are taken in this direction. Therefore, to predict how educational research will evolve in the future, studies focusing on the past and present of educational studies should be conducted first (Pring, 2013). Because past experiences are a good guide in the construction of the future. In the bibliometric analysis studies conducted similarly to our study, prominent scientific publications, frequently preferred research topics, productive authors, publications and citations by years, productive institutions, and countries were revealed. However, bibliometric studies must be continuously improved according to the innovative approaches brought by the age. Therefore, it is essential to follow the studies carried out in specific periods and to know the international view of the field. Thanks to bibliometric studies, different and current study subjects are also noticed by researchers. This study adopts a current issue, such as e-learning, based on innovative approaches in educational research. One of the critical starting points of the research is that no current study in the literature deals with the content of scientific studies related to e-learning in ME. The need for a more detailed study on developments, changes, trends, and processes in e-learning in ME reveals the necessity of this research. In order to make a good prediction about the future change in e-learning in ME, it is necessary to know which subjects have been studied in previous years (Chang et al., 2010). This study aims to determine the current profile of e-learning use in ME and contribute to creating a sustainable learning approach. Unlike other studies, it is aimed to create a more comprehensive assessment of the use of e-learning in ME by giving more weight to structural analysis. In this context, bibliometric analysis of 341 scientific articles that were accessed from the WoS database in accordance with the purpose of the research was conducted.

PURPOSE OF THE STUDY

This study aims to create a comprehensive bibliometric map of published scientific studies on e-learning in ME. The WoS database analyzed 341 articles published by 1018 authors representing 79 countries between 2012 and 2022. Scientific and technological developments experienced at a dizzying pace today significantly impact the determination of researchers' interests and fields of study. Knowing the past and present products in a study that centers on technological approaches such as e-learning in ME provides us with valuable clues about how future studies should be. In particular, it is essential for the researchers who will work on this subject to know the most productive authors, the most cited scientific studies and scientists, and the collaborations between authors, institutions, and countries. Therefore, this study will be a valuable resource for researchers working on this subject. In addition, this research is essential in guiding and making a difference in the research to be done within the scope of e-learning in ME. The research sought answers to the following research questions (RQs) within the scope of ME:

- RQ 1. What are the patterns of articles with e-learning content according to years and citation count?
- RQ 2. What authors, institutions, and countries have contributed the most to e-learning research?
- RQ 3. Which authors and journals are closely linked to the topic of e-learning?
- RQ 4. Which authors and countries are involved in collaborative research on e-learning?
- RQ 5. How is the distribution of keywords and co-occurrence in researches on e-learning?
- RQ 6. What are the trending topics and thematic changes in e-learning research?
- RQ 7. How do the conceptual structure and thematic map in e-learning research change?

METHOD

Research Design

This study presents a descriptive, cross-sectional-retrospective bibliometric analysis conducted through the analysis of published scientific documents on the use of e-learning in ME in the period 2012-2022. Bibliometrics was used because scientific literature and the authors who produced them were examined according to statistical procedures. This type of analysis allows readers and researchers to gain a holistic view of the research topic determined within a certain period of time and quantitative analysis of scientific publications (Chen et al., 2019; Gokhale et al., 2020). In addition to being functional, bibliometric analysis is an effective method for defining the relevant field (Donthu et al., 2021; Grzybowska & Awasthi, 2020; Pesta et al., 2018). In bibliometric analysis, a detailed evaluation can be made of sources and document types by making descriptive and performance analyses. Also, document matching can be examined with the help of scientific mapping and network analysis. Bibliometric assessment has two strengths. These are the dynamic and structural analysis phases (Chaparro & Rojas-Galeano, 2021). In dynamic analysis, impact values such as the number of publications and citations, timeline of authors, general trends/changes of terms, keywords frequency, distribution of keywords, and h-index are examined (Jamali et al., 2022). The structural analysis section examines indicators such as word dendrograms, conceptual and thematic maps, co-occurrence networks, collaboration, and standard citation networks (Jamali et al., 2022). The research framework proposed by Arksey and O'Malley (2005) was used as a guide in conducting the study. Accordingly, defining the research question(s), determining the relevant documents, deciding on the study selection, creating the data set, analyzing the data set, making a summary, reporting, and discussion processes according to the findings were followed. By following these processes, it was tried to increase the reliability of both the data set and the study.

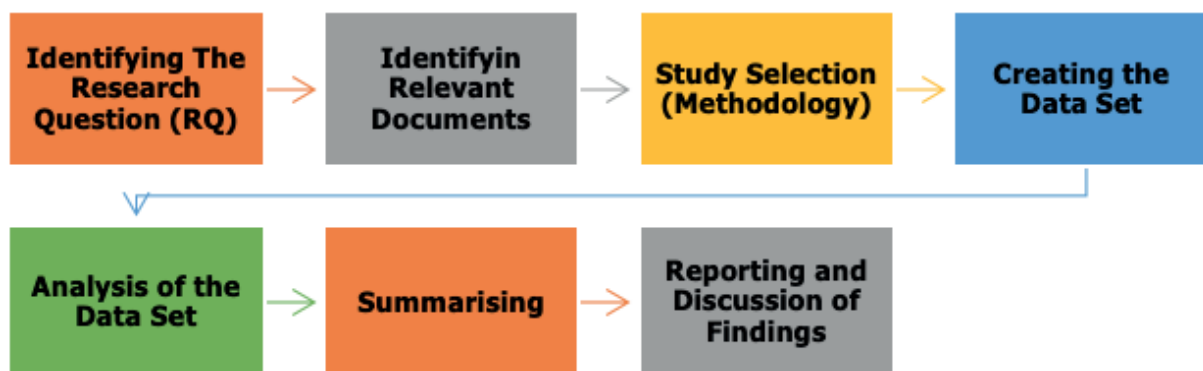


Figure 1. Process followed in the study

Data Collection and Procedure

The Web of Science™ Core Collection database was used to create a source database for e-learning in ME. The WoS database is a database of many disciplines within Clarivate Analytics. Among the significant reasons for choosing the WoS™ database is the presence of a large number of subject categories, the possibility of accessing peer-reviewed full-text available versions, the presence of prestigious journals that are accepted in the world, the

presence of publisher business partners and a large number of reference information (Web of Science Group [WoSG], 2023). Especially the significant increase in scientific studies makes it difficult for researchers to follow the literature related to their fields of interest (Aktoprak & Hursen, 2022). Therefore, the WoS database, which includes accepted and qualified studies in the field, was preferred. Bibliometric methods were used to explore the determined field's basic structure (Donthu et al., 2021). In this context, the title, keywords, and summary sections are among the primary criteria taken into account in creating the data set. While the keywords consist of article-specific terms that give an idea about the research, the part that is most read by the readers and represents the whole of the study is the summary section (Tosun, 2022). Firstly, scientific records with e-learning content in ME were searched. In this context, a pre-scan was made by typing [Title-Abs-Key (“e-learning”) AND (“math*”)] in the WoS search all fields module, and 3334 documents were reached. After this pre-scan, 1185 documents were reached by scanning again as searches title, abstract, author keywords, and keywords plus. After this search, the publication years were limited to 2012-2022, and 873 documents were reached. Of these documents, 475 (54.4%) were proceeding papers, 341 (39.1%) articles, 21 (2.2%) book chapters, and 36 (4.2%) other documents (review article, early access, editorial material, meeting abstract etc.). Finally, the article was selected as the document type, and final data were obtained with 341 articles. In order to obtain more data, no language restrictions were applied in the selection of publications. The 341 articles in the dataset were written in eight different languages (307 English, 14 Russian, 11 Spanish, 3 Bulgarian, 2 Turkish, 2 Ukrainian, 1 French and 1 Portuguese). Articles suitable for the content of the research were saved in the “Plain Text” format from the WoS database. The files downloaded in Plain Text format were then uploaded to VOSviewer and RStudio applications. With the help of the obtained data set, bibliometric analyzes were performed. The following figure shows the structure created by the PRISMA 2020 flowchart guidelines (Figure 2). Thanks to this flow diagram used in systematic reviews, the stages of improvement in the data set are shown (Haddaway et al., 2022).

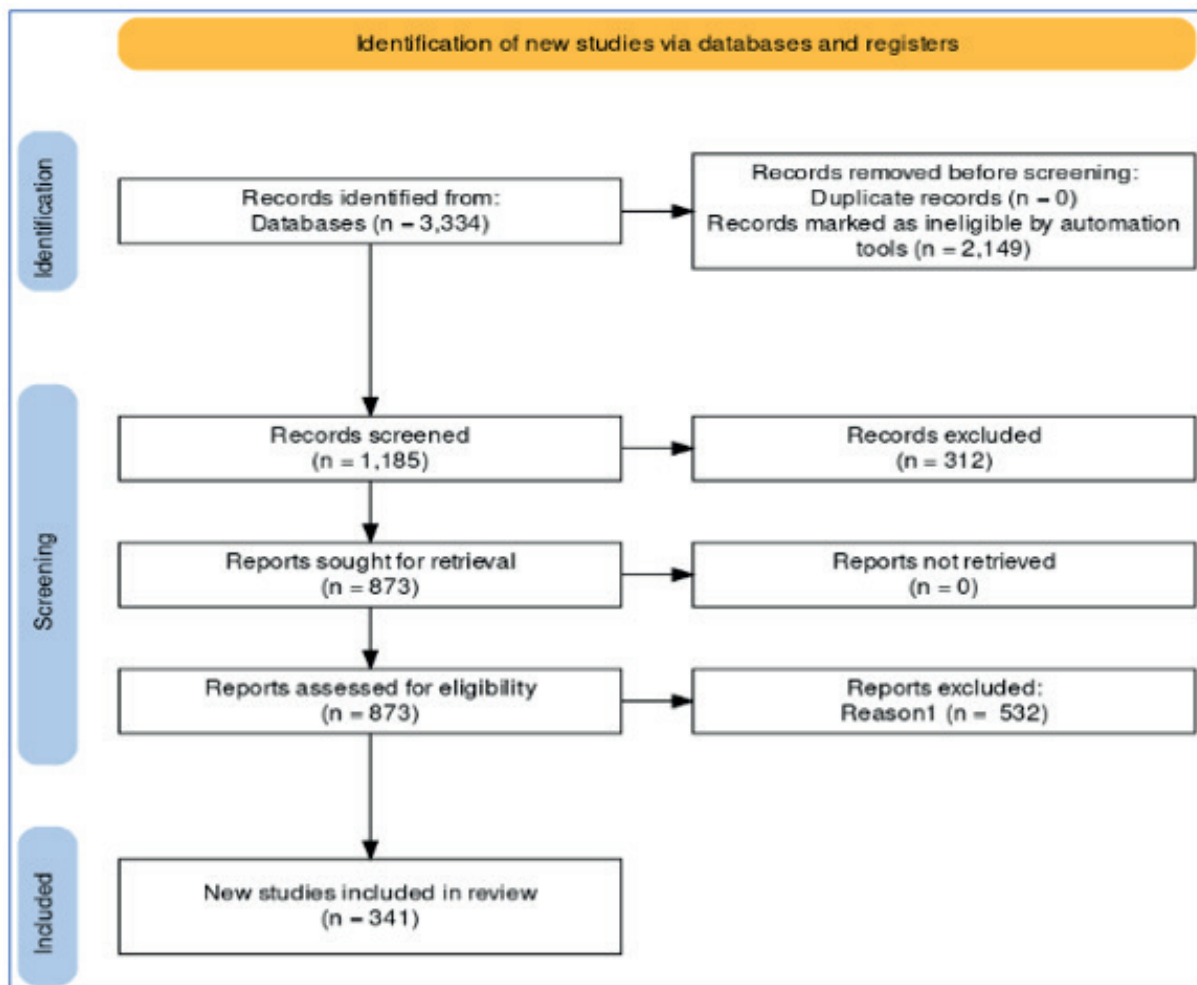


Figure 2. Flow diagram of the process of selection of scientific articles on e-learning in ME

Data Analysis

Traditional literature searches are generally conducted based on the researchers'/institutions' own skills, efforts and opinions, and the findings are presented with the help of limited analysis techniques (Andres, 2009; Grabowska & Saniuk, 2022; Wang et al., 2017). However, in this study, bibliometric analysis was preferred, which helps to understand how the knowledge structure and research areas in written documents have developed (Pritchard, 1969). Bibliometric analysis helps to perform statistical and quantitative analysis of documents such as author, subject, citation, sources, and publications. In this way, it reveals the general structure of many disciplines and the determined discipline. Bibliometric analysis is structured as descriptive and scientific mapping. Descriptive analysis and scientific mapping techniques were used to evaluate the data set. Within the scope of descriptive analysis, the main features of the data set, such as journals, authors, and documents, were examined. Within the scope of scientific mapping analysis, comprehensive analyzes were made through visualization methods such as network analysis, three-field plots, and thematic maps. In the study, VOSviewer 1.6.18 software was used to visualize the similarities of the data set in dynamic and structural analysis (Van Eck & Waltman, 2010). In addition, the R-tool 4.2.2 software of the Bibliometrix package, which was designed for quantitative-bibliometrics-research, was also used to analyze the data set (Aria & Cuccurullo, 2017). The data set analysis started with descriptive analyses of the WoS database. The relationships between the articles and the VOSviewer program were used to analyze the findings on the strength of the relationships. The visualizations created with the help of this program carry out the collaboration of authors, institution(s) and countries, and related research topics, as well as the association of publications on the data obtained from the WoS database (Yuan et al., 2021). Researchers in bibliometric analysis frequently prefer VOSviewer software. This open-access software can be downloaded and used for free (<https://www.vosviewer.com>). With the help of the VOSviewer program, large bibliometric maps can be viewed and interpreted directly, making it easier to understand large data sets (Van Eck & Waltman, 2010). In this way, the visualization of scientific studies is provided. In particular, journals, researchers, co-citations, publication networks, bibliographic matching, co-authorship relationships, and words used in documents can be configured.

On the other hand, with the help of the R-tool program, the conceptual, intellectual, and social structures of the data set were examined, as well as the general analysis of the authors and documents. Thanks to the RStudio software included in the Bibliometrix application, quantitative analysis applications related to the research subject are carried out. This open-source software is free to download and use (www.rstudio.com). In this software, items are defined as objects of interest. Elements and links represent network entities and clusters. In addition to the topics researched in these analysis studies, keywords, distribution of publications by years, citations to studies, words used in the abstracts, productive authors, institutions, countries, and the most cited authors are frequently used.

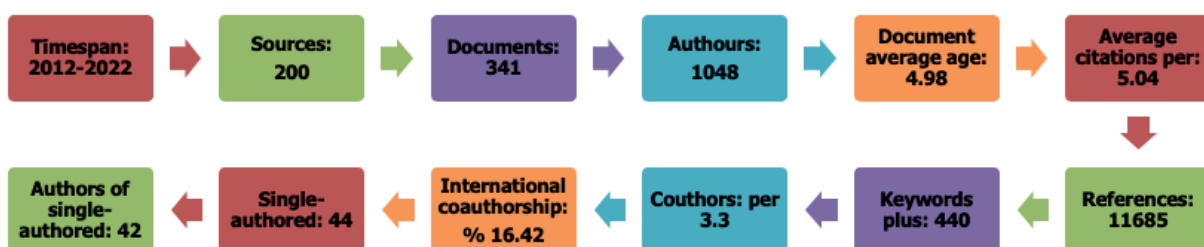


Figure 3. Statistical data of the descriptive main information in the articles reviewed

As Figure 3 indicates, 341 scientific articles were handled by 1048 authors in the study's data analysis. Generally, studies with multiple authors have been carried out. The number of articles with a single author is 44. While the collaboration index between the authors is 3.3, the percentage of international collaboration is 16.42%. Thematic and strategic diagram analyses were also included in the analysis of scientific studies between 2012-2022. Thanks to this structure created by Law et al. (1988), dynamic cluster formations can be determined by analyzing keywords or same-axis words. Thanks to these formations, the general view of e-learning in ME can be more detailed. Conceptual maps detail the conceptual structure of the research topic by dividing the content determined by the researcher into information sets (Wetzstein et al., 2019).

Validity, Reliability and Ethics

The process was explained in detail both to increase the validity of the research and to clarify how the data were obtained. In addition, the collection date of the data set, which modules were used in the WoS database, which restrictions were made and how the evaluation was made during data analysis process was explained. Also, explanations of the methods used in the data collection and analysis processes were included. In order to ensure the reliability of the research, the findings were presented without comment. The consistency between the data was kept in the foreground, and the data reached were discussed in the context of the relevant literature. All the operations done in the writing processes of the research are specified, and detailed information on how the data set was accessed (internet access addresses) is given. The research does not require ethics committee approval as it is based on documents obtained from the WoS™ Core Collection database. In addition, all the rules specified in the Council of Higher Education (CoHE) Scientific Research and Publication Ethics Directive have been complied with in the entire process, from the planning and implementation of this research to the data collection and analysis of the data, and no damage has been done to the data set.

FINDINGS

In this section, the results obtained in accordance with the sub-problems of the research are presented. First of all, the distribution of scientific articles published on e-learning by years, and the number of citations is presented. Afterward, descriptive results about the authors, institutions, and countries that contributed the most to e-learning within the scope of ME were included. In the next step, findings about the journals closely related to e-learning in ME and the authors, institutions, and countries involved in the collaborative work are presented. Immediately after, cluster distributions are given according to author matching. Finally, conceptual structure and thematic maps related to trending topics and keywords in e-learning in ME are presented. Findings section; scientific production, network analysis (co-citation, collaboration, keywords, co-occurrence, clustering network of authors), trending topics and thematic evolution, conceptual structure, and thematic maps are presented below.

Scientific Production on E-Learning in Mathematics Education

The figure below shows annual publications and citations on e-learning in ME between 2012 and 2022. According to the data obtained from the WoS database, the annual production and annual citation numbers related to the study subject are indicated with a different color.

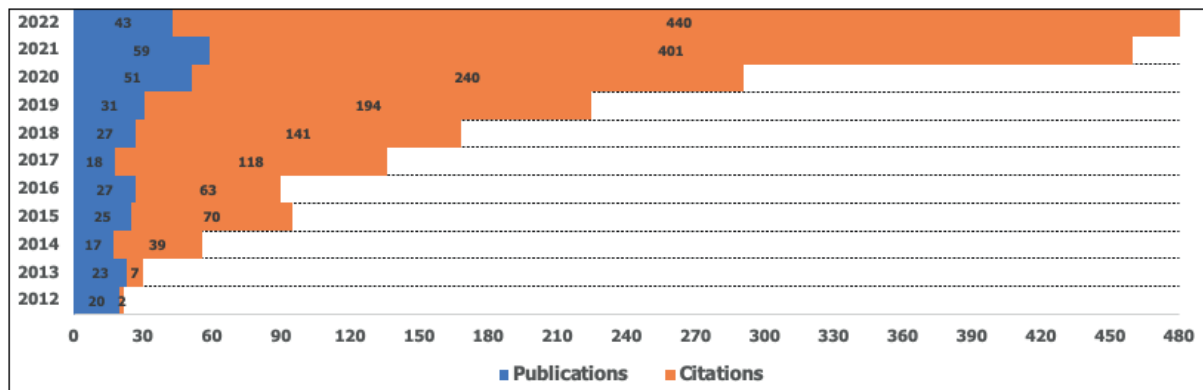


Figure 4. Annual scientific production and citation on e-learning in ME

Figure 4 shows the data of scientific outputs published on e-learning in ME. Accordingly, the annual publications increased in 2020 (51 articles) and 2021 (59 articles). The minimum number of publications was in 2014 (17 articles). Similarly, fewer articles were published in 2017 (18 articles), 2012 (20 articles), and 2013 (23 articles). Similarly, fewer articles were published in 2017 (18 articles), 2012 (20 articles), and 2013 (23 articles) compared to other years. Although there is a decrease in the number of publications in 2022 (43 articles), the number of published articles will continue in the coming years. The number of annual citations increases every year. It is noteworthy that those citations were made in 2021 (401 citations) and 2022 (440 citations). Below are the findings about the authors who published the most in this field.

Table 1. Most productive authors on e-learning in math education

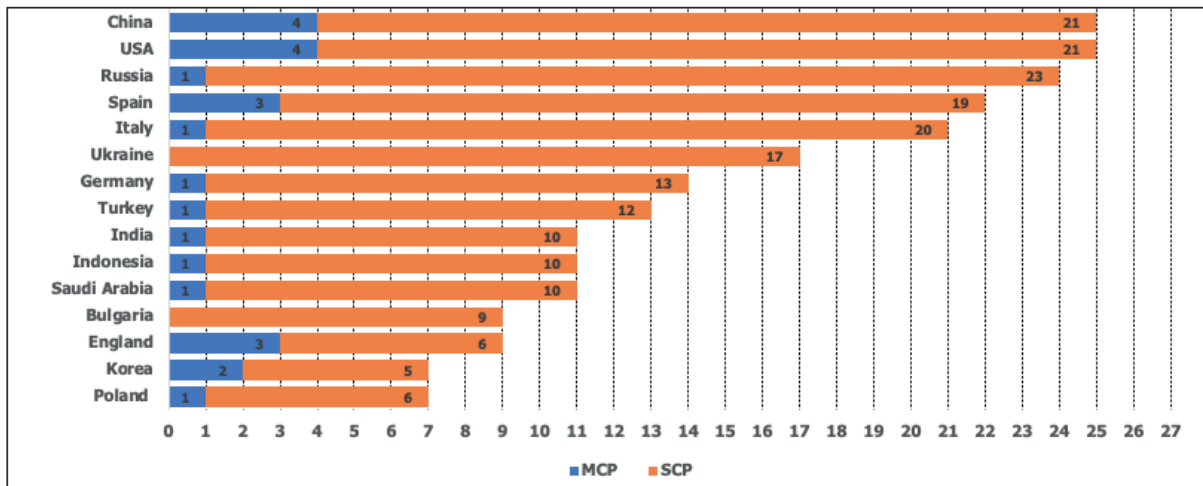
Authors	Articles	Articles Fractionalized
Albano, G.	7	3.20
Dello Iacono, U.	5	1.70
Baki, A.	4	1.03
Ozyurt, H.	4	1.03
Ozyurt, O.	4	1.03
Bakaric, M. B.	3	1.00
Bardelle, C.	3	2.50
Guven, B.	3	0.70
Juric, P.	3	1.00
Mandal, S.	3	1.33
Matetic, M.	3	1.00
Mikhailova, E. A.	3	0.78
Naskar, S. K.	3	1.33
Pierri, A.	3	0.87
Post, C. J.	3	0.78

Table 1 shows the authors who have contributed the most to e-learning in ME in the last ten years and their respective publications. Data in the table are limited to authors with at least three publications. Accordingly, Albano, G. (7 articles), Dello Iacono, U. (5 articles), Baki, A. (4 articles), Ozyurt, H. (4 articles), and Ozyurt, O. (5 articles) are the authors who contributed the most to this field. On the other hand, with three publications each, Bakaric, M. B., Bardelle, C., Guven, B., Juric, P., Mandal, S., Matetic, M., Mikhailova, E. A., Naskar, S. K., Pierri, A. and Post, C. J. other authors who contributed to this field. The table below provides information on the annual total number of citations of the articles.

Table 2. Most cited articles (by total citation per year) on e-learning in ME

Papers	Doi	Total Citations	TC per Year	Normalized TC
Wang, T. H., 2014	10.1016/j.compedu.2013.12.002	92	9.20	7.86
Borba, M. C., 2016	10.1007/s11858-016-0798-4	61	7.63	6.10
Ozyurt, O., 2013	10.1016/j.eswa.2012.12.008	44	4.00	4.32
Fabian, K., 2016	10.1007/s40692-015-0048-8	44	5.50	4.40
Farhan, M., 2018	10.1016/j.future.2017.09.037	38	6.33	5.32
Lin, H. C. K., 2014	10.1016/j.chb.2014.09.052	36	3.60	3.08
Ozyurt, O., 2013	10.1016/j.chb.2012.11.013	35	3.18	3.44
Warin, B., 2016	10.1109/TE.2015.2462809	30	3.75	3.00
Jasute, E., 2016	-	29	3.63	2.90
Arias, J. J., 2018	-	28	4.67	3.92
Yilmaz, F. G. K., 2016	10.1016/j.compedu.2016.01.006	27	3.38	2.70
Sarwar, S., 2019	10.1007/s11042-019-08125-8	24	4.80	6.39
Thongsri, N., 2020	10.1080/14703297.2019.1585904	23	5.75	5.56
Junus, K., 2001	10.3390/educsci11030139	21	7.00	6.91
Moreno G. A. J., 2020	10.3390/math8050840	20	5.00	4.83

Table 2 shows the fifteen most cited reference information among 341 articles on e-learning in ME. The most cited articles in the table are Wang, T. H. (9.20 citations per year), Borba, M. C. (7.63 citations per year), Ozyurt, O. (4.00 citations per year), Fabian, K. (5.50 citations per year), Farhan, M. (6.33 citations per year), Lin, H. C. K. (3.60 citations per year), Ozyurt, O. (3.18 citations per year), Warin, B. (3.75 citations per year), Jasute, E. (3.63 citations per year), Arias, J. J. (4.67 citations per year), Yilmaz, F. G. K. (3.38 citations per year), Sarwar, S. (4.80 citations per year), Thongsri, N. (5.75 citations per year), Junus, K. (7.00 citations per year) and Moreno, G. A. J. (5.00 citations per year). Below is the distribution of the corresponding authors by country.



Notes: MCP = Multiple Country Publications; SCP = Single Country Publications

Figure 5. Corresponding' author's country on e-learning in ME

When Figure 5 is examined, it is noteworthy that the responsible authors working on e-learning in ME are primarily from one country. Corresponding authors are mostly China (n=25), USA (n=25), Russia (n=24), Spain (n=22), Italy (n=21), Ukraine (n=17), Germany (n=14), Turkiye (n=13), India (n=11), Indonesia (n=11), Saudi Arabia (n=11), Bulgaria (n=9), England (n=9), Korea (n=7) and Poland (n=7) countries. One of his remarkable findings is that all of the articles related to Bulgaria and Ukraine include a single-country author. The figure below shows the distribution of authors who have assumed a dominant role in e-learning in ME over the years.

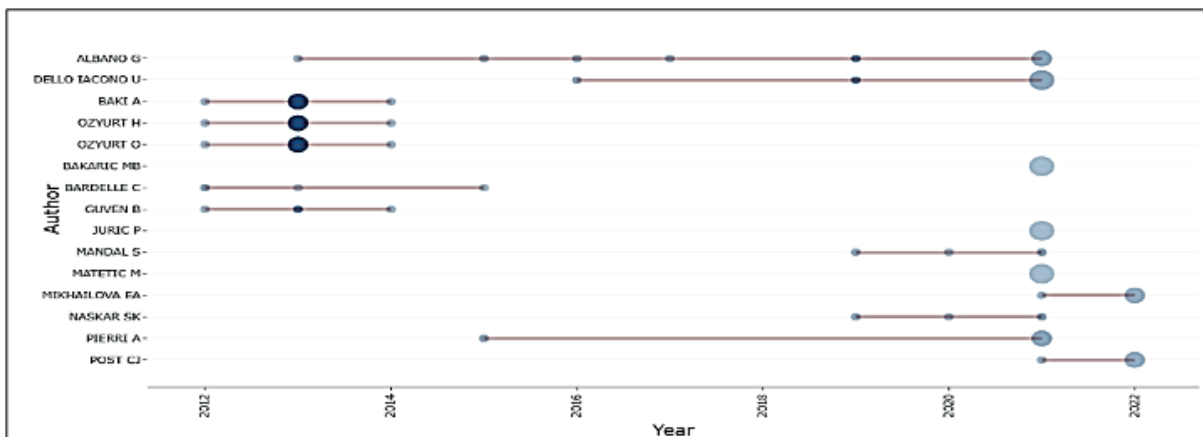


Figure 6. Authors' production over time on e-learning in ME

Figure 6 shows the authors who assumed the dominant role over time. The dominance factor is a measure that calculates author dominance by dividing the number of articles with multiple authors in which the author is the first author by the total number of articles with multiple authors (Kumar & Jan, 2014). Analyzing the figure, the dominant roles of Albano authors from 2013 to 2021, Dello Iacono from 2016 to 2021, and Pierri from 2015 to 2021 can be seen. Apart from these, some authors have assumed the dominant roles of the period. For example, Baki, Ozyurt, and Ozyurt stand out as dominant authors between 2012 and 2014. Similarly, Bardelle is the dominant author from 2012 to 2015, Guven from 2012 to 2014, Mandal from 2019 to 2021, and Mikhailova and Post from 2021 to 2022. Information about institutions that are more productive in e-learning in ME is given in the figure below.

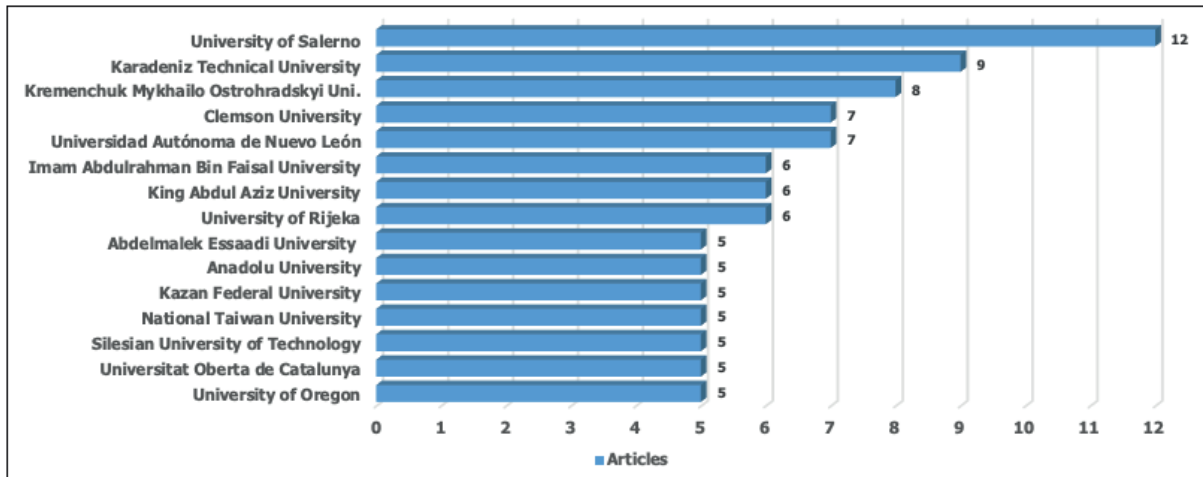


Figure 7. Most relevant affiliations over time on e-learning in ME

When Figure 7 is examined, it is seen that the most productive institution regarding e-learning in ME is the University of Salerno (12 articles). This is followed by Karadeniz Technical (9 articles), Kremenchuk Mykhailo Ostrohradskyi National (8 articles), Clemson (7 articles), Universidad Autonoma de Nuevo Leon (7 articles), Imam Abdulrahman Bin Faisal (6 articles), King Abdul Aziz (6 articles), Rijeka (6 articles), Abdelmalek Essay (5 articles), Anatolia (5 articles), Kazan Federal (5 articles), National Taiwan (5 articles), Silesian Technology (5 articles), Oberta de Catalunya (5 articles) and Oregon (5 articles) follow the universities. Below is information about the countries with the most references to e-learning in ME.



Figure 8. Most cited countries on e-learning in ME

When the tree map in Figure 8 is examined, China (n=248) is one of the most cited countries. This is followed by Turkiye (n=149), Spain (n=142), England (n=105), Italy (n=104), USA (n=102), Germany (n=72), Mexico (n=69), Korea (n=61), Indonesia (n=56), Australia (n=44), France (n=36), Poland (n=33), Finland (n=35) and India (n=31) respectively. The following section presents network analysis, trend topic, and thematic evolution information about articles published on e-learning in ME.

Network Analysis on E-Learning in Mathematics Education

This section includes network analyses of scientific studies on e-learning in ME between 2012 and 2022, trend topics, and thematic evolution. The following figure shows the co-citation analysis. Co-citation analysis is defined as the frequency of citing two studies together. This analysis technique shows the citation frequency of two different analysis units in the same study (Bagis, 2021, p. 100). In other words, it is a visualization of the frequency of citing two studies together. The network visualization of co-citation analysis is included in the context of the cited authors in the figure below.

Co-Citation Networks Analysis on E-Learning in Mathematics Education

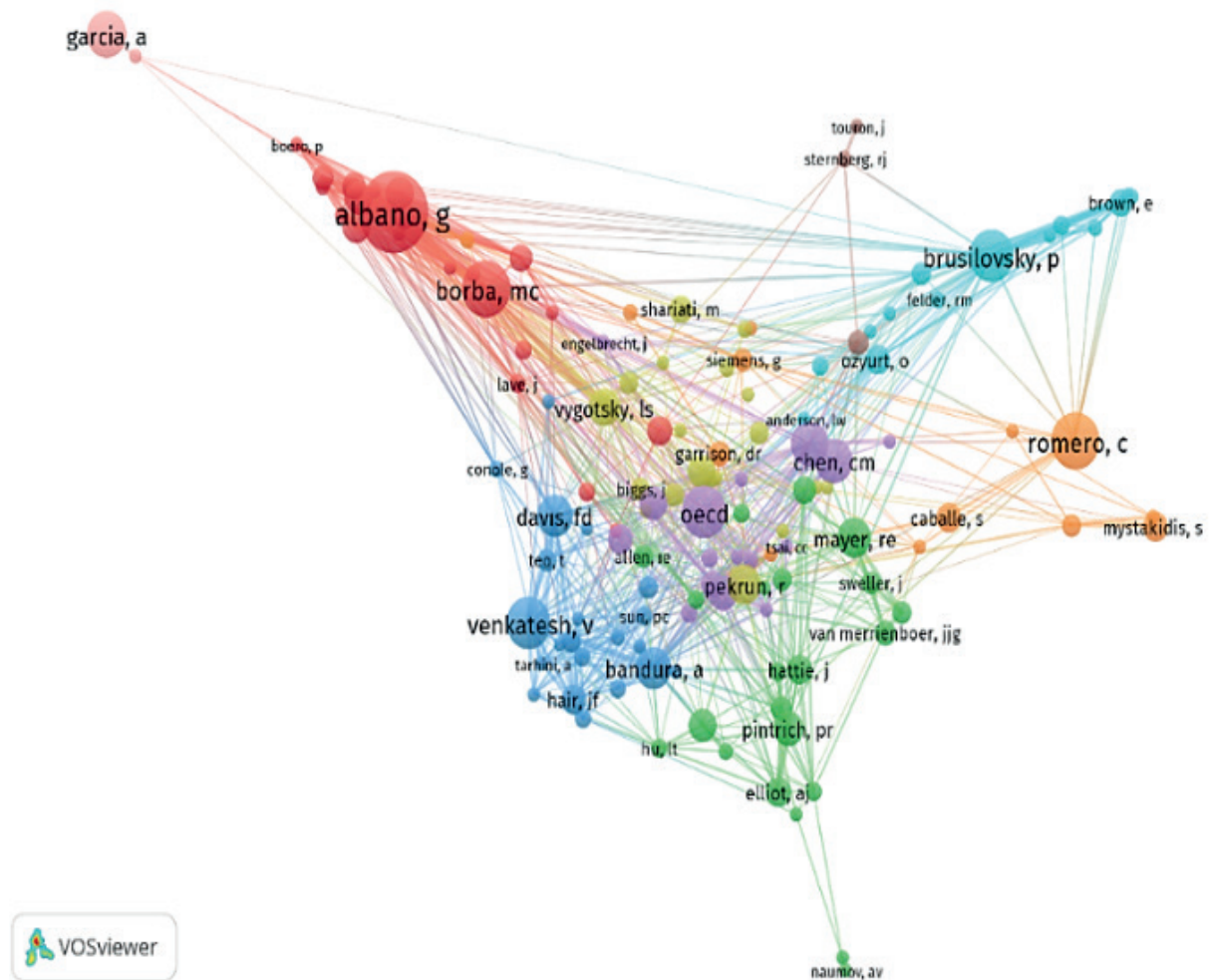


Figure 9. Co-citation network analysis in the context of authors

In Figure 9, co-citation network analysis is given in the context of the authors. In e-learning in ME, preference was made so that a quoted author should have at least five citations. According to this threshold value, the total number of authors cited for their studies in the data set in which the analysis was made is 9383, and the number of cited studies meeting the threshold value is 157. It is seen that authors with different connection strengths come to the fore depending on the colors used. The cluster in red includes authors such as Albano, Borba, Bardelle, and Duval. In this cluster, Albano [connections: 1384, total connection strength: 4524] is central. The green-colored cluster includes authors such as Mayer, Hattie, Pintrich, Elliot, and Marsh. Mayer [number of connections: 40, total connection strength: 130] is central in this cluster. The blue-colored cluster includes authors such as Venkatesh, Bandura, Davis, and Hair. Venkatesh [number of connections: 20, total connection strength: 198] is central in this cluster. The cluster turquoise includes authors such as Brown, Brusilovsky, Ozyurt, and Felder. Brusilovsky [number of connections: 34, total connection strength: 190] is centrally located in this cluster. The purple cluster includes authors and institutions such as Chen, OECD, Hwang, and Zimmerman. The OECD [number of connections: 53, total connection strength: 165] is central in this cluster. In the orange cluster, Romero [number of connections: 30, total connection strength: 82] is the central author. Co-citation network analysis is included in the context of the journals cited below.

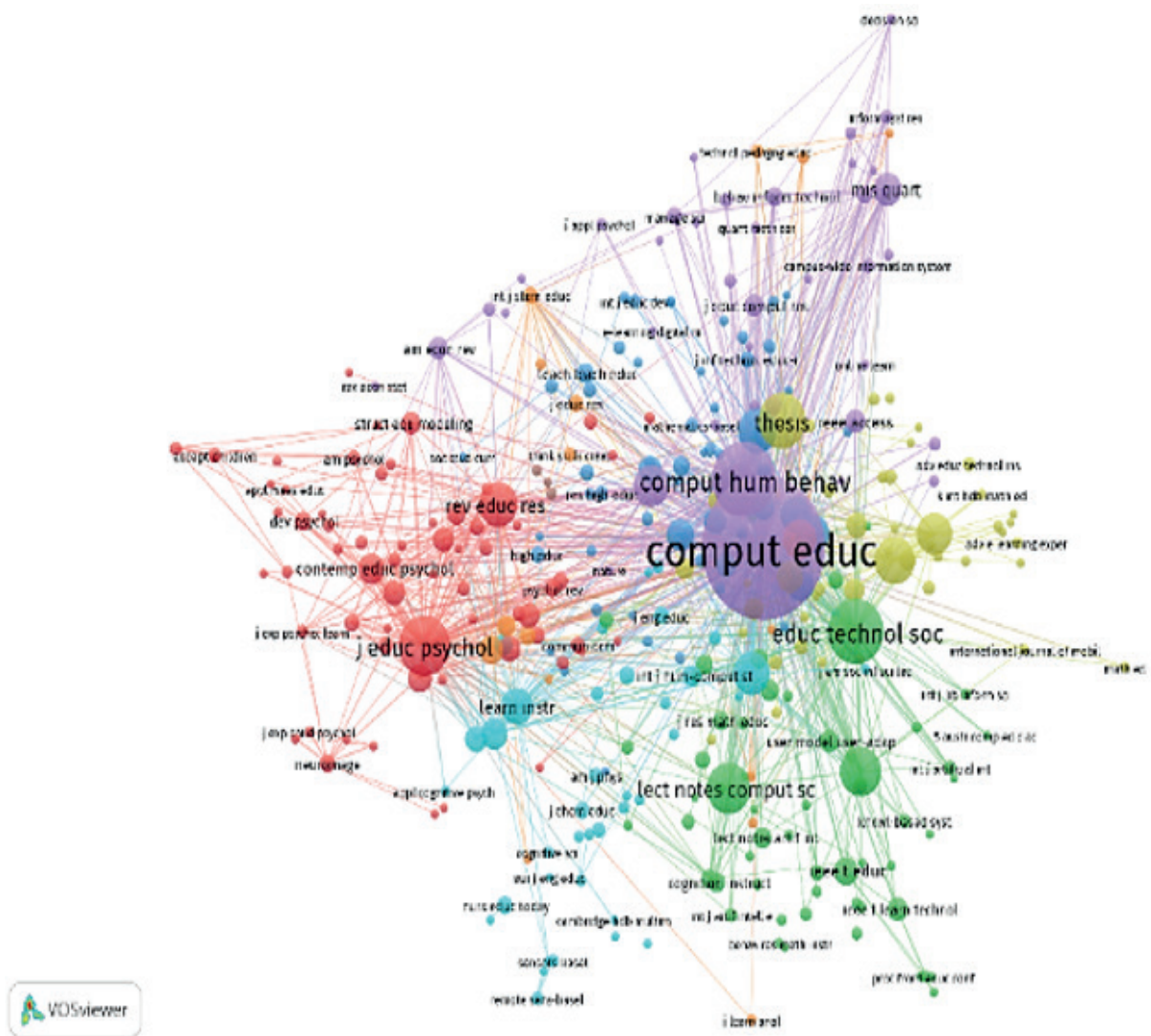


Figure 10. Co-citation network analysis in the context of journals

In Figure 10, a co-citation network analysis in the context of journals is given. In ME, preference was made so that the minimum number of citations of a cited journal on e-learning was five. According to this threshold value, the total number of documents cited in the data set in which the analysis was made is 6646, and the number of cited studies meeting the threshold value is 327. It is seen that journals with different connection strengths come to the fore depending on the colors used. Journal of Educational Psychology and Review of Educational Research stand out in the red cluster. Computers & Education and Computers in Human Behavior journals stand out in the purple cluster. ZDM Mathematics Education and Educational Studies in Mathematics journals dominate the yellow cluster. Educational Technology & Society and Expert Systems with Applications journals have stronger links in the green cluster.

Collaboration Networks Analysis on E-Learning in Mathematics Education

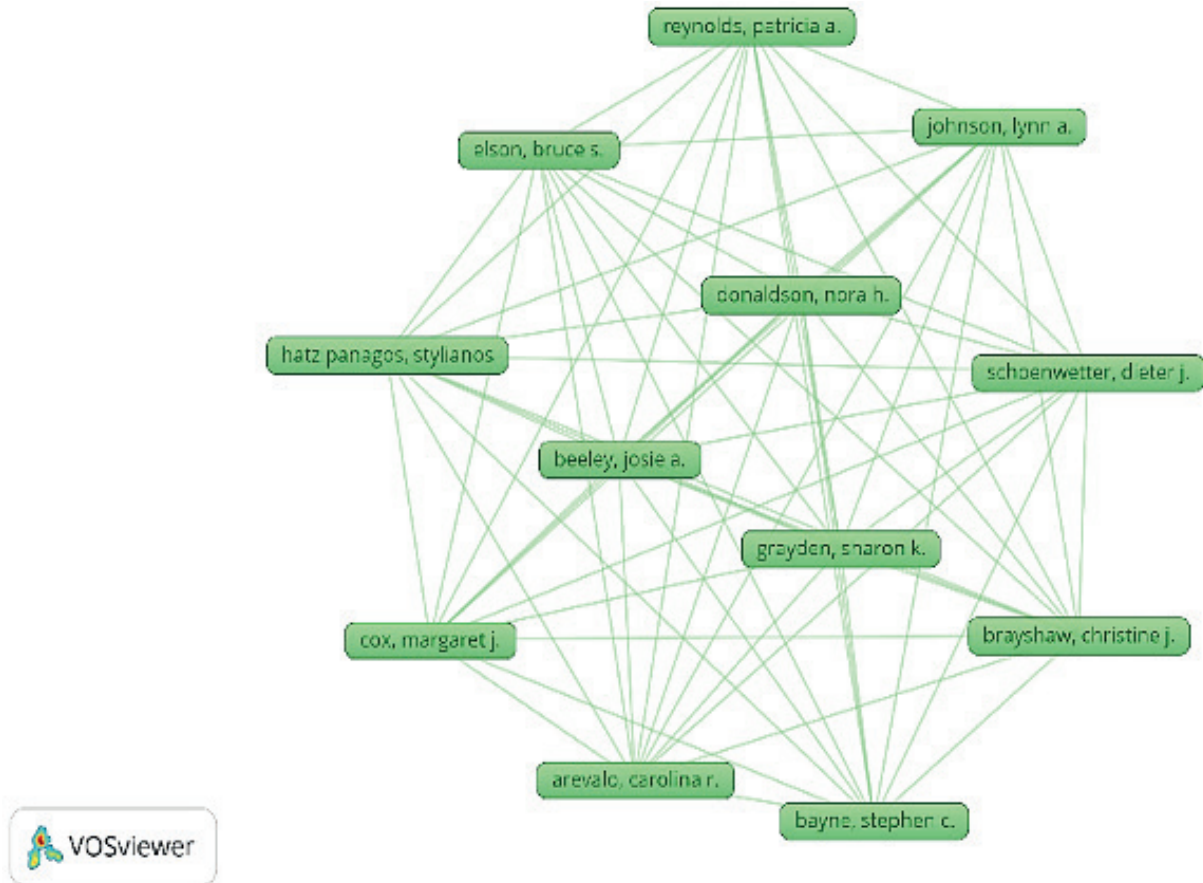


Figure 11. Co-author network analysis in the context of authorship

Figure 11 shows the co-author network analysis results in the authorship context. From the figure, the collaborations between the authors on e-learning in ME are quite limited. Accordingly, it is seen that there is a collaboration between Arevalo, C. R., Beeley, J. A., Bayne, S. C., Brayshaw, C. J., Grayden, S. K., Cox, M. J., Hatzipanagos, S., Schoenwetter, D. J., Donaldson, N. H., Elson, B. S., Johnson, I. A., and Reynolds, P. A. authors in a single cluster. Below is a co-author network analysis in the context of countries.

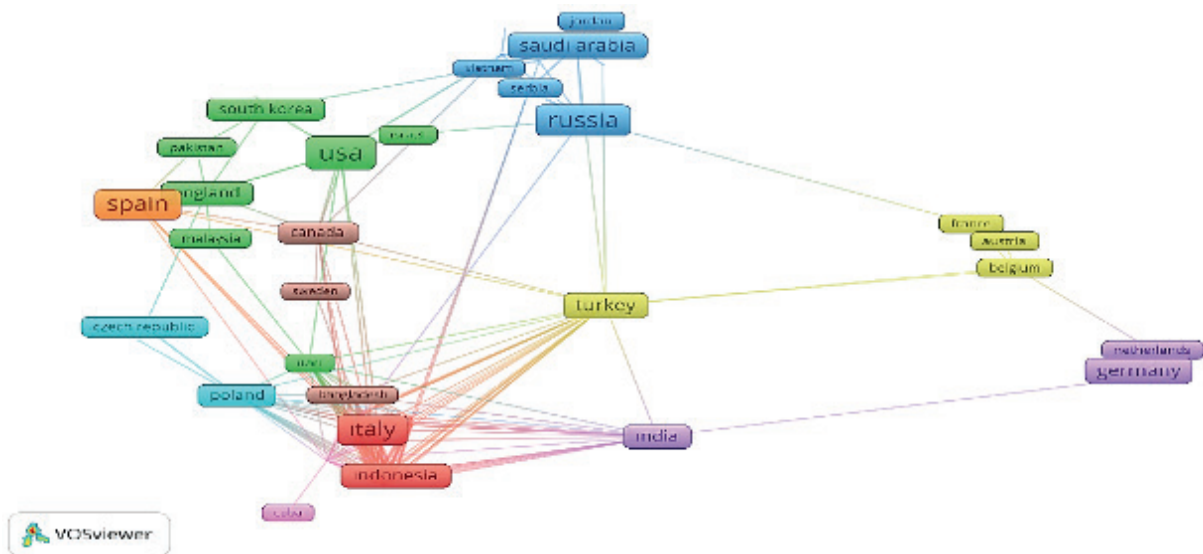


Figure 12. Co-author network analysis in the context of countries

Figure 12 shows the co-author analysis by country. According to the network analysis of 79 countries, it is seen that countries such as Italy, USA, Turkiye, Spain, Germany, and Russia are more prominent. The yellow cluster includes Turkiye, Algeria, Belgium, Peru, France, and Austria. The intensity of cooperation between countries such as the green cluster USA, Iran, England, Malaysia, Pakistan, South Korea, and Israel draws attention. The red cluster includes countries such as Italy, Indonesia, Mexico, Portugal, Romania, Slovenia, Arab Emirates, Brazil, and Chile. The purple cluster includes countries such as Germany, India, Netherlands, Norway, and Sudan. The blue cluster includes collaborations between Russia, China, Saudi Arabia, Serbia, Vietnam, Egypt, and Jordan. The turquoise cluster includes countries such as Czech Republic, Poland, and Slovakia. The world cooperation network is shown below.

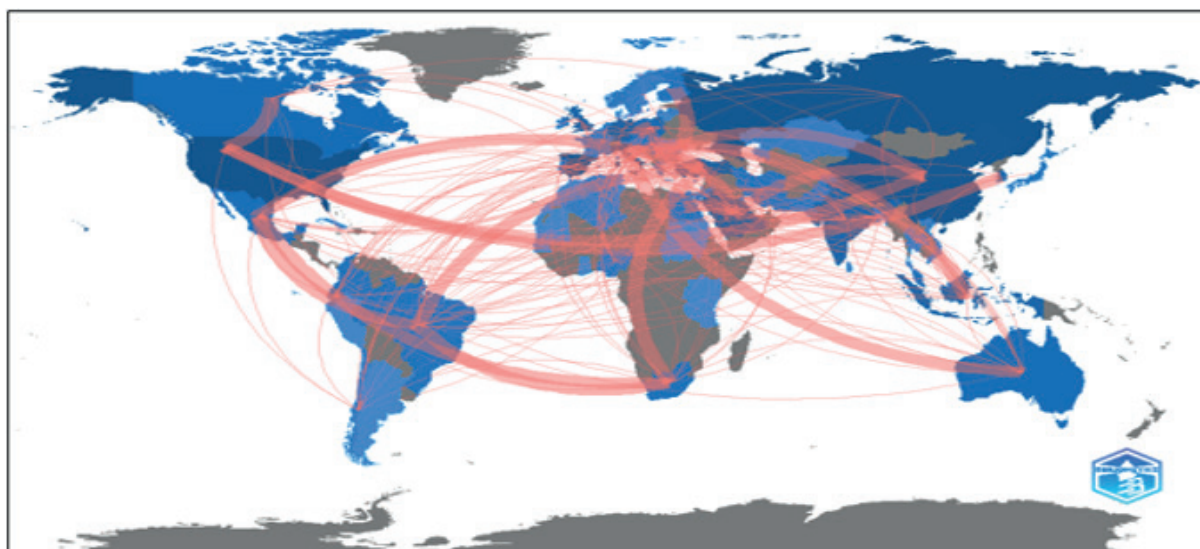


Figure 13. Authors' world collaboration network on e-learning in ME

Figure 13 shows the cooperation between countries more clearly. According to the figure, the relations between Brazil with South Africa, China with Saudi Arabia, China with Serbia, Greece with Finland, Indonesia with Hungary, Italy with Australia, Italy with Slovenia, Mexico with Brazil, Mexico with South Africa, Poland with Czech Republic, Saudi Arabia with Egypt, Saudi Arabia with Serbia, Turkey with Brazil, Turkey with Mexico, Turkey with South Africa, USA with Canada, USA with China and USA with Korea are noteworthy. There is a certain level of partnership between these countries, although not at an intense level.

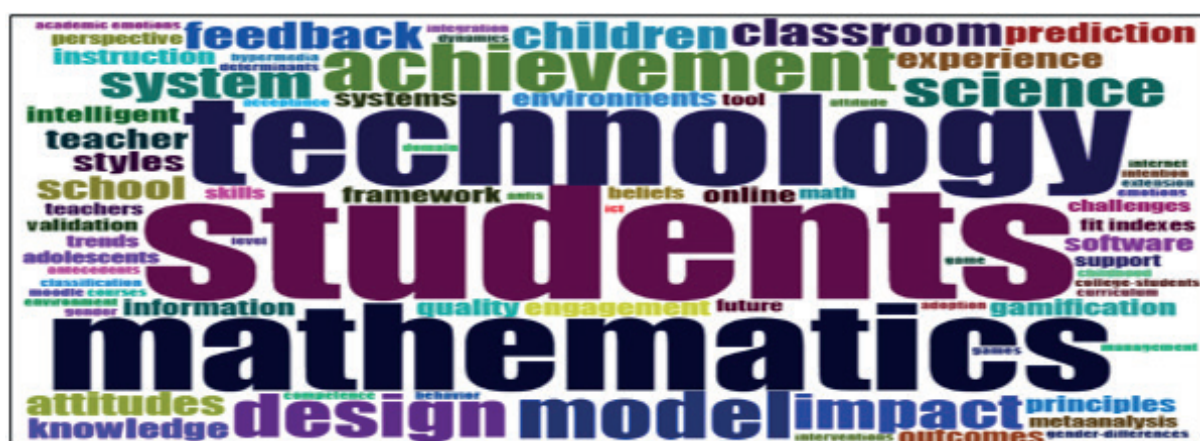


Figure 14. Word cloud for e-learning in ME

Figure 14 shows the keywords plus involved in studies on e-learning in ME. According to the figure, it is seen that the frequently preferred keywords are “students”, “technology”, “mathematics”, “education”, “performance”, “achievement”, “model”, “design”, “impact”, “motivation” and “science”. The co-word network analysis was examined to determine better how often the keywords are used in the same document. In this context, the co-occurrence of the keywords created by the authors was examined. In this way, in the following figure, the co-word network analysis, in other words, the occurrences between the keywords, are shown.

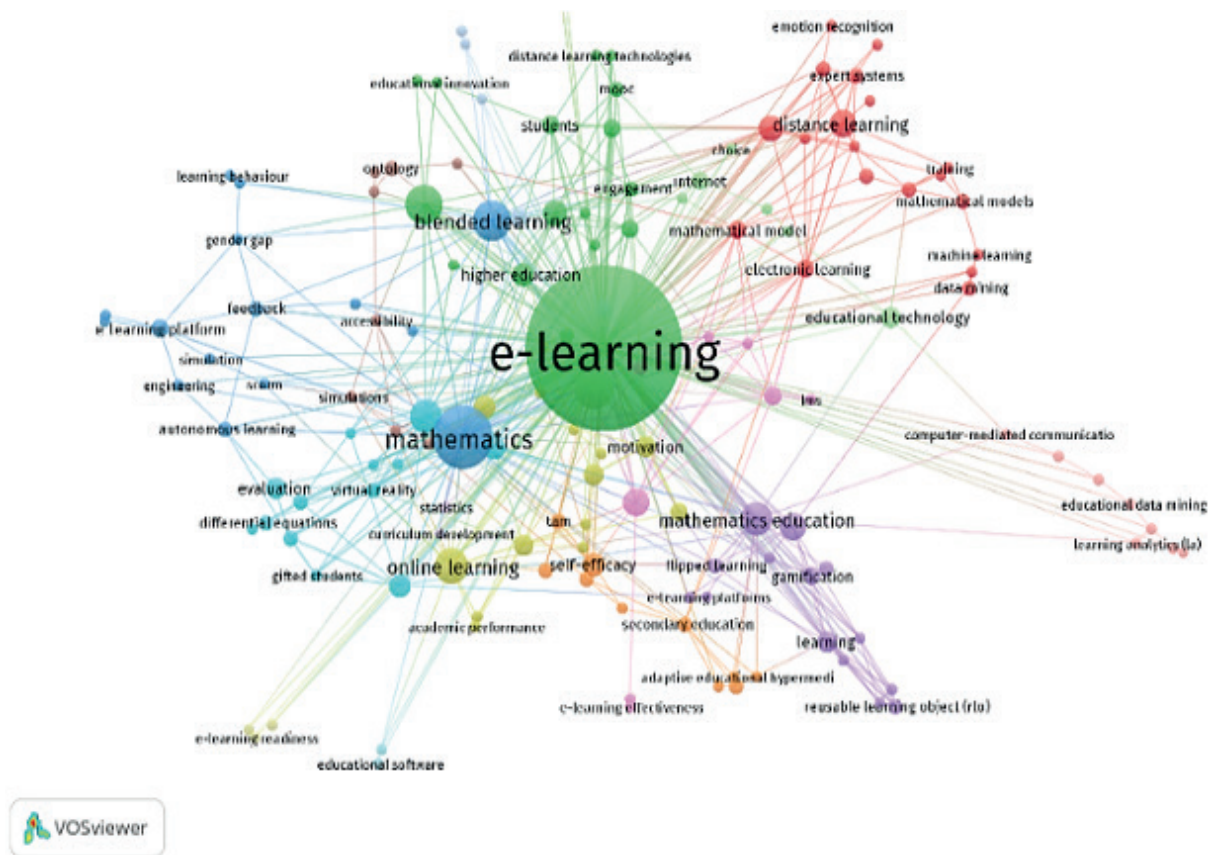


Figure 15. Co-word network analysis in the context of author keywords

In Figure 15, co-word network analysis is given in the context of author keywords. Studies on e-learning in ME were preferred, so the number of citations was at least two. According to this threshold value, the total number of documents cited from the studies in the data set in which the analysis was made is 1217, and the number of cited studies meeting the threshold value is 149. When the figure is examined, the words “e-learning”, “mathematics”, “mathematics education”, “online learning”, “blended learning”, “educational technology”, “distance learning”, “evaluation” and “higher education” come to the fore more dominantly. In the figure below, in the three-domain diagram, also known as the Sankey diagram, the links to each other as keywords (left), authors (middle), and institutions (right) are discussed to contextualize the flow trend of scientific studies on e-learning in ME.

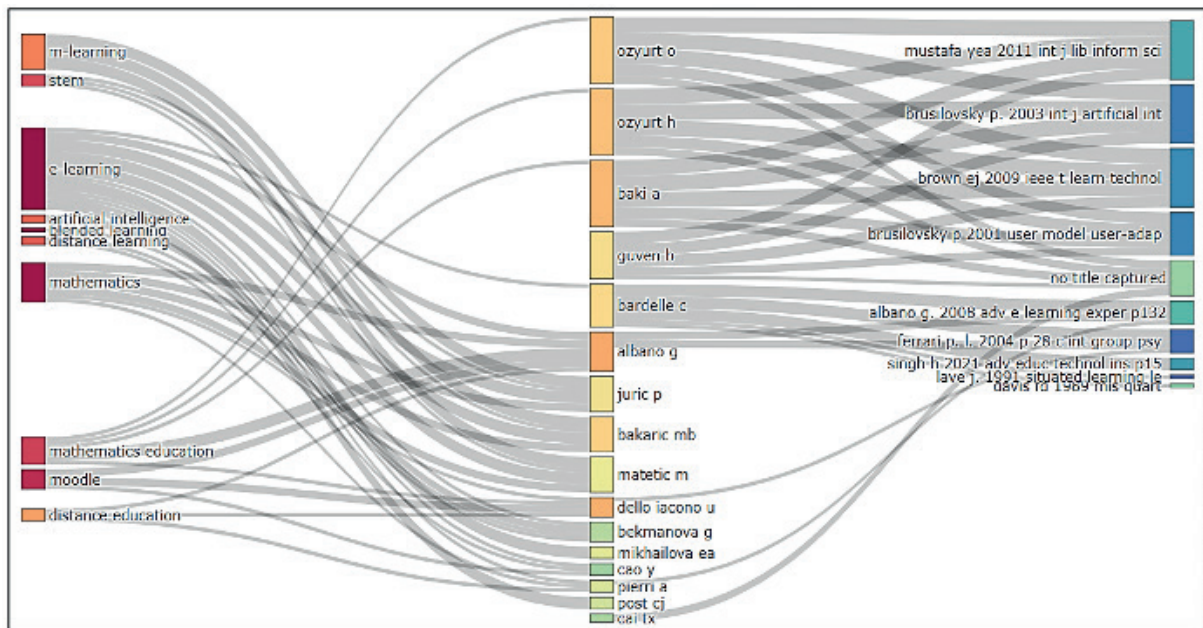


Figure 16. E-learning in ME Sankey Plot (keyword- author-affiliation)

When Figure 16 is examined, the boxes' size is proportional to the number of links (keyword, author, or institution). According to the figure, it is seen that the margin widths of the keywords “e-learning”, “mathematics”, “mathematics education”, “m-learning” and “moodle” are larger than the other keywords. The large margins show that many authors use keywords in their publications. On the other hand, it is noteworthy that the authors of Ozyurt, O., Ozyurt, H., Baki, A., Guven, B., Albano, G., Juric, P. and Bakaric, M. B. are used in a wide list. It can be said that a comprehensive keyword list reflecting the diversity of the studies is used based on the interaction between institutions, keywords, and authors.

Trending Topics and Thematic Evolution on E-Learning in Mathematics Education

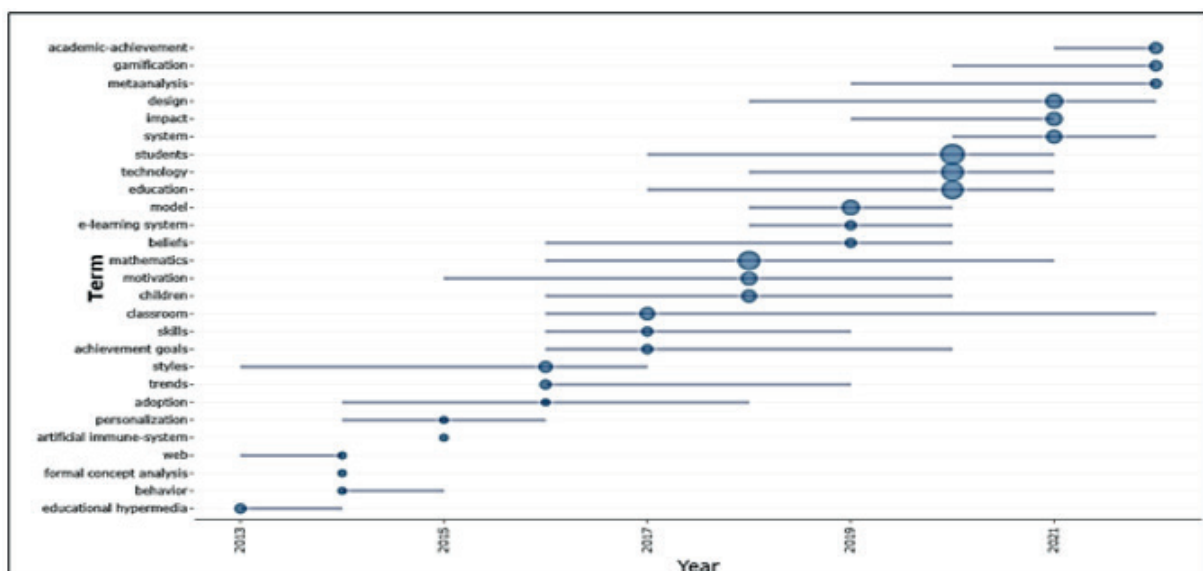


Figure 17. E-learning in ME trending topics map (keywords plus)

Figure 17 contains trending keywords in e-learning in ME. Keywords are one of the essential steps that reflect the content of research. According to the trend topic map, “students” and “education” (2017-2021),

“technology” (2018-2021), “mathematics” (2016-2021), “model” (2018-2020), “design” (2018-2022), “motivation” (2015-2020) and “impact” (2019-2021) keywords seem to be more preferred. In addition, the keywords “system” (2020-2022), “classroom” (2016-2022), “children” (2016-2020), “styles” (2013-2017), “academic achievement” (2021-2022) is also frequently preferred. Keywords from the study offer clues over the years and in identifying trends. The explosion or increase in keywords in scientific studies is a leading indicator of study potential (Qian et al., 2019). It helps researchers to see the changes in the study content. It also offers valuable opportunities and ideas for work to be done in a similar direction. The trend topic map determined according to e-learning topics in ME is shown below.

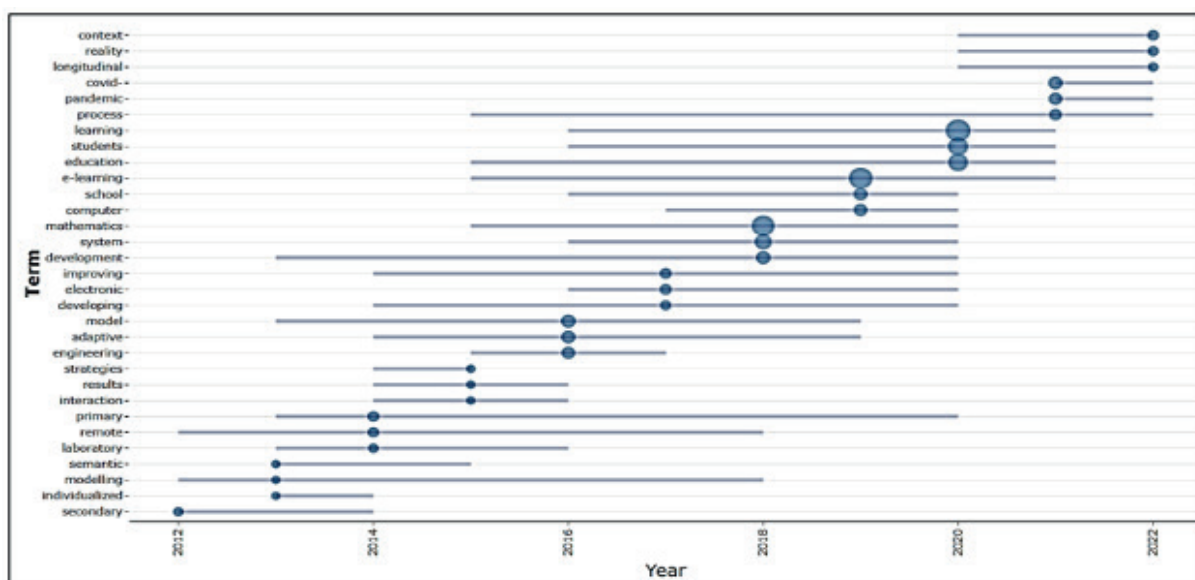


Figure 18. E-learning in ME trending topics map (titles)

Figure 18 includes trending article titles on e-learning in ME. According to the trend topic map, “learning” and “students” (2016-2021), “e-learning” and “education” (2015-2021), “mathematics” (2015-2020), “system”, “school”, “children” and “electronic” (2016-2020), “model” (2013-2019), “development” and “primary” (2013-2020), “adaptive” (2014-2019), “covid”, “pandemic” and “academic achievement” (2021-2022) article titles are mostly preferred. In addition, “engineering” (2015-2017), “computer” (2017-2020), “styles” (2013-2017), “process” (2015-2022), and “improving” (2014-2020) articles titles are also available is often preferred. Such topics can be considered trending topics/hotspots in scholarly publications on e-learning in ME because trending topics often represent hotspots or emerging themes in a particular research area (Chen et al., 2021a; Mostafa, 2020). The thematic change over the years is shown below.

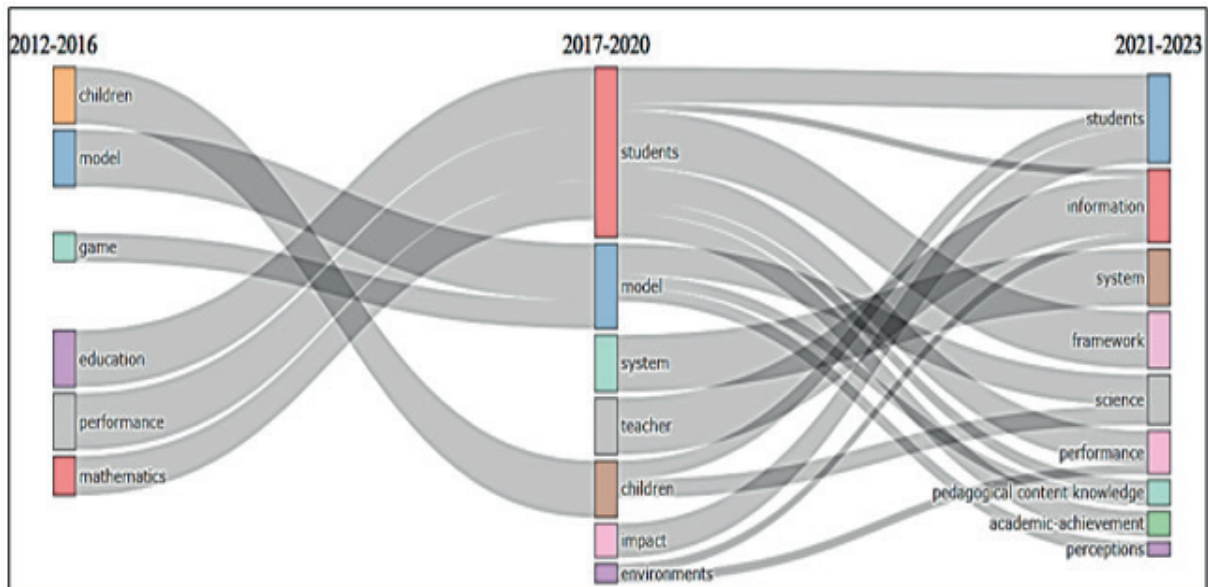


Figure 19. Thematic evolution indicator on e-learning in ME by years

Figure 19 shows the thematic changes in e-learning in ME over intermittent years. According to the figure, the keywords “children”, “model”, “game”, “education”, “performance” and “mathematics” stand out between 2012 and 2016. According to the size of the boxes, the keywords “students”, “model”, “system”, “teacher”, “children”, “impact and “environments” are more dominant between 2017 and 2020, respectively. The keywords “students”, “information”, “system”, “framework”, “science”, “performance”, “pedagogical content knowledge”, “academic achievement” and “perceptions” come to the fore according to the size of the boxes between 2021-2023 years, which is the closest time period to today.

Conceptual Structure and Thematic Maps on E-Learning in Mathematics Education

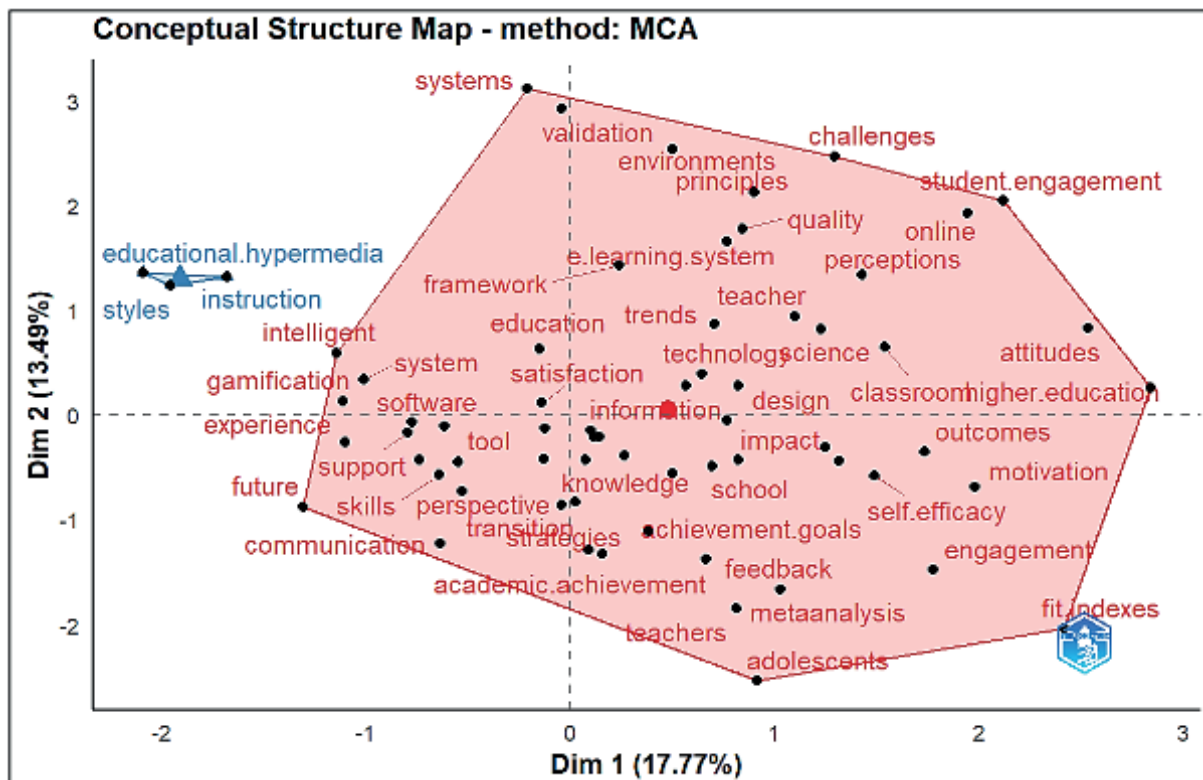


Figure 20. E-learning in ME conceptual structure map (MCA method)

In Figure 20, the MCA was run on the keywords presented by the authors on e-learning in ME. This resulting map reveals the conceptual structure of e-learning in ME between 2012 and 2022. According to the graph, the best size reduction obtained for the first two dimensions of the MCA accounts for approximately 31% of the total variability. The closer the points are to each other in this graph, the more similar the profile they represent, with each cluster of points representing distinctive profiles (Mostafa, 2020; Wong et al., 2021). In the graph, the depth of the red-colored structure is greater than the blue-colored structure. For example, the red-colored cluster “information”, “e-learning”, “knowledge”, “design”, “school”, “technology”, “self-efficacy”, “achievement”, “education” and “outcomes” highlight keywords that highlight methods. The blue-colored cluster contains keywords such as “educational”, “styles”, “hypermedia” and “instruction”. The thematic/strategic map is given below.

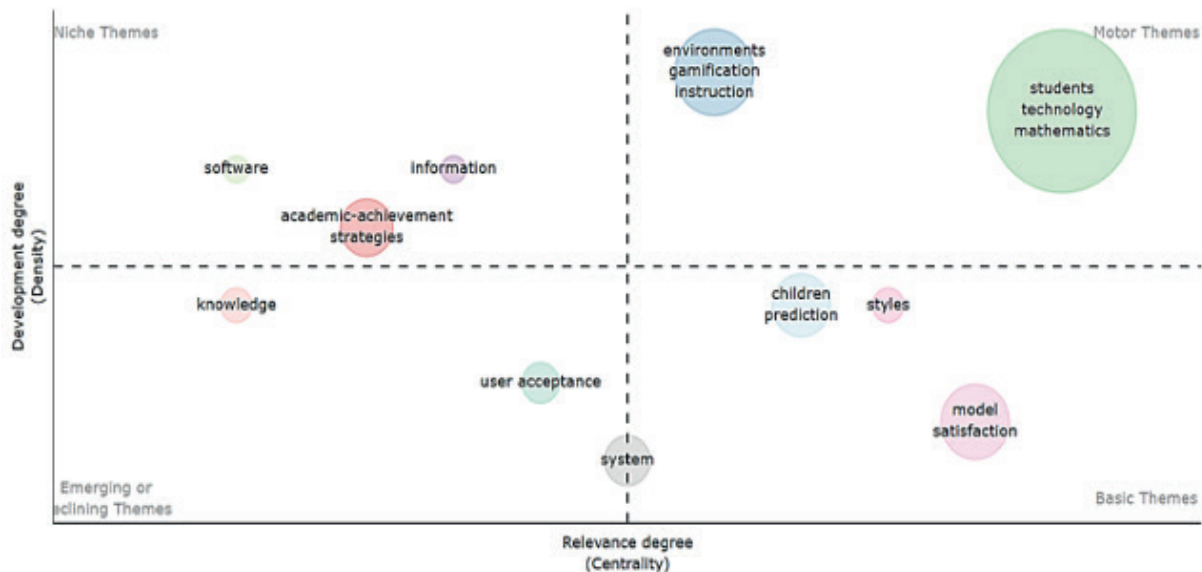


Figure 21. E-learning in ME thematic map

Figure 21 shows the thematic/strategic map of e-learning in ME according to keywords plus. Walktrap is used as a clustering algorithm in thematic/strategic mapping. The minimum cluster frequency (per thousand docs) value of twelve was chosen to reduce cluster contiguity. The map in the chart is represented by a dotted line dividing it into four quadrants. Both axes represent mean values. Each dial in this chart represents a different theme. Bubble size is determined in proportion to the frequency of studies using keywords. The first quarter of the chart (motor themes) is well developed both internally and externally as it is formed with high density and centrality (Cobo et al., 2011). (Cobo et al., 2011). These themes, which include e-learning in ME are “students”, “technology”, “mathematics”, “environments”, “gamification” and “instruction”. These themes are current themes and point to current trends. On the other hand, the second quarter is known as Niche themes, which are very developed and isolated. This theme exhibits a high density and low centrality structure. The content of this much is based on the fact that while it is well developed internally, it is of little importance externally. Niche themes, including e-learning in ME are “academic-achievement”, “strategies”, “information” and “software”. The themes in the third quarter include low density and low centrality. Weak ties at the inner and outer levels characterize the themes in this quadrant. Such themes indicate potential hotspots in research on interactive learning environments. Examples of these themes are “knowledge” and “user acceptance”. Finally, the core and cross themes quarter (low density-high centrality) includes poorly developed themes in terms of interconnections. However, they are characterized by significant external bonds. These simple themes that include e-learning in ME include are “model”, “satisfaction”, “styles”, “children” and “prediction”.

DISCUSSIONS AND CONCLUSION

This study tried to determine the comprehensive view of the scientific articles published on e-learning in ME between 2012 and 2022. In this context, 341 scientific articles were accessed from the WoS™ Core Collection database, and bibliometric analysis was performed. First, scientific articles related to the study subject were examined according to their years and citation counts. According to the findings, scientific studies on e-learning in ME have entered an increasing trend since 2018. Although there has been a decrease in the number of studies published in 2022, this situation is closely related to the emerging global epidemic. It was determined that there is a continuous increase in the number of citations on this subject. It is noteworthy that there has been a significant increase in the number of citations due to the increase in the number of studies. Accordingly, the popularity of e-learning in ME has increased, especially in recent years. The number of citations made in the last two years is relatively high. This situation, which has emerged both in the number of publications and citations, shows that e-learning in ME is becoming an essential field of study with increased visibility. Considering that approximately 45% of the world's population has access to the internet, technological terms such as mobility, online courses, touch technology, and massive open online courses (MOOCs) are now frequently used by mathematics educators (Borba et al., 2016). Therefore, it is inevitable that studies with digital technology content will increase day by day, and intensive studies should be carried out in this direction. In a similar study conducted by Hung (2012), it was determined that the number of studies on e-learning between the years 2000-2008 increased compared to the previous years. The findings of the study by Djeki (2022) also indicate that studies on e-learning are increasing. However, there has been a significant increase in e-learning in ME, especially in recent years, as in other disciplines, the development of e-learning needs studies.

When the articles based on the WoS database are examined, Albano, G., Dello Iacono, U., Baki, A., Ozyurt, H., Ozyurt, O., Bakaric, M. B., Bardelle, C., Guven, B. and Juric, P. authors stand out. Looking at the general working profiles of these authors, it is seen that they have qualified publications on e-learning in ME. According to WoS author information, the universities of Salerno (Italy), Karadeniz Technical (Turkiye), Rijeka (Croatia), and Milan (Italy) come to the fore when looking at the institutions where these authors work. These pioneering authors' works occupy an important place in the field and contain valuable information in guiding the field. The article "developing an assessment-centered e-learning system for improving student learning effectiveness" published by Wang in *Computers & Education* journal in 2014, has been the most cited work. In the study, the teaching of the speed unit within the scope of the math course was considered. In the study conducted with sixth-grade students, four learning environments were created according to the e-teaching model. Personalized e-learning is significantly more effective in facilitating learning achievement and improving misconceptions, especially for students with low prior knowledge. In another study by Borba et al. (2016), it was the most cited publication. In the study, it was tried to determine what the latest developments in digital technology research in the field of ME are. In ME, "blended learning", "e-learning" and "mobile learning" constitute the main research topics of the study. In the study, the effects of digital technologies on ME practice were discussed, and some suggestions were made for future research. Another study conducted by Ozyurt et al. (2013) aimed to learn and teach permutation-combination-binomial expansion and probability at the secondary school level by designing an intelligent web-based e-learning system called UZWEBMAT. Another most cited study was done in 2016 by Fabian et al. In the study, research findings related to mobile mathematics technologies were synthesized. Within the scope of the study, the effects of mobile use on student perceptions, attitudes, achievements, and commitment were investigated. It was determined that student attitudes toward mobile use are primarily favorable. It was determined that the interaction and participation of students with other students increased in general. In terms of success, it was determined that there was an effect size of .48. Among the common features of the most cited studies is that they contain content about how e-learning can be in ME at a time when the subject is just beginning to take shape. In this respect, these studies have gained an important place in the field and have guided researchers in e-learning. Notably, the posts about its practical use in ME have been met by other researchers. It is seen that there is an increasing trend in the number of studies on the use and effectiveness of digital technologies in ME in recent years (Chen et al., 2021b; Djeki et al., 2022; Hung, 2012).

When the countries of the responsible authors in the studies were examined, it was determined that the countries of China, USA, Russia, Spain, and Italy came to the fore more. It is noteworthy that the study's responsible authors are usually single-country authors. On the other hand, there are no authors from other countries among the corresponding authors in Ukraine and Bulgaria. When the prolific authors' findings were examined yearly, it was determined that the authors named Albano, G. between 2013 and 2021, Dello Iacono, U. between 2016 and 2021, and Pierri, A. between 2015 and 2021 were the dominant authors. Apart from this, it was determined that there are also dominant periodical authors. For example, authors Baki, A., Ozyurt, H., Ozyurt O, and Guven, B. acted as dominant authors between 2014 and 2021. Similarly, between 2019 and 2021, Mandal S. impacted this field. The most productive institution in e-learning in ME has been the University of Salerno (Italy). This institution is followed by Karadeniz Teknik (Turkiye), Kremenchuk Mykhailo Ostrohradskyi (Ukraine), Clemson (South Carolina), Universidad Autonoma de Nuevo Leon (Mexico), and Imam Abdulrahman bin Faisal (Saudi Arabia). The most important reason for these institutions to come to the fore is that most of the authors who publish scientific studies on e-learning in ME work in these institutions. Although this finding is an expected result, it can be said that the authors put the institutions they work into the fore. When the findings of the most cited countries were examined, it was determined that China, Turkiye, Spain, England, USA, and Germany were more active in this field. Similar findings were obtained in studies conducted in previous years. For example, Djeki et al. (2022), USA, Spain, England, and China were determined as the most productive countries. Tibana-Herrera et al. (2018), USA comes to the forefront as a productive country. According to Chen et al. (2021b), China was the most productive country based on the Scopus database. In another study by Hung (2012), England, USA, Taiwan, and China were determined as the most productive countries. Therefore, it is seen that the countries that were productive in the past on the e-learning approach still have a say today. Similarly, the countries of the responsible authors are more prominent in e-learning, and these authors place their countries at the top of e-learning.

Another finding from the study was from co-citation analysis in the context of authors. It is stated that specific authors are in the central position when a cited author's minimum number of citations is selected as five. Authors Albano, Borba, Bardelle, Romero, Brusilovsky, Venkatesh, Chen, and Brown are prominent authors in the co-citation analysis. In particular, the connection knots of Albano, Borba, and Brusilovsky authors with other authors are thick and frequent. These authors united and discussed the axis of a common subject. Another finding from the study was from co-citation analysis in the context of authors. It is stated that specific authors are in the central position when a cited author's minimum number of citations is selected as five. Authors Albano, Borba, Bardelle, Romero, Brusilovsky, Venkatesh, Chen, and Brown are prominent authors in the co-citation analysis. In particular, the connection knots of Albano, Borba, and Brusilovsky authors with other authors are thick and frequent. These authors united and discussed the axis of a common subject. These similarities that emerge in bibliometric analyses indicate intradisciplinary or thematic similarity (Jiang et al., 2019). Authors central to the cluster on e-learning in ME tend to influence other communities. In addition, these authors significantly impact other researchers as they control and promote content related to the study topic (Mostafa, 2020). Therefore, these authors are considered influential authors with the subject of study. In the context of journals, *Computers & Education* and *Computers in Human Behavior* journals come to the fore in co-citation network analysis. These journals are pioneer journals, and the subject of study has strong links. At the same time, these journals contain many studies with the subject of study. The fact that these journals focus on technology and technological tools is among the first references in studies conducted similarly. Journals that are pioneers on the subject of the study have gained a significant position both in getting more citations and in determining the trends in the relevant field.

On the other hand, one of the remarkable features of these journals is that most of the authors working in this field have publications in these journals. One of the remarkable findings of the study was obtained from co-author network analysis in the context of authorship. Accordingly, it was determined that the cooperation between the authors remained at a limited level. In the co-author network analysis in the context of countries, it was determined that there were connections between 79 countries, such as Italy, USA, Turkiye, Spain, Germany, and Russia. It was determined that cooperation between countries remains limited in terms of

the number of connections and the power of the connection nodes. In the analysis made according to the geographical atlas, it was determined that although cooperation exists between countries such as USA, China, Turkiye, Australia, Brazil, and Mexico, this is at a limited level. According to Djeki et al. (2022), in the study covering the years 2015-2020, it was determined that while the journals *Computers in Human Behavior*, *Computers & Education*, and *International Journal of Emerging Technologies in Learning* came to the fore, similar journals are still at the forefront in ME today. Especially on the subject of common, *Computers & Education* and *Computers in Human Behavior* journals have been the journals in which more studies in this field have been published. The studies in these journals make significant contributions to the field and pioneer innovative approaches/approaches in e-learning.

The study's other finding was obtained from word cloud analysis reflecting the contents of e-learning in ME. According to the findings, the keywords "technology", "students" and "mathematics" stand out. Keywords are one of the essential building blocks of a study. Due to their abstract nature, they provide valuable clues in obtaining a general idea about the study (Chen et al., 2021a). The co-occurrence network of keywords was also examined to determine how often keywords coexist in the same document in e-learning in ME. According to the findings, it was determined that the words "e-learning", "mathematics", "mathematics education", "online learning", "blended learning", "educational technology", "distance learning", "evaluation" and "higher education" are frequently preferred. It was determined that these keywords are located in the center of the clusters they are in, and in other words, they act as core words. The margin widths of the keywords "e-learning", "mathematics" and "mathematics education" were found to be larger than the other keywords in the Sankey three-stage diagram. Similarly, in a similar study by Goksu (2021), topics such as augmented reality, higher education, and smartphone-oriented mobile learning were preferred. Technology-oriented keywords and topics are essential information in reflecting the content of the e-learning topic. Therefore, it plays a critical role in spreading the e-learning approach to wider audiences and attracting more attention from researchers. While the concepts of systems and models, teaching and learning strategies, and factors and case studies have come to the fore in studies on e-learning in the past years, it is seen that more technical concepts are preferred in new studies (Hung, 2012). Therefore, as technology advances, changes in the content of the studies are inevitable. The diversity of technological tools affects researchers, which is felt in the studies.

When the findings about trend keywords and titles in e-learning in ME are examined, it was determined that certain keywords are dominant in specific years. It was determined that current research words such as "academic-achievement", "gamification", "meta-analysis", "design", "impact" and "system" are preferred more frequently, especially as we approach the present day. According to these changes, there is a transformation from formal, conceptual structures to a technology and skill-oriented phase. When we look at the thematic changes in e-learning after 2021, there is a shift towards skill-based approaches such as performance, pedagogical content knowledge, information, and perception. The evolution towards a more student-centered understanding of e-learning draws attention. In the past years, as the e-learning approach, which is game and model-centered, approaches today, information, system, and framework-oriented structures have dominated. A better understanding of how students learn mathematics, combined with the practical application of e-learning, can improve meaningful mathematics learning and make the subject more exciting (Ahn & Edwin, 2018). In addition, studies show that the use of the e-learning method in mathematics teaching has positive effects on students' motivation, autonomy, participation, and understanding of mathematical concepts (Moreno-Guerrero et al., 2020). When the conceptual structure related to e-learning in ME was examined, it was determined that two clusters were formed between 2012 and 2022. The best size reduction achieved for these two dimensions accounted for approximately 31% of the total variability. Key highlighting different learning methods, especially "information", "e-learning", "knowledge", "school", "technology", "self-efficacy", "design", "achievement", "education" and "outcomes" it was determined that the words were frequently included in the studies. Looking at the thematic map of e-learning in ME, the concepts of "students", "technology", "mathematics", "environments", "gamification"

and “instruction” indicate current trends. Therefore, these themes are both internally and externally well-developed and trending themes. These structures, also known as motor themes, show how the field of study has changed, and the subject of many studies today has developed in this direction (Cobo et al., 2011). As the benefits of e-learning, whose popularity is increasing day by day, are understood, it is seen that the studies in this field continue without slowing down. Although e-learning is an approach intertwined with technology, it has a structure immediately affected by the change in technology. So much so that the changes in technology make themselves felt immediately in the e-learning environment (Wang, 2014). Therefore, conducting more studies on e-learning in mathematics teaching is essential. In order to prepare for the future with a more prepared and equipped education approach, we need technology and education together more than ever (European Commission/EACEA/Eurydice, 2019; NCTM, 2016; OECD, 2019). In this context, it is necessary to increase technological diversity by giving more weight to technology-based studies in mathematics, as in other fields.

Recommendations and Further Research

Within the scope of the study, the subject of e-learning in ME was taken as the basis. In studies to be carried out in a similar direction, all types of digital content can be addressed. In addition, research on e-learning environments can be conducted not only for the discipline of mathematics but also for many other disciplines. WoS database was used to select scientific articles published on e-learning in ME. In order to reach more data sets in similar studies, Scopus, Eric, Ulakbim, Ebsco etc. databases can also be used. In addition, changes can be made in the search criteria in similar studies to be carried out. BKCI-SSH, BKCI-S, SSCI, SSCI Expanded, ESCI, A&HCI, and CPCI-S indexes were preferred in the study. By making changes in WoS categories, only SSCI, A&HCI, or SSCI-Expanded can be preferred. Only articles were chosen in the study as the document type. All documents (proceeding paper, book chapters, early access, review article, meeting abstract, editorial material etc.) can be selected for similar studies. In addition, changes in language and WoS category selections can narrow or expand the scope of work on structures. In this way, the study’s findings can be considered and discussed with a larger-scale set. Future studies may continue to analyze published research articles on e-learning in ME after 2023. This way, changes in e-learning can be better monitored over the years. Finally, comprehensive analyses can be carried out with the help of content analyses, not only bibliometric analyses, at the point of the dynamic changes that occur over time in e-learning. This study discusses scientific productivity, network analysis, conceptual structures, thematic maps, and trends. Therefore, a more in-depth process can be followed with the help of systematic or descriptive analysis.

Limitations

The study has some limitations as well as many contributions to be made to the studies on e-learning. Among the most critical limitations of the study is that only the WoS database is preferred for accessing articles published on e-learning in ME. Another limitation of the study is that the scientific articles included in the study have e-learning content. Other digital competencies should have been included in the study. In addition, articles were selected as the document type in the study. The study did not include other document types such as early access, review article, proceeding paper, book review, and editorial material. Therefore, the contents of document types may differ.

BIODATA and CONTACT ADDRESSES of AUTHORS



Dr. Deniz KAYA is an Associate Professor at the Faculty of Education, Nevsehir Haci Bektas Veli University. He received his Master and PhD degrees in Mathematics Education from Dokuz Eylul University, 2007 and 2015. He has articles published in international and national journals, and papers presented to international and national meetings. His academic interests include mathematical connection, visualizing the concepts images, computational thinking, algebraic reasoning, educational technology, flipped learning, and mathematical modelling in mathematics education.

Deniz KAYA

Department of Mathematics Education, Faculty of Education

Address: Nevsehir Haci Bektas Veli University, 50300, Merkez/Nevsehir, Turkiye

Phone: +90 3842281000/21097

E-mail: denizkaya@nevsehir.edu.tr



Dr. Tamer KUTLUCA is a Professor in the Department of Mathematics Education. He is still working at Diyarbakir Dicle University Ziya Gokalp Education Faculty in Turkiye. He has articles published in international and national journals, papers presented to international and national meetings. He was served various projects as executive and researcher. His academic interest areas are mathematics education, computer assisted education, learning environment, information and communication technologies integration, instructional design. He is the editor-in-chief in two international journals (JCER and IEJES) and in addition to be editorial board in several international journals.

Tamer KUTLUCA

Department of Mathematics Education, Faculty of Education

Address: Dicle University, 21280, Sur/Diyarbakir, Turkiye

Phone: +90 4122411001/8881

E-mail: tkutluca@dicle.edu.tr

REFERENCES

- Ahn, J., & Edwin, A. (2018). An e-learning model for teaching mathematics on an open-source learning platform. *International Review of Research in Open and Distributed Learning*, 19(5), 255-267. <https://doi.org/10.19173/irrodl.v19i5.3733>
- Aktoprak, A., & Hursen, C. (2022). A bibliometric and content analysis of critical thinking in primary education. *Thinking Skills and Creativity*, 44, 1-22. <https://doi.org/10.1016/j.tsc.2022.101029>
- Albano, G. (2012). Mathematics education: Teaching and learning opportunities in blended learning. In A. Juan, M. Huertas, S. Trenholm, & C. Steegmann (Eds.), *Teaching mathematics online: Emergent technologies and methodologies*, (pp. 60-89). Hershey, New York: Information Science Reference. <https://doi.org/10.4018/978-1-60960-875-0.ch004>
- Allen, M., Mabry, E., Mattrey, M., Bourhis, J., Titsworth, S., & Burrell, N. (2004). Evaluating the effectiveness of distance learning: A comparison using meta-analysis. *Journal of Communication*, 54(3), 402-420. <https://doi.org/10.1111/j.1460-2466.2004.tb02636.x>
- Almarzooq, Z., Lopes, M., & Kochar, A. (2020). Virtual learning during the covid-19 pandemic: A disruptive technology in graduate medical education. *Journal of the American College of Cardiology*, 75(20), 2635-2638. <https://doi.org/10.1016/j.jacc.2020.04.015>

- Altıparmak, M., Kurt, I. D., & Kapidere, M. (2011). E-ogrenme ve uzaktan eğitimde açık kaynak kodlu öğrenme yönetim sistemleri [E-learning and open-source code management systems in education]. *XIII. Academic Informatics Conference Proceedings, 2-4 February 2011*, (pp. 319-327). Malatya: Inonu University Press.
- Andres, A. (2009). *Measuring academic research: How to undertake a bibliometric study*. Oxford: Chandos Publishing.
- Aria, M., & Cuccurullo, C. (2017). Bibliometrix: An R-tool for comprehensive science mapping analysis. *Journal of Informetrics, 11*(4), 959-975. <https://doi.org/10.1016/j.joi.2017.08.007>
- Arksey, H., & O'Malley, L. (2005). Scoping studies: Towards a methodological framework. *International Journal of Social Research Methodology, 8*(1), 19-32. <https://doi.org/10.1080/1364557032000119616>
- Awodele, O., Kuyoro, S. O., Adejumbi, A. K., Awe, O., & Makanju, O. (2011). Citadel of e-learning: A new dimension to learning system. *World of Computer Science and Information Technology Journal, 1*(3), 71-78. <https://doi.org/10.48550/arXiv.1105.4517>
- Ayanda, D., Eludiora, S., Amassoma, D., & Ashiru, M. (2012). Towards a model of e-learning in Nigeria higher institutions: An evolutionary software modelling approach. *Research Journal of Applied Sciences, 7*(5), 240-246. <https://doi.org/10.3923/rjasci.2012.240.246>
- Bagis, M. (2021). Main analysis techniques used in bibliometric research. In Ozturk, O., & Gurler, G. (Eds.) *Bibliometric analysis as a literature review tool* (pp. 97-123). Ankara: Nobel Academic Publishing.
- Bal, H. (2015). *Fen eğitiminde teknoloji kullanımı değerlendirme raporu [Technology use evaluation report in science education]*. Ankara: MoNE, General Directorate of Innovation and Educational Technologies.
- Bali, M. M. E. I., Aliyah, Z., & Humaidi, D. (2022). Effectiveness of hybrid learning assisted in e-learning media in mathematics learning at elementary school. *Journal of Innovation in Educational and Cultural Research, 3*(4), 683-690. <https://doi.org/10.46843/jiecr.v3i4.340>
- Bernard, R. M., Borokhovski, E., Schmid, R. F., Tamim, R. M., & Abrami, P. C. (2014). A meta-analysis of blended learning and technology use in higher education: From the general to the applied. *Journal of Computing in Higher Education, 26*(1), 87-122. <https://doi.org/10.1007/s12528-013-9077-3>
- Binkley, M., Erstad, O., Herman, J., Raizen, S., Ripley, M., & Rumble, M. (2012). Defining 21st century skills. In P. Griffin, B. McGaw & E. Care (Eds.), *Assessment and teaching of 21st century skills* (pp. 17-66). New York: Springer Science and Business Media.
- Borba, M. C., Askar, P., Engelbrecht, J., Gadanidis, G., Llinares, S., & Aguilar, M. S. (2016). Blended learning, e-learning and mobile learning in mathematics education. *ZDM Mathematics Education, 48*, 589-610. <https://doi.org/10.1007/s11858-016-0798-4>
- Borba, M. C. (2012). Humans-with-media and continuing education for mathematics teachers in online environments. *ZDM Mathematics Education, 44*(6), 801-814. <https://doi.org/10.1007/s11858-012-0436-8>.
- Bringula, R., Reguyal, J. J., Tan, D. D., & Ulfa, S. (2021). Mathematics self-concept and challenges of learners in an online learning environment during COVID-19 pandemic. *Smart Learning Environment, 8*(22), 1-23. <https://doi.org/10.1186/s40561-021-00168-5>
- Cerezo, R., Bogarin, A., Esteban, M., & Romero, C. (2020). Process mining for self-regulated learning assessment in e-learning. *Journal of Computing in Higher Education, 32*, 74-88. <https://doi.org/10.1007/s12528-019-09225-y>
- Chaka, C. (2020). Skills, competencies and literacies attributed to 4IR/Industry 4.0: Scoping review. *IFLA Journal, 46*(4), 369-399. <https://doi.org/10.1177/0340035219896376>
- Chang, Y. H., Chang, C. Y., & Tseng, Y. H. (2010). Trends of science education research: An automatic content analysis. *Journal of Science Education and Technology, 19*, 315-331. <https://doi.org/10.1007/s10956-009-9202-2>

- Chaparro, N., & Rojas-Galeano, S. (2021). Revealing the research landscape of master's degrees via bibliometric analyses. *Library Philosophy and Practice*. <https://doi.org/10.48550/arXiv.2103.09431>
- Chen, X., Zou, D., Xie, H., & Cheng, G. (2021a). Twenty years of personalized language learning: Topic modeling and knowledge mapping. *Educational Technology & Society*, 24(1), 205-222. [https://doi.org/10.30191/ETS.202101_24\(1\).0016](https://doi.org/10.30191/ETS.202101_24(1).0016)
- Chen, X., Zou, D., Xie, H., & Wang, F. L. (2021b). Past, present, and future of smart learning: A topic based bibliometric analysis. *International Journal of Educational Technology in Higher Education*, 18(1), 1-29. <https://doi.org/10.1186/s41239-020-00239-6>
- Chen, X., Yu, G., Cheng, G., & Hao, T. (2019). Research topics, author profiles, and collaboration networks in the top-ranked journal on educational technology over the past 40 years: A bibliometric analysis. *Journal of Computers in Education*, 6(4), 563-585. <https://doi.org/10.1007/s40692-019-00149-1>
- Chen, D., Liu, Z., Luo, Z., Webber, M., & Chen, J. (2016). Bibliometric and visualized analysis of emergy research. *Ecological Engineering*, 90, 285-293. <https://doi.org/10.1016/j.ecoleng.2016.01.026>
- Cheng, B., Wang, M., Mørch, A. I., Chen, N.-S., Spector, J. M. (2014). Research on e-learning in the workplace 2000-2012: A bibliometric analysis of the literature. *Educational Research Review*, 11, 56-72.
- Cheong, S. C. (2002). E-learning-a providers prospective. *Internet and Higher Education*, 4(3-4), 337-352. [https://doi.org/10.1016/S1096-7516\(01\)00075-6](https://doi.org/10.1016/S1096-7516(01)00075-6)
- Cobo, M., Lopez-Herrera, A., Herrera-Viedma, E., & Herrera, F. (2011). An approach for detecting, quantifying, and visualizing the evolution of a research field: A practical application to the fuzzy sets theory field. *Journal of Informetrics*, 5(1), 146-166. <https://doi.org/10.1016/j.joi.2010.10.002>
- Common Core State Standards Initiative (CCSSI) (2016). *Common core state standards for mathematics*. Washington, DC: National Governors Association Center for Best Practices and the Council of Chief State School Officers. Retrieved January 31, 2023 from <http://www.corestandards.org>
- Cullen, C. J., Hertel, J. T., & Nickels, M. (2020). The roles of technology in mathematics education. *The Educational Forum*, 84(2), 166-178. <https://doi.org/10.1080/00131725.2020.1698683>
- Delen, A. (2021). *Turkiyede e-ogrenme ortamlarina iliskin yapilan arastirmalardaki egilimler: 2004-2020 donemi tezlerin incelenmesi [Trends in studies on e-learning environments in Turkey: examination of theses between 2004-2020]*. (Master dissertation). Necmettin Erbakan University Graduate School of Educational Sciences, Konya, Turkey. Available from the Council of Higher Education, National Dissertation Center, Dissertation ID: 658807.
- Djeki, E., Degila, J., Bondiombouy, C., & Alhassan, M. H. (2022). E-learning bibliometric analysis from 2015 to 2020. *Journal of Computers in Education*, 9(4), 727-754. <https://doi.org/10.1007/s40692-021-00218-4>
- Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. M. (2021). How to conduct a bibliometric analysis: An overview and guidelines. *Journal of Business Research*, 133, 285-296. <https://doi.org/10.1016/j.jbusres.2021.04.070>
- Ekesionye, N. E. & Okolo, A. N. (2011). Optimizing e-learning opportunities: An effective and necessary tool towards branding higher education in Nigerian Society. In N. Onyegebu, & U. Eze (Eds), *Optimizing e-learning opportunities for effective education service delivery*. University of Nigeria Nsukka: Institute of Education.
- European Commission/EACEA/Eurydice (2019). *Digital education at school in Europe. Eurydice report*. Luxembourg: Publications Office of the European Union. Retrieved January 31, 2023 from <https://data.europa.eu/doi/10.2797/10633>
- European Commission/EACEA/Eurydice (2011). *Mathematics education in Europe: Common challenges and national policies*. Luxembourg: Publications Office of the European Union. Retrieved January 25, 2023 from <https://data.europa.eu/doi/10.2797/72660>

- Garrote-Rojas, D., Arenas Castillejo, J. A., & Jimenez Fernandez, S. (2018). Las TIC como herramientas para el desarrollo de la competencia intrcultural. *EDMETIC, Revista de Educacion Mediaticay TIC*, 7(2), 166-183. <https://doi.org/10.21071/edmetic.10543>
- Gokhale, A., Mulay, P., Pramod, D., & Kulkarni, R. (2020). A bibliometric analysis of digital image forensics. *Science & Technology Libraries*, 39(1), 96-113, <https://doi.org/10.1080/0194262X.2020.1714529>
- Goksu, I. (2021). Bibliometric mapping of mobile learning. *Telematics and Informatics*, 56, 1-20. <https://doi.org/10.1016/j.tele.2020.101491>
- Gonzalez-Perez, L. I., & Ramirez-Montoya, M. S. (2022). Components of education 4.0 in 21st century skills frameworks: Systematic review. *Sustainability*, 14(3), 1-31. <https://doi.org/10.3390/su14031493>
- Govindasamy, T. (2002). Successful implementation of e-learning pedagogical considerations. *The Internet and Higher Education*, 4(3-4), 287-299. [https://doi.org/10.1016/S1096-7516\(01\)00071-9](https://doi.org/10.1016/S1096-7516(01)00071-9)
- Gokdas, I., & Kayri, M. (2005). E-ogrenme ve Turkiye acisindan sorunlar, cozum onerileri [Problems and solution proposals in terms of e-learning and Turkey]. *Van Yuzuncu Yil University Journal of Education*, 2(2), 1-20.
- Grabowska, S., & Saniuk, S. (2022). Business models in the industry 4.0 environment-results of web of science bibliometric analysis. *Journal of Open Innovation Technology, Market, and Complexity*, 8(1), 1-19. <https://doi.org/10.3390/joitmc8010019>
- Grzybowska, K., & Awasthi, A. (2020). Literature review on sustainable logistics and sustainable production for industry 4.0. In K., Grzybowska, A., Awasthi, & R., Sawhney (Eds.), *Sustainable logistics and production in industry 4.0 new opportunities and challenges* (pp. 1-19). New York: Springer Publishing.
- Gulbahar, Y. (2022). *E-ogrenme [E-learning]* (7th Edition). Ankara: Pegem Academy Publishing.
- Gurcan, F., & Ozyurt, O. (2020). Emerging trends and knowledge domains in e-learning researches: Topic modeling analysis with the articles published between 2008-2018. *Journal of Computer and Education Research*, 8(16), 738-756. <http://doi.org/10.18009/769349>
- Haddaway, N. R., Page, M. J., Pritchard, C. C., & McGuinness, L. A. (2022). PRISMA2020: An R package and Shiny app for producing PRISMA 2020-compliant flow diagrams, with interactivity for optimised digital transparency and Open Synthesis. *Campbell Systematic Reviews*, 18(2), 1-2. <https://doi.org/10.1002/cl2.1230>
- Hung, C. M., Huang, I., & Hwang, G. J. (2014). Effects of digital game-based learning on students' self-efficacy, motivation, anxiety, and achievements in learning mathematics. *Journal of Computers in Education*, 1(2-3), 151-166. <https://doi.org/10.1007/s40692-014-0008-8>
- Hung, J. I. (2012). Trends of e-learning research from 2000 to 2008: Use of text mining and bibliometrics. *British Journal of Educational Technology*, 43(1), 5-16. <https://doi.org/10.1111/j.1467-8535.2010.01144.x>
- Irfan, M., Kusumaningrum, B., Yulia, Y., & Widodo, S. A. (2020). Challenges during the pandemic: Use of e-learning in mathematics learning in higher education. *Journal of Mathematics Education*, 9(2), 147-158. <https://doi.org/10.22460/infinity.v9i2.p147-158>
- International Society for Technology in Education (ISTE) (2008). *National educational technology standards for students*. Retrieved January 25, 2023 from <https://www.iste.org/standards/for-educators>
- Jamali, S. M., Ebrahim, N. A., & Jamali, F. (2022). The role of STEM education in improving the quality of education: A bibliometric study. *International Journal of Technology and Design Education, Springer Verlag*, 32(3), 1-22. <https://doi.org/10.1007/s10798-022-09762-1>
- Jiang, Y., Ritchie, B., & Benckendorff, P. (2019). Bibliometric visualisation: An application in tourism crisis and disaster management research. *Current Issues in Tourism*, 22(16), 1925-1957. <https://doi.org/10.1080/13683500.2017.1408574>

- Juan, A. A., Huertas, M. A., Trenholm, S., & Steegmann, C. (Eds.). (2012). *Teaching mathematics online: Emergent technologies and methodologies*. Hershey, PA: IGI Global.
- Karkar, A. J. M., Fatlawi, H. K., & Al-Jobouri, A. A. (2020). Highlighting e-learning adoption challenges using data analysis techniques: University of Kufa as a case study. *The Electronic Journal of e-Learning*, 18(2), 136-149.
- Kramarski, B., & Gutman, M. (2006). How can self-regulated learning be supported in mathematical E-learning environments? *Journal of Computer Assisted Learning*, 22(1), 24-33. <http://dx.doi.org/10.1111/j.1365-2729.2006.00157.x>
- Kumari, R. (2021). E-learning of mathematics- a new trend of learning in 21st century during covid-19 pandemic. *International Journal for Research in Applied Science & Engineering Technology*, 9(XII), 736-739.
- Kurnaz, F. B., & Ergun, E. (2019). Investigation of the relations between e-learning style and academic achievement in e-learning environment. *Journal of Theoretical Educational Science*, 12(2), 532-549. <http://dx.doi.org/10.30831/akukeg.407029>
- Lamb, S., Maire, Q., & Doecke, E. (2017). *Key skills for the 21st century: An evidence-based review*. Retrieved January 25, 2023 from <https://vuir.vu.edu.au/35865/1/Key-Skills-for-the-21st-Century-Analytical-Report.pdf>
- Law, J., Bauin, S., Courtial, J., & Wittaker, J. (1988). Policy and the mapping of scientific change: A co-word analysis of research into environmental acidification. *Scientometrics*, 14(3-4), 251-264. <https://doi.org/10.1007/BF02020078>
- Lin, Y. W., Tseng, C. L., & Chiang P. J. (2017). The effect of blended learning in mathematics course. *EURASIA Journal of Mathematics Science and Technology Education*, 13(3), 741-770. <https://doi.org/10.12973/eurasia.2017.00641a>
- Ministry of National Education (MoNE) (2018). *Guclu yarinlar icin 2023 egitim vizyonu [2023 Education vision for strong tomorrows]*. Retrieved January 31, 2023 from https://www.gmka.gov.tr/dokumanlar/yayinlar/2023_E%C4%9Fitim%20Vizyonu.pdf
- Mishra, P., & Mehta, R. (2017). What we educators get wrong about 21st-century learning: Results of a survey. *Journal of Digital Learning in Teacher Education*, 33(1), 6-19. <https://doi.org/10.1080/21532974.2016.1242392>
- Moreno-Guerrero, A. J., Aznar-Diaz, I., Caceres-Reche, P., & Alonso-Garcia, S. (2020). E-Learning in the teaching of mathematics: An educational experience in adult high school. *Mathematics*, 8(5), 1-16. <https://doi.org/10.3390/math8050840>
- Mostafa, M. M. (2020). A knowledge domain visualization review of thirty years of halal food research: Themes, trends and knowledge structure. *Trends in Food Science & Technology*, 99, 660-677. <https://doi.org/10.1016/j.tifs.2020.03.022>
- Moubayed, A., Injadat, M., Shami, A., & Lutfiyya, H. (2020). Student engagement level in an e-learning environment: Clustering using k-means. *American Journal of Distance Education*, 34(2), 137-156. <https://doi.org/10.1080/08923647.2020.1696140>
- Mulqueeney, K., Kostyuk, V., Baker, R. S., & Ocumpaugh, J. (2015). Incorporating effective e-learning principles to improve student engagement in middle-school mathematics. *International Journal of STEM Education*, 2(1), 1-14. <https://doi.org/10.1186/s40594-015-0028-6>
- Mutlu, Y., Polat, S., & Alan, S. (2019). Development of preservice mathematics teachers' TPACK through micro teaching: Teaching the VuStat program. *International Journal of Technology in Education and Science (IJTES)*, 3(2), 107-118.
- National Council of Teachers of Mathematics (NCTM) (2016). *Executive summary: principles and standards for school mathematics*. Authors, NCTM.
- National Council of Teachers of Mathematics (NCTM) (2014). *Principles to actions: Ensuring mathematical success for all*. Authors, NCTM.

- National Council of Teachers of Mathematics (NCTM) (2000). *Principles and standards for school mathematics*. Authors, NCTM.
- Organisation for Economic Co-operation and Development (OECD) (2022). *Education at a Glance 2022: OECD indicators*. Paris: OECD Publishing. <https://doi.org/10.1787/3197152b-en>
- Organisation for Economic Co-operation and Development (OECD) (2019). *Skills outlook 2019: Thriving in a digital world*. Paris: OECD Publishing. <https://doi.org/10.1787/df80bc12-en>
- Ozyurt, O., Ozyurt, H., Baki, A., & Guven, B. (2013). Integration into mathematics classrooms of an adaptive and intelligent individualized e-learning environment: Implementation and evaluation of UZWEBMAT. *Computers in Human Behavior*, 29, 726-738. <http://dx.doi.org/10.1016/j.chb.2012.11.013>
- Oksuz, C., & Ak, S. (2010). A validity and reliability study of the level of technology use scale in mathematics lessons at elementary school level. *Electronic Journal of Social Sciences*, 9(32), 372-383.
- Parlakkilic, A., & Gulduren, C. (2019). Turkiye'deki e-ogrenme arastirmalarinda yonelimler [Trends in e-learning research in Turkey]. *International Journal of Contemporary Educational Studies*, 5(1), 19-28.
- Partnership for 21st Century Learning (P21) (2019). *Framework for 21st century learning. A network of battelle for kids*. Retrieved January 22, 2023 from <https://www.battelleforkids.org/networks/p21>
- Pesta, B., Fuerst, J., & Kirkegaard, E. O. W. (2018). Bibliometric keyword analysis across seventeen years (2000-2016) of intelligence articles. *Journal of Intelligence*, 6(4), 1-12. <https://doi.org/10.3390/jintelligence6040046>
- Pierce, R., Stacey, K., & Barkatsas, A. (2007). A scale for monitoring students' attitudes to learning mathematics with technology. *Computers & Education*, 48(2), 285-300. <https://doi.org/10.1016/j.compedu.2005.01.006>
- Pring, R. (2013). *Egitim arastirmalari felsefesi [Educational research philosophy]* (D. Koksall, Trans.). Nobel Publishing.
- Pritchard, A. (1969). Statistical bibliography or bibliometrics. *Journal of Documentation*, 25(4), 348-349.
- Pujiasih, E. (2020). Membangun generasi emas dengan variasi pembelajaran online di masa pandemi covid-19 [Building a golden generation with online learning variations during the covid-19 pandemic]. *Ideguru: Jurnal Karya Ilmiah Guru*, 5(1), 42-48. <https://doi.org/10.51169/ideguru.v5i1.136>
- Qian, J., Law, R., & Wei, J. (2019). Knowledge mapping in travel website studies: A scientometric review. *Scandinavian Journal of Hospitality and Tourism*, 19(2), 192-209. <https://doi.org/10.1080/15022250.2018.1526113>
- Rohendi, D., Wahyudin, D., & Kusumah, I. H. (2023). Online learning using STEM-based media: To improve mathematics abilities of vocational high school students. *International Journal of Instruction*, 16(1), 377-392. <https://doi.org/10.29333/iji.2023.16121a>
- Sacristan, A. I. (2017). Digital technologies in mathematics classrooms: Barriers, lessons and focus on teachers. In E. Galindo & J. Newton, (Eds.), *Proceedings of the 39th annual meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education* (pp. 90-99). Indianapolis, IN: Hoosier Association of Mathematics Teacher Educators.
- Scardamalia, M., Bransford, J., Kozma, B., & Quellmalz, E. (2012). New assessments and environments for knowledge building. In P. Griffin, B. McGaw & E. Care (Eds.) *Assessment and teaching of 21st century skills* (pp. 231-300). Netherlands: Springer Publishing.
- Sulistyaningsih, D., Purnomo., & Aziz, A. (2019). Development of learning design for mathematics manipulatives learning based on e-learning and character building. *International Electronic Journal of Mathematics Education*, 14(1), 197-205. <https://doi.org/10.29333/iejme/3996>

- Tibana-Herrera, G., Fernandez-Bajon, M. T., & De-Moya-Anegon, F. (2018). Output, collaboration and impact of e-learning research: Bibliometric analysis and visualizations at the country and institutional level (Scopus 2003-2016). *El Profesional De La Informacion*, 27(5), 1082-1096. <https://doi.org/10.3145/epi.2018.sep.12>
- Trilling, B., & Fadel, C. (2009). *21st century skills: learning for life in our times*. San Francisco: John Wiley & Sons.
- Tosun, C. (2022). Analysis of the last 40 years of science education research via bibliometric methods. *Science & Education*, 1-30. (in press) <https://doi.org/10.1007/s11191-022-00400-9>
- Umoh, J. B., & Akpan, E. T. (2014). Challenges of blended e-learning tools in mathematics: students' perspectives university of Uyo. *Journal of Education and Learning*, 3(4), 60-70. <http://dx.doi.org/10.5539/jel.v3n4p60>
- Uzunboylu, H., Tezer, M., & Yildiz, E. P. (2020). The effects of the authentic learning approach with a course management system (moodle) on students' mathematics success and online authentic learning self-efficacy. *Educational Research and Reviews*, 15(11), 679-689. <https://doi.org/10.5897/ERR2020.4087>
- Uzel, D., & Ozdemir, E. (2012). The effects of problem-based e-learning on prospective teachers' achievements and attitudes towards learning mathematics. *Procedia-Social and Behavioral Sciences* 55, 1154-1158. <https://doi.org/10.1016/j.sbspro.2012.09.609>
- Van Eck N. J., & Waltman, L. (2010). Software survey: VOSviewer, a computer program for bibliometric mapping. *Scientometrics*, 84(2), 523-538. <https://doi.org/10.1007/s11192-0090146-3>
- Wang, J. J., Chen, H., Rogers, D. S., Ellram, L. M., & Grawe, S. J. (2017). A bibliometric analysis of reverse logistics research (1992-2015) and opportunities for future research. *International Journal of Physical Distribution & Logistics Management*, 47(8), 666-687. <https://doi.org/10.1108/IJPDLM-10-2016-0299>
- Wang, T. H. (2014). Developing an assessment-centered e-learning system for improving student learning effectiveness. *Computers & Education*, 73, 189-203. <http://dx.doi.org/10.1016/j.compedu.2013.12.002>
- Wang, T. H. (2011). Developing web-based assessment strategies for facilitating junior high school students to perform self-regulated learning in an e-learning environment. *Computers & Education*, 57(2), 1801-1812. <http://dx.doi.org/10.1016/j.compedu.2011.01.003>
- Web of Science Group (WoSG) (2023). *Web of Science Core Collection*. Retrieved January 31, 2023 from <https://clarivate.com/>
- Wetzstein, A., Feisel, E., Hartmann, E., & Benton, W. (2019). Uncovering the supplier selection knowledge structure: A systematic citation network analysis from 1991 to 2017. *Journal of Purchasing and Supply Management*, 25, 1-16. <https://doi.org/10.1016/j.pursup.2018.-10.002>
- Wong, W., Mittas, N., Arvanitou, E., & Li, Y. (2021). A bibliometric assessment of software engineering themes, scholars and institutions (2013-2020). *Journal of Systems and Software*, 180, 1-10. <https://doi.org/10.1016/j.jss.2021.111029>
- World Economic Forum (WEF) (2016). *New Vision for education: Fostering social and emotional learning through technology*. Geneva: WEF. Retrieved January 31, 2023 from https://www3.weforum.org/docs/WEF_New_Vision_for_Education.pdf
- Yaniawati, P., Kariadinata, R., Sari, N. M., Pramiasih, E. E., & Mariani, M. (2020). Integration of e-learning for mathematics on resource-based learning: Increasing mathematical creative thinking and self-confidence. *International Journal of Emerging Technologies in Learning*, 15(6), 60-78. <https://doi.org/10.3991/ijet.v15i06.11915>
- Yuan, B. Z., Bie, Z. L., & Sun, J. (2021). Bibliometric analysis of global research on muskmelon (*Cucumis melo* L.) based on Web of Science. *Hort Science*, 56(8), 867-874. <https://doi.org/10.21273/HORTSCI15827-21>

THE DETERMINATION OF THE SENSE OF COMMUNITY LEVELS OF UNIVERSITY STUDENTS IN ONLINE DISTANCE EDUCATION ENVIRONMENTS IN TERMS OF DIFFERENT VARIABLES

Dr. Aysun GUNES

ORCID: 0000-0002-4152-6768
School of Foreign Languages
Anadolu University
Eskisehir, TURKIYE

Dr. Emin OZEN

ORCID: 0000-0001-7026-1503
Assessment and Evaluation Unit
Ministry of National Education
Eskisehir, TURKIYE

Mona AYKUL

ORCID: 0000-0002-9050-3917
Graduate Schools of Social Science
Yildiz Technical University
Istanbul, TURKIYE

Received: 15/02/2023 **Accepted:** 05/07/2023

ABSTRACT

Online education has been implemented in Turkiye as well as in many countries of the world in recent years and is becoming more widespread day by day. Being able to take place anytime and anywhere, eliminating the limitations of time and space, and providing lifelong learning can be described as the most basic factors in the spread of online education. In addition, due to the rapid increase in the number of learners who have to take online education due to the Covid-19 global epidemic, which has affected the whole world recently, it has become an important issue for learners to acquire knowledge and skills in online distance learning environments. Also, it is necessary to determine the level of developing a sense of community in order to ensure the learners' self-expression in the relevant environments, their active participation and the continuity of the learning action. In this study, it was aimed to determine the level of sense of community of learners studying at Turkish-German University in the 2021-2022 academic year in online distance education environments in terms of different variables like gender, level of education, and their ability to use computer programs and applications. The research was carried out in the cross-sectional scanning model. The obtained data are analyzed with the help of SPSS package program. The findings are evaluated at the 95% confidence interval and at the 5% significance level. Sub-factor averages, factor correlations are examined and diagnostic statistics related to the study group are included. In addition, t-test is used for variables with two sublevels and one-way Anova is used for variables with more than two sublevels. If there is a difference in the Anova test, Post-Hoc tests are used to determine the pairwise differences. As a result, in order to make education more efficient in online learning environments, it is concluded that in order to strengthen the sense of community, learners can be given tasks that they can discuss and negotiate, learners can be made to work in groups in related environments, etc. In addition, considering the stress, anxiety and uncertainty that learners and educators face with the global epidemic, it is thought that social presence should take priority for learning to take place. It is recommended that the study be developed by applying it to larger regions and samples.

Keywords: Online distance education, sense of community, online learning, parametric tests.

INTRODUCTION

With the technological developments experienced today, we often see that innovations gain momentum in many areas of our lives, and this acceleration affects many areas as well as its reflections in the field of education. In the light of these developments, there is an increase in virtual learning environments, and many virtual education environments with different infrastructures are offered to users. In this context, the number of institutions providing online distance education has been increasing, especially with the covid-19 pandemic period, and in parallel, there has been a serious increase in the number of teachers and learners in online education environments (Dhawan, 2020). This increase in online distance education environments raises the issue of belonging to the relevant environments. It is thought that the sense of community has become an important issue in online distance education and online learning environments within all developments.

Learning in these environments takes place by distributing the course material with tools such as text, sound, video, graphics and animation through the use of communication technologies based on the Internet (Gumus, 2007). Online environments have carried educational practices beyond the physical boundaries of the classroom and made the online interaction between student-student and student-teacher a part of education. Thus, students; they started to interact with teachers/instructors and classmates using both synchronous and asynchronous online communication tools (Wang, 2008). These environments have been accepted by many educational institutions due to reasons such as low cost, the opportunity of the faculty member to provide education services independent of time and place, and the convenience they provide in transmission (Varol and Turel, 2003). This situation has affected the spread of online environments in educational institutions (Cited by Yildiz, 2020).

In non-face-to-face learning environments, a sense of reality and a strong sense of classroom community can create a sense of connectedness and belonging among learners and help them fulfill their responsibilities towards each other and the institution they are studying at. In the literature on open and distance learning (ODL), there are studies that emphasize the importance of a sense of community in these educational environments. For example, in his seminal work on ODL, Rovai (2002) mentions that by adopting a set of course design principles in ODL courses, dialog can be increased and thus a sense of community can be fostered. Similarly, Liu et al. (2007) state that a sense of community is “critical” to the online learning experience. In a more recent study, Ilgaz and Askar (2013) found a high positive relationship between sense of community and satisfaction with online learning. In this respect, it is thought that a scientific study on this subject will contribute to the literature.

In the context of all these statements; it is an important issue for learners to acquire knowledge and skills in online distance education environments. In addition, it is thought that the level of development of the sense of community should be determined in order for learners to express themselves in the relevant environments, to ensure their active participation and the continuity of the learning action.

Purpose and Importance of the Study

In this study, it was aimed to determine the level of community feeling of learners studying at Turkish-German University in the 2021-2022 academic year in online distance education environments in terms of affective and operational dimensions, to determine the change status of the learners in terms of their demographic characteristics, their ability to use computer programs and applications, and to obtain information about the level of community feeling of learners in online environments.

It is thought that the related study will provide important findings in terms of providing information about the current program and practices of the institution according to the data from the learners in the online environments, which have become more widespread with the covid-19 pandemic, and providing the opportunity to review the course designs and current practices and evaluations. In this context, it is thought that the study can contribute to the literature in determining the current state of the online distance education process from the learner’s point of view and making suggestions to make it more effective. It is also important in terms of setting an example for researchers who want to work in the field.

Limitations of the Study

This study is limited to the learners who take online courses with distance education methods in the academic year of 2021-2022, specific to the Turkish-German University.

RELATED LITERATURE

In general, the sense of community can be defined as belonging, the sense of recognizability that the members create towards each other and the group, and the belief that the needs of the members will be met thanks to their togetherness. McMillan and Chavis (1986) defined the sense of community under four components. These are membership, influence, support, and shared emotional connection.

When the relevant literature is examined, it is possible to come across various studies. Based on these four components created by McMillan and Chavis, Rovai (2001a) defined the components of sense of class community. These components are spirit, trust, influence and learning.

In their study, Ilgaz and Askar (2009) developed a sense of community scale to examine the online community feeling of students enrolled in a distance education program structured on the blended learning model. Based on the scale developed by Rovai, Wighting and Lucking in 2004, a measurement tool was developed and validity-reliability studies were conducted. The prepared scale was developed with the data obtained from 571 first year students of Ankara University Theology Undergraduate Distance Education Program. As a result of the analyzes made, the scale took its final form with 6 items and 2 factors. As a result, a scale with validity and reliability studies has been developed to be used to determine the sense of community of students studying in online environments in distance education.

Yildiz (2018) aimed to adapt the Scale of the Sense of Community in Online Environments into Turkish and to examine it in terms of reliability and validity. After the relevant validity and reliability studies, it was determined that the adapted scale has reliability and validity in measuring the sense of community in online environments.

In his study, Enfiyeci ve Butukalan-Filiz (2019) examined the relationship between the sense of community, motivation and academic achievement of postgraduate distance education students in online environments. The study, which was carried out with the descriptive relational research model, was carried out with Ahmet Yesevi University Distance Education Master's programs students. The research was carried out with 453 students who were studying in 16 different graduate programs at Ahmet Yesevi University in the 2017-2018 academic year and responded to the scales sent via e-mail through the system. In order to collect data from students, "Personal Information Form", "The Scale of the Sense Online Learning Community" and "Motivation Scale" prepared by the researcher were used. Obtained data were statistically analyzed with descriptive statistical analysis, correlation analysis and regression analysis. As a result of the research, there was no relationship between sense of community and motivation, while a negative, non-significant relationship was found between sense of community and academic achievement. It has been observed that there is a positive and significant relationship between the collected data and academic achievement and motivation. In addition, it was observed that the sense of community variable did not have an effect on the motivation variable, while motivation was a significant predictor of academic achievement.

In his work in Yildiz (2020); determined the factors that affect students' sense of community in online learning environments. The participants of the study consisted of 15 associate degree students from 5 different departments in a distance education and research center. Research data were obtained by semi-structured interview, one of the qualitative data collection tools. As a result, it has been suggested that while organizing online environments, attention should be paid to informing the instructors about the process, designing the interfaces where interaction takes place, making orientations about the system, and determining appropriate methods and strategies.

Chatterjee and Correia (2020) investigated the relationship between learners' sense of community and their attitudes towards online cooperative learning. As a result of the study, it was determined that there is a moderate positive relationship between cooperation and sense of community. In addition, it was noticed that the degree of relationship between sense of community and cooperative learning was higher among graduate students than undergraduate students. In addition, a higher degree of correlation was found between a

positive attitude towards cooperative learning and the dimensions of sense of community compared to the relationship between a negative attitude towards cooperative learning and a sense of community.

Kilinc and Altinpulluk (2021) conducted a study to examine the community perceptions of learners who produce content in online learning environments in terms of variables such as gender, age, access to information technologies and experience of using information technologies. The results obtained within the scope of the research, in which 117 content-producing learners participated, show that the sense of community of content-producing learners does not differ significantly according to their gender, technology access and technology usage experience. In addition, it was concluded that the learners who produce content in the context of the operational dimension, which is a sub-dimension of the sense of community scale, differ significantly depending on age.

Ozen and Duzenli (2023), in their study at Anadolu University School of Foreign Languages, aimed to determine the differentiation status of the level of the sense of community development in online distance learning environments in terms of affective and operational dimensions, according to the variables related to the demographics of the learners, the language levels they study and their technology use skills. As a result of the research, it was found that gender and language levels are not important factors in developing a sense of community, it is important to create a supportive and inclusive learning environments for all learners regardless of their demographic characteristics, and they concluded that it is necessary to provide effective and efficient online environments where learners with higher technology proficiency, who can use various tools and technologies in online learning, are more comfortable and competent in using these technologies and expressing themselves comfortably.

When the relevant literature is examined, there are several studies on the determination of the level of the sense of community of learners in online distance education environments. However, in the institutional context, there is no study that covers all learners in an institution. In this context, it is predicted that the results of this study will be beneficial in terms of increasing the quality of online courses.

METHODOLOGY

This study is designed in the cross-sectional survey model of quantitative research method (Buyukozturk, Kilic Cakmak, Akgun, Karadeniz, & Demirel, 2012). The cross-sectional survey model first aims to take a photo of the situation by collecting data at once to illuminate a situation, variable, phenomenon and then to reveal the situation, variables and the relationship between the variables by examining this photo.

The dependent variable of the study is the Level of the Sense of Community of the learners studying at Turkish-German University in Online Distance Education Environments. In this study, the independent variables are:

- Gender
- The level of basic computer skills
- Faculty/Institute
- The level of education

In this context, the sub-problems of the research are shaped around the following questions:

1. Does the Level of the Sense of Community of learners studying at Turkish-German University in Online Distance Education Environments differ according to gender?
2. Does the Level of the Sense of Community of the learners studying at Turkish-German University in Online Distance Education Environments differ according to the faculty/institute they study?
3. Does the Level of the Sense of Community of the learners studying at the Turkish-German University in Online Distance Education Environments differ according to their level of education?
4. Does the Level of Community Feeling of the learners studying at Turkish-German University in Online Distance Education Environments differ according to the skill level of using the program and application?

Participants

The learners of Turkish-German University taking lessons according to the blended learning model constitute the universe of this study. Within the scope of the study, the link of the data collection tool was sent to the learners from the automation system.

The population of the study consists of university students taking courses in online learning environments. While determining the study group, criterion sampling and convenience sampling methods are used as sampling methods. The reason for choosing these sampling methods is that the convenience sampling method makes it easy to reach the research sample in terms of time, labor and finances and to collect data quickly, while the reason for choosing the criterion sampling method is that it should consist of students who are in online learning environments or taking courses (Buyukozturk et al., 2012). In this context, the sample of the study consisted of the learners of Turkish-German University, where ethics committee permission was obtained for the study. Within the scope of the study, data were collected from 368 (n=368) learners. Cresswell (2008) states that the data collected from 360 or more individuals in survey studies represent the universe.

Data Collection

In the collection of data, the 'survey on the internet' method, which is a faster, effective and economical method, which is seen to be increasing in popularity in the literature (Shonlau et al., 2002 as cited in Avcioglu, 2014), was used (Arikan, 2018). The surveys were uploaded to the online survey platform called Google Forms, and the link to access the form was shared with the students. The necessary ethics committee permission was obtained from the Scientific Research and Publication Ethics Committee of the Turkish-German University on 08.11.2021.

Data Collection Tools

Participant Information Form

In this study, in the Participant Information Form prepared in accordance with the purpose of the research, there are questions about *gender, education level, ability to use computer programs and applications, faculty types, and grade levels.*

The Scale of the Sense of Community in an Online Distance Education Environment

In this study "The Scale of the Sense of Community in an Online Distance Education Environment" developed by Ilgaz and Askar (2009) is used. The Scale of the Sense of Community in an Online Distance Education Environment, which was originally developed in Turkish and whose validity and reliability studies were conducted on university students participating in distance education by Ilgaz and Askar (2009), is a 7-point Likert-type scale consisting of 6 items. The scale consists of two sub-dimensions, affective (4 items) and operational (2 items). The CFA performed revealed that the scale showed a good fit [$\chi^2(7, N=571) = 24.76, p < .000, RMSEA = 0.067, S-RMR = 0.034, GFI = 0.99, AGFI = 0.96, CFI = 0.99, NNFI = 0.98, IFI = 0.99$]. The Cronbach alpha coefficient calculated for the reliability analysis was found to be 0.79 and 0.73 for the sub-dimensions, respectively, and 0.80 for the total scale (Ilgaz & Askar, 2009). The validity and reliability results of the scale show that the scale can be applied to students participating in online distance education programs.

Data Analysis

The skewness and kurtosis coefficients of the scores obtained from The Scale of the Sense of Community in an Online Distance Education Environment were found to be between +1.5 and -1.5. According to the obtained values, it can be said that the data provides the assumption of normality (De Carlo, 1997). Descriptive statistics of scale scores are presented in Table 1.

Table 1. Descriptive statistics of scores

	N	Min.	Max.	Average	SD	Skewness	Kurtosis
Affective	368	1.00	7.00	4.15	1.43	.127	.254
Operational	368	1.00	7.00	3.66	1.55	.290	.497

The obtained data are analyzed with the help of SPSS package program. The findings are evaluated at the 95% confidence interval and at the 5% significance level. In the comparison of the quantitative data, t-test is used for variables with two sublevels and one-way Anova is used for variables with more than two sublevels. If there is a difference in the ANOVA test, Post-Hoc tests are used to determine the pairwise differences.

Cronbach's Alpha value was examined to determine the reliability level of the scale used in the research. It is seen that the Cronbach's Alpha internal reliability coefficient is ,873, and the scale has high reliability.

FINDINGS

Findings Concerning the Working Group

In this section, the frequency and percentage distributions of the data collected through the participant information form are shown in tables.

Table 2. Distribution Table by Gender of the Learners

Variables	Groups	Frequency	Percentage
Gender	Woman	176	47.8
	Male	192	52.2
	Total	368	one hundred

It is seen that 47.8% of the study group consists of female and 52.2% male participants.

Table 3. The Level of Basic Computer Skills of the Participant

Variables	Groups	Frequency	Percentage
The level of basic computer skills	Low	37	10.1
	Middle	220	69.8
	High	111	30.2
	Total	368	one hundred

According to the answers given by the learners in the study group regarding the skill levels of using computer programs and applications; low 10.1% medium level 69.8% high level skills 30.2%. In this context, the excess of those who say they have medium level skills is striking.

Table 4. The Level of Education

Variables	Groups	Frequency	Percentage
Level of Education	Language Preparatory Classes	106	28.8
	1st Class	107	29.1
	2. Class	61	16.6
	3rd grade	35	9.5
	4th Grade	43	11.7
	Graduate	16	4.3
	Total	368	one hundred

When the participation status of the learners in the study group is examined according to their level of education, it is observed that the highest participation in the research is the 1st grade with 29.1% and the language preparatory classes with 28.8%. It is seen that those who participate the least are graduate students with 4.3%.

Table 5. Types of Faculties, Institutes, and Colleges Where Learners Study

Variables	Groups	Frequency	Percentage
Faculty/Institute	School of Foreign Languages	60	16.3
	Faculty of Administration	73	19.8
	Faculty of Science	46	12.5
	Faculty of Law	33	9.0
	Faculty of Engineering	133	36.1
	Faculty of Culture and Social Sciences	8	2.2
	Graduate School of Social Sciences		
	Graduate School of Science	13	3,5
		2	,5
Total	368	one hundred	

When the participation status of the study group according to the faculties is examined, it is seen that the highest participation is seen in the engineering faculty with 36.1%, the second highest participation is seen in the Faculty of Management with 19.8%, and the least participation is in the institute of science.

Findings Related to Problem Situations

Do the Levels of Community Sense Development of the Working Group in Online Distance Learning Environments Change by Gender?

It is said that the affective sub-dimension of the scale includes questions about caring, trust, welcoming and giving opportunities, and the operational sub-dimension includes questions about creating a community in online education environments such as sharing speech.

Table 6. T-test Table of Learners Participating in the Study by Gender

Variables	Groups	Cover	T	P	Cohen's
Affective	Woman	4,176	,300	,309	
	Male	4,128			
Operational	Woman	3.59	,90	,018*	,41
	Male	3.34			

While there was no significant difference in the affective sub-dimension of the levels of developing a sense of community in online distance education environments between groups of different genders, there was a statistically significant difference in the operational sub-dimension ($P < .05$). Cohen's d values of the found difference are examined. It is seen that the relevant value for the sub-dimensions with significant differences between them is 0.41 and has a medium effect size. It is seen that the mean score of women in the operational sub-dimension is higher than the mean score of men.

Do the Levels of Community Sense Development of the Working Group in Online Distance Education Environments Change According to the Level of Use of Computer Programs and Applications?

Table 7. One-way Anova Table According to the Skills of Using Computer Programs and Applications of the Learners Participating in the Study

Variables	Groups	Cover	F	P
Affective	Low	2,603	,374	,688
	Middle			
	High			
Operational	Low	2,399	1,737	,177
	Middle			
	High			

According to the one-way Anova analysis results indicated in the table, the learners; In online distance education environments, there is no significant difference between the skills of computer programs and applications at the levels of community feeling in both affective and operational sub-dimensions of the scale.

Do the Levels of Community Sense Development of the Working Group in Online Distance Education Environments Change According to the Faculties Where They Study?

In the scale, there are factors such as the affective sub-dimension of caring, trust, welcoming and giving opportunities, and the operational sub-dimension, the factors of creating a community in online education environments such as sharing speech. According to the Anova results, it was observed that there was a difference between the groups in the affective sub-dimension ($\text{Sig.} = .002 < .05$). Since the variances were homogeneously distributed ($\text{Sig.} = .160 > .05$) and the distribution in the sample groups was not equal, Hochberg's GT2 Post Hoc test was performed.

Table 8. One-way Anova Table by the Faculties/Institutes of Study Participants

Variables	Groups	Cover	F	P	Difference
Affective	School of Foreign Languages	4,0750	3,360	,002*	2-5
	Faculty of Administration	4.4897			
	Faculty of Science	4,2120			
	Faculty of Law	4.3333			
	Faculty of Engineering	3.8177			
	Faculty of Culture and Social Sciences	4,1250			
	Graduate School of Social Sciences	5.0962			
	Graduate School of Science	6,3750			
Operational	School of Foreign Languages	3.6583	2,218	,052	
	Faculty of Administration	3.9452			
	Faculty of Science	3.8478			
	Faculty of Law	3,5606			
	Faculty of Engineering	3.3459			
	Faculty of Culture and Social Sciences	4.0625			
	Graduate School of Social Sciences	4.6154			
	Graduate School of Science	4,7500			

According to the Post Hoc test results regarding the types of faculties, there are significant differences in affective dimension between the learners of the Faculty of Engineering and the Faculty of Administration. In the affective dimension, it is seen that the highest averages are at the Faculty of Administration (4.4897) and the lowest average is at the Faculty of Culture and Social Sciences (3.8177).

Do the Levels of Community Sense Development in Online Distance Education Environments of the Working Group Differentiate According to their Level of Education?

The affective sub-dimension of the scale is defined as a factor that includes the characteristics of creating a community in online education environments for caring, trusting, welcoming and giving opportunities. According to Anova results, it is seen that there is a significant difference between the levels of education of the learners participating in the study and their sense of community in online distance education environments, and the affective dimension, one of the sub-dimensions of the related scale ($P < .05$)

Table 9. One-way Anova Table According to the Levels of Education of the Learners Participating in the Study

Variables	Groups	Cover	F	P	Difference
Affective	Language prep. classes	4.082547	2,223	,038*	2-4
	1st Class	4.0514			
	2. Class	4.2582			
	3rd grade	3,8500			
	4th grade	4.2965			
	Graduate	5,2031			
	Operational	Language prep. classes			
1st Class		3,5794			
2. Class		3.9344			
3rd grade		3.4286			
4th grade		3.6279			
Graduate		3.9688			

In addition, according to the anova results, it was observed that there was a difference between the groups in the affective sub-dimension (Sig.=.038<.05). Since the variances were not homogeneously distributed (Sig.=.035<.05), the Games-Howell Post Hoc test was performed due to the differences in the sample groups.

According to the Post Hoc test results regarding the levels of education, it is seen that the students at the graduate level have significant differences with the students at the language preparatory classes, 1st and 3rd grade levels in the affective dimension. In the affective dimension, it is seen that the highest average is at the graduate level (5.2031), and the lowest average is at the 3rd grade level (3.8500).

CONCLUSION AND DISCUSSION

In the context of the results of the descriptive findings obtained from this study, the number of male learners participating in the research is higher than the women participants, the number of learners with medium level of computer program usage and application skills is higher in the current sample, and it is seen that preparatory and first-year students participate more in the research, and students at undergraduate level participate much more than learners at graduate level according to their level of education.

Within the scope of the results of the inferential findings related to the problem statement, as a result of the appropriate tests, no significant difference was found in the levels of developing a sense of community in online distance learning environments of learners in online distance education environments, according to their gender and level of the use of computer programs and applications. This finding is in line with the findings of Kilinc and Altinpulluk (2021). This finding supports the finding that gender is not an effective variable in developing a sense of community. Based on this finding, it can be said that in a community of online learners, it is possible for both men and women to support and encourage each other regardless of their gender and thus, if appropriate conditions are provided, a more positive and effective learning environment can be created for all members of the community. In addition, the finding that gender and computer application usage levels were not significant factors in developing a sense of community emphasizes the importance of creating a supportive and inclusive learning environment for all learners, regardless of their gender or other characteristics.

It has been determined with the help of the related analyzes that the significant difference in the affective dimension of the development of the level of sense of community in online environments according to the faculty types is between the Faculty of Administration and the Faculty of Culture and Social Sciences. It was seen that the group with the highest sense of commitment was learners Faculty of Administration, and the group with the lowest commitment was from the Faculty of Culture and Social Sciences. It was also concluded that the level of emotional sharing in the related environments of engineering students was lower than the students of other faculties. This finding coincides with the result of Enfiyeci and Buyukalan-Filiz's (2019) study that learners studying in the department of English Language and Literature show higher engagement in terms of developing a sense of community than those studying in other fields. As a result, it is concluded that learners in social sciences show higher commitment in the affective context of sense of community than learners in science.

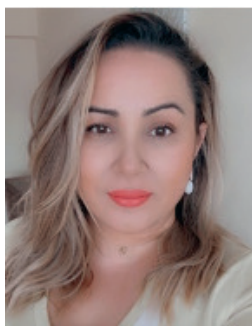
Finally, it is seen as a result of the related analyzes that the significant difference seen in the affective dimension of the levels of developing a sense of community in online environments of the levels of education of the learners is with the preparatory, 1st and 3rd grade levels of the graduate learners. It is concluded that as the class level rises, affective belonging, sharing and trust towards online environments increase. Considering the grade levels, as a result of the related analyses in the sub-factors of caring, trusting, welcoming and giving opportunities in the affective sub-dimension of the level of developing a sense of community in online environments, it is seen that learners at the 3rd grade level show higher commitment than other learners at the 1st grade level. This finding was found to be consistent with Beeson et al.'s (2019) study. Thus, it can be argued that students who spend more time in an online environment may have more opportunities to interact with and get to know other members of the community, which may foster a sense of connection and belonging.

As a result, considering the stress, anxiety and uncertainty that learners and educators face with the global epidemic, it is thought that social presence should take priority for learning to take place. In order for online distance education systems to create a successful and productive learning environment, it is important

for the participants to feel themselves as part of the group (Valentine, 2002). Undoubtedly, as the reality of COVID-19 continues to be a part of life, educators and learners are likely to miss physical presence. Although social distancing has become the new norm, most of the activities required to establish relationship and create a sense of belonging to the group can be done collectively but separately in online environments. Studies have shown that as in face-to-face education, using approaches that will attract students' attention and encourage learning and giving feedback (Haar, 2018), using educational technologies as an effective tool instead of making them a subject (Shea, 2006). structuring the content and teaching techniques considering that students have different learning styles (Cayci & Unal, 2007; Valentine, 2002), showing more sensitivity to the needs of students compared to formal education (Ribbe & Bezanilla, 2013), conducting lessons with smaller groups in a way that will increase the quality of interaction instead of crowded classrooms (Rovai, 2002), increasing instructor-student interaction (Shea, 2006), giving students responsibilities for their own learning in the form of individual and group work, making them realize that they are doing something for themselves and each other (Rovai, 2002), structured communication between lecturers, students, and technical assistance personnel (Shea, 2006) and giving students tasks with which they can cooperate (Rovai, 2002) strengthen the sense of community.

In this period, when the use of online education environments is increasingly on the agenda if the epidemic continues, in order to strengthen the sense of community in order to make education more efficient, learners can be given tasks that they can discuss and negotiate on, and group work can be given by pairing students who are enthusiastic enough to teach and want to learn. Online learning systems can be developed where students can work closely but separately with each other, and systems can be structured with an emphasis on social ties. In future studies, it is thought that the research can be repeated on different samples in a more expanded way in order to confirm the findings obtained from this study, how much augmented/virtual reality technologies can simulate a real classroom experience and its effect on student motivation can be examined.

BIODATA and CONTACT ADDRESSES of AUTHORS



Dr. Aysun GUNES is a lecturer of English at Anadolu University, a teacher trainer and also a Master Trainer on Educational Technology for Pearson. She holds an MA and a PhD in open and distance education. She has been a visiting scholar at the University of Jyväskylä within an E-SLP project called in “Digitally Competent Educators” Module 2. since 2019. Her interest areas are 21st century skills, micro-credentials, educational technology, teacher training, technology integration into ELT, learning management systems, MOOCs, instructional design and open and distance learning.

Aysun GUNES

Anadolu University

Address: Yunus Emre Campus, School of Foreign Languages, Tepebasi/Eskisehir

Phone: +90 5062480388

E-mail: aysung@anadolu.edu.tr



Dr. Emin OZEN is a Ph.D. Department of Distance Education. Since 2008, he has been working in schools affiliated to the Ministry of National Education mathematics teaching / management and instructor trainer duties in institutions Dr. OZEN is currently working as a Measurement and Evaluation Specialist in a unit affiliated to the Ministry of National Education and lectures at undergraduate and graduate level at Anadolu University. Mixed method research, scale development and adaptation, digital transformation in education, technological pedagogical content knowledge, attitudes and trends in distance education, quality in online distance education, learner support services, etc. He

has carried out more than 40 studies such as articles, full text and abstract papers, books, book chapters, etc. Currently he continues his 2nd master's degree in the field of Mathematics Education at Osmangazi University/Institute of Educational Sciences.

Emin OZEN
Department of Distance Education
Address: Anadolu University, 26470, Eskisehir, Turkiye
Phone: +90 5066892582
E-mail: eminozen@anadolu.edu.tr



Mona AYKUL is an e-learning expert and has a Master's degree in educational technology. She founded and managed the Distance Education Application and Research Center of the Turkish-German University between 2020-2022 and worked as a language lecturer at the same university for eight years. Her research focuses on e-learning, instructional design, contemporary learning methods, program design and education in the digital context. She presents her research topics in international congresses and conferences and contributes to the intercultural dialog in scientific terms between Germany and Turkiye.

Mona AYKUL
Graduate School for Social Science, Curriculum and Instruction
Address: Yildiz Technical University, 34220, Istanbul, Turkiye
Phone: +90 5432976626
E-mail: monaaykul@gmail.com

REFERENCES

- Arikan, R. (2018). Anket Yontemi Uzerine Bir Degerlendirme. *Halıc Universitesi Sosyal Bilimler Dergisi*, 1 (1), 97-159.
- Beeson, E., Aideyan, B., O'Shoney, C., Bowes, D. A., Ansell, K. L., & Peterson, H. M. (2019). Predicting Sense of Community among Graduate Students in a Distance Learning Environment. *Universal Journal of Educational Research*, 7(3), 746-753.
- Buyukozturk, S., Kilic Cakmak, E., Akgun, O. E., Karadeniz, S. ve Demirel, F. (2012). *Bilimsel Arastirma Yontemleri* (11. Baski). Ankara: PegemA Yayıncılık.
- Creswell, J. W. (2008). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research* (3rd ed.). Upper Saddle River, NJ: Pearson Education, Inc.
- Cayci, B., Unal, E. (2007). Examination of the learning styles of primary school teacher candidates according to various variables. *Journal of Science, Education and Thought*, 7(3), 1-16
- Chatterjee, R., & Correia, A. P. (2020). Online students' attitudes toward collaborative learning and sense of community. *American Journal of Distance Education*, 34(1), 53-68.
- De Carlo, LT (1997) On the Meaning and Use of Kurtosis. *Psychological Methods*, *American Psychological Association*, 2, 292-307. <http://dx.doi.org/10.1037/1082-989X.2.3.292>
- Dhawan, S. (2020). Online learning: A panacea in the time of COVID-19 crisis. *Journal of educational technology systems*, 49(1), 5-22.
- Enfiyeci, T., & Buyukalan-Filiz, S. (2019). Uzaktan egitim yuksek lisans ogrencilerinin topluluk hissinin cesitli degiskenler acisindan incelenmesi. *Tubav bilim dergisi*, 12(1), 20-32.
- Gumus, S. (2007). *Cevrimici isbirligi ekiplerinde ogrenenlerin sorun cozerek ogrenmeyle ilgili tutum ve gorusleri* (Yuksek Lisans Tezi). Yuksekogretim Kurulu Ulusal Tez Merkezi veri tabanından erisildi (Tez No. 210036)
- Haar, M. (2018). Increasing sense of community in higher education nutrition courses using technology. *Journal of Nutrition Education and Behavior*, 50(1), 96-99.

- Ilgaz, H., Askar, P. (2009). Cevrimici Uzaktan Egitim Ortaminda Topluluk Hissi Olcegi Gelistirme Calismasi. *Turkish Journal of Computer and Mathematics Education*. Vol.1 No.1 (2009),27-34.
- Kilinc, H., & Altinpulluk, H. (2021). Investigation of the Sense of Community Levels of Content Generating Learners' in Online Learning Environments in terms of Various Variables. *Cukurova University Faculty of Education Journal*, 50(2), 1127-1153
- Liu, X., Magjuka, R. J., Bonk, C. J., & Lee, S. H. (2007). Does sense of community matter? An examination of participants' perceptions of building learning communities in online courses. *Quarterly Review of Distance Education*, 8(1), 9.
- McMillan, D. W., & Chavis, D. M. (1986). Sense of community: A definition and theory. *Journal of community psychology*, 14(1), 6-23.
- Ozen, E. & Duzenli, H. (2023). Ogrenenlerin cevrimici uzaktan egitim ortamlarinda topluluk hissi gelistirme duzeylerinin farkli degiskenler baglaminda incelenmesi. *Acikogretim Uygulamalari ve Arastirmalari Dergisi (AUAd)*, 9(1), 316-336. <https://doi.org/10.51948/auad.1203894>
- Ribbe, E., & Bezanilla, M. J. (2013). Scaffolding learner autonomy in online university courses. *Digital Education Review*, 98-112.
- Rovai, A. P. (2002). Building sense of community at a distance. *International Review of Research in Open and Distributed Learning*, 3(1), 1-16.
- Shea, P. (2006). A study of students' sense of learning community in online environments. *Journal of Asynchronous Learning Networks*, 10(1), 35-44
- Star, E., (2020). An Investigation of Factors Affecting Distance Education Students' Sense of Community in Online Learning Environments. *Journal of Qualitative Studies in Education* . Vol.8 No.1(2020),180-205.
- Valentine, D. (2002). Distance learning: Promises, problems, and possibilities. *Online Journal of Distance Learning Administration*, 5(3), 1-11.
- Varol, M., Turel,Y.K. (2003). Cevrimici Uzaktan Egitimde Iletisim Modulu. *The Turkish Online Journal of Educational Technology*. Vol. 2 No.1 (2003), 34-42
- Wang, S. K. (2008). The effects of a synchronous communication tool (yahoo messenger) on online learners' sense of community and their multimedia authoring skills. *Journal of Interactive Online Learning*, 7(1), 59-74
- Yildiz, E. (2020). Cevrimici ogrenme ortamlarinda uzaktan egitim ogrencilerinin topluluk hissine etki eden faktorlerin incelenmesi. *Egitimde Nitel Arastirmalar Dergisi*, 8(1), 180- 205.
- Yildiz, E. (2018). Cevrimici ortamlarda topluluk hissi olceginin Turkce'ye uyarlanmasi guvenirlilik ve gecerlik calismasi. *Egitim Teknolojisi Kuram ve Uygulama*, 8(1), 24-38

TEACHERS' PERCEPTIONS ABOUT THE USE OF LEARNING MANAGEMENT SYSTEMS DURING THE COVID-19 PANDEMIC CONSIDERING DATA SCIENCE

Dr. Ricardo-Adan SALAS-RUEDA

ORCID: 0000-0002-4188-4610
Instituto de Ciencias Aplicadas y Tecnologia
Universidad Nacional Autonoma de Mexico
Mexico City, MEXICO

Dr. Clara ALVARADO-ZAMORANO

ORCID: 0000-0001-9122-7590
Instituto de Ciencias Aplicadas y Tecnologia
Universidad Nacional Autonoma de Mexico
Mexico City, MEXICO

Received: 19/03/2022 **Accepted:** 15/02/2023

ABSTRACT

Technological advances such as Learning Management System (LMS) are changing the teaching-learning conditions, organization of school activities and functions of educators. In particular, the use of LMS in the educational field is necessary due to the appearance of the SARS-CoV-2 virus. This quantitative research analyzes the teachers' perception about the use of LMS during the COVID-19 pandemic considering data science. The sample is 115 teachers from the National Autonomous University of Mexico. These teachers took the "Classroom of the Future 2020" Diploma in order to create new educational spaces. The results of the machine learning technique indicate that the performance of the school activities in LMS positively influences the learning process, motivation and participation of the students during the COVID-19 pandemic. Also, the decision tree technique identifies three predictive models about the use of this technological tool in the educational field considering the academic level and sex of the teachers. In conclusion, educators can improve the learning conditions, organize creative activities inside and outside the classroom, achieve the innovation in the educational context and build virtual spaces through LMS.

Keywords: Learning Management System, teaching, learning, data science, COVID-19.

INTRODUCTION

Technological tools and Internet are revolutionizing the planning and organization of the school activities (Castillo-Cuesta et al., 2022; Rashid, Guo, & Babenko, 2020; Sezer & Yilmaz, 2019). In fact, the emergence of LMS is causing a substantial transformation in the roles of educators and students during the teaching-learning process (Alserhan & Yahaya, 2021; Hanafi et al., 2020; Ueda et al., 2018). LMS allows the delivery, dissemination and administration of e-learning courses (Alhosban & Ismaile, 2018; Koh & Kan, 2020; Sabirova et al., 2019). For example, Moodle facilitates the realization of the student-centered activities from anywhere (Muñoz et al., 2017; Ueda et al., 2018). Also, the use of this technological tool facilitates the construction of new educational virtual spaces and increases the motivation of the students (Aldiab et al., 2019; Koh & Kan, 2020; Moonsamy & Govender, 2018).

According to Zanjani et al. (2017), LMS promotes the active role, collaboration, critical thinking and construction of knowledge. In fact, Blackboard allows that teachers organize creative activities where students participate before, during and after the face-to-face sessions (Gibeault, 2018; Zanjani et al., 2017). Teachers use LMS to plan and carry out the activities inside and outside the classroom (Alserhan & Yahaya, 2021; Fathema & Akanda, 2020; Ohliati & Abbas, 2019). In particular, Blackboard and Blended Learning

(BL) allow the interaction and communication between the participants of the educational process at any time (Liu, 2016). Also, LMS has a fundamental role to update the school activities in the distance modality (Beyatli, Altinay, & Altinay, 2018; Fathema & Akanda, 2020). For example, the use of Moodle (Sabirova et al., 2019), Blackboard (Liu, 2016), Edmodo (Wahyuni et al., 2020) and Canvas (Fathema & Akanda, 2020) in educational institutions improve the teaching-learning conditions during the 21st century.

Various authors (e.g., Fathema & Akanda, 2020; Wahyuni et al., 2020) mention that the incorporation of technology in the educational field increases the academic performance, satisfaction and motivation of the students. In fact, teachers use Information and Communication Technologies (ICTs) to build new spaces where students have the main role during the educational process (Sabirova et al., 2019; Sanchez-Gonzalez & Castro-Higueras, 2022; Wang, 2022; Xue, 2022). In particular, the use of LMS in the educational field is necessary due to the conditions caused by the SARS-CoV-2 virus. Therefore, this quantitative research analyzes the teachers' perception about the use of LMS considering data science. The research questions are:

- What is the teachers' perception about the use of LMS for the performance of the school activities?
- How the performance of the school activities in LMS influences the learning process, motivation and participation of the students during the COVID-19 pandemic considering the linear regression technique?
- What are the predictive models about the use of LMS in the educational field considering the decision tree technique?

LITERATURE REVIEW

Due to the appearance of the SARS-CoV-2 virus, educators incorporated LMS to facilitate the learning from anywhere, delivery of the activities, realization of the discussion forums, communication and consultation of the school resources at any time. In particular, this quantitative research analyzes the teachers' perception about the use of LMS during the COVID-19 pandemic considering data science in order to discover new information about this technological tool.

Today, Moodle, Blackboard and Canvas allow the creation of new school activities that favor the assimilation of knowledge and development of skills (Beyatli, Altinay, & Altinay, 2018; Fathema & Akanda, 2020; Hanafi et al., 2020; Wahyuni et al., 2020). For example, LMS have improved the teaching-learning conditions in the courses of Recruitment and employment management (Liu, 2016), Medicine (Alhosban & Ismaile, 2018), Sciences (Wahyuni et al., 2020), Health (Zain, Fadil, & Hadi, 2018), English language (Beyatli, Altinay, & Altinay, 2018) and Islamic Education (Hanafi et al., 2020).

Teachers use LMS as a support tool during the performance of the school activities (Fathema & Akanda, 2020; Hanafi et al., 2020; Wahyuni et al., 2020). For example, Canvas facilitated the assimilation of knowledge, development of competencies and communication at the higher educational level (Fathema & Akanda, 2020). In the field of Sciences, the students consulted the audiovisual contents and didactic resources in Edmodo to assimilate the knowledge and develop their skills at any time (Wahyuni et al., 2020).

Educational institutions use LMS to transmit the materials of the courses, submit the online announcements, receive the assignments, disseminate the grades and communicate with the students (Alserhan & Yahaya, 2021; Zain, Fadil, & Hadi, 2018; Wahyuni et al., 2020). In the Faculty of Health, the use of Moodle facilitated the realization of the online exams and organization of the student-centered activities (Zain, Fadil, & Hadi, 2018). On the other hand, Hanafi et al. (2020) propose the use of the LMS called e-BBQ together with the ADDIE pedagogical model to transform the Islamic Education course. Likewise, Edmodo transformed the roles of teachers and students in the secondary schools (Beyatli, Altinay, & Altinay, 2018). In the English Language course, this LMS increased the motivation of the students, developed the oral skills and facilitated the feedback of the school activities (Beyatli, Altinay, & Altinay, 2018).

According to Moonsamy and Govender (2018), the advantages about the use of Blackboard in the educational field are the ease of use and availability of information at any time and place. In the Recruitment and Employment Management course, the teacher used Blackboard and BL to organize creative school activities such as the discussion forums, consultation of the multimedia resources and realization of the online exams (Liu, 2016). Also, the consultation of materials such as digital presentations and multimedia resources in

Blackboard improved the academic performance of the students and facilitated the dissemination of the grades, delivery of the school activities and sending of the messages during the Medicine course (Alhosban & Ismaile, 2018). In addition, the students of the Physics course actively participated inside and outside the classroom through Moodle (Sabirova et al., 2019). Finally, technological advances such as LMS allow the updating of courses, construction of new educational spaces and organization of creative school activities (Aldiab et al., 2019; Juhanak, Zounek, & Rohlikova, 2019).

METHOD

Data science and Machine Learning algorithms allow the identification of new information about the incorporation of technological tools in the educational field to make the decisions (Immekus et al., 2022; Yagci, 2022). The linear regression technique allows evaluating the research hypotheses (Lincke et al., 2021; Salas-Rueda et al., 2023). On the other hand, the decision tree technique facilitates the construction of models to discover valuable information (Nti et al., 2022; Salas-Rueda, 2022).

This work used the Machine Learning algorithms on linear regression and decision tree to analyze the use of LMS during the COVID-19 pandemic. The particular aims of this quantitative research are (1) analyze the teachers' perception about the use of LMS for the performance of the school activities (2) analyze how the performance of the school activities in LMS influences the learning process, motivation and participation of the students during the COVID-19 pandemic considering the linear regression technique and (3) identify the predictive models about the use of LMS in the educational field considering the decision tree technique.

Participants

The sample is composed of 115 teachers (53 men and 62 women) from the National Autonomous University of Mexico who have the Bachelor (n = 32, 27.83%), Specialty (n = 4, 3.48%), Master (n = 55, 47.83%) and Doctorate (n = 24, 20.87%). These teachers come from the Institute of Geophysics, National Preparatory School no. 7, Faculty of Philosophy and Letters, Faculty of Psychology, Institute of Geology and CCH Vallejo.

Procedure

The teachers of the National Autonomous University of Mexico took the "Classroom of the Future 2020" Diploma in order to create new educational spaces through the incorporation of pedagogy and technological tools in the school activities (See Figure 1). For example, educators can organize the discussion forums, share the multimedia resources of the courses, receive the assignments from anywhere and promote the active role of the students through LMS.

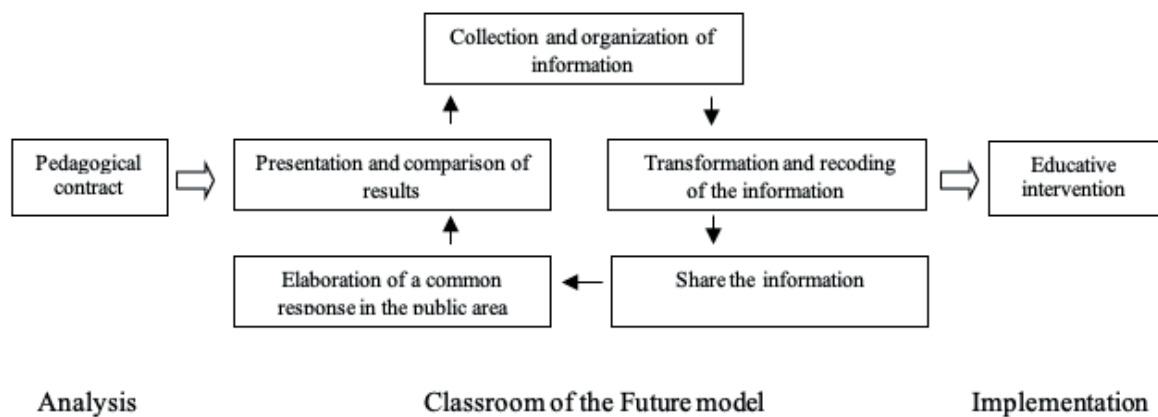


Figure 1. "Innovation in University Teaching 2020" Diploma

This research proposes the following model to analyze the use of this technological tool in the educational field (See Figure 2).

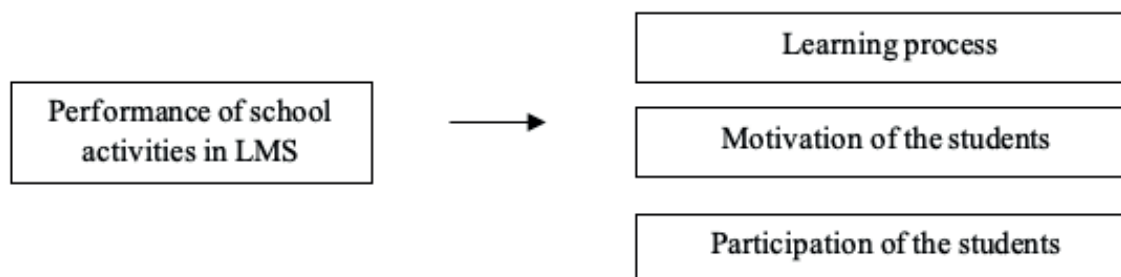


Figure 2. Model about the impact of LMS

Various authors (e.g., Muñoz-Arteaga et al., 2022; Sanchez-Gonzalez & Castro-Higueras, 2022) mention that technological advances such as LMS allow the realization of the school activities in the distance modality and cover the educational needs caused by the SARS-CoV-2 virus. Therefore, the research hypotheses about the use of LMS in the educational field are:

- Hypothesis 1 (H1): The performance of the school activities in LMS positively influences the learning process during the COVID-19 pandemic
- Hypothesis 2 (H2): The performance of the school activities in LMS positively influences the motivation of the students during the COVID-19 pandemic
- Hypothesis 3 (H3): The performance of the school activities in LMS positively influences the participation of the students during the COVID-19 pandemic

The decision tree technique allows identifying the following predictive models about the use of LMS in the educational field:

- Predictive Model 1 (PM1) about the performance of the school activities in LMS and learning process during the COVID-19 pandemic
- Predictive Model 2 (PM2) about the performance of the school activities in LMS and motivation of the students during the COVID-19 pandemic
- Predictive Model 3 (PM3) about the performance of the school activities in LMS and participation of the students during the COVID-19 pandemic

Data Collection

Data collection was carried out through a questionnaire during the “Classroom of the Future 2020” Diploma at the National Autonomous University of Mexico (See Table 1).

Table 1. Questionnaire about LMS

No.	Variable	Dimension	Question	Answer	n	%
1	Profile of teacher	Sex	1. Indicate your sex	Man	53	46.09%
				Woman	62	53.91%
	Academic level	2. Indicate your academic level	Bachelor	32	27.83%	
			Specialty	4	3.48%	
Master			55	47.83%		
			Doctorate	24	20.87%	

2	Technology in the educational field	LMS	3. LMS facilitate the performance of the school activities	Very much (1)	56	48.70%
				Much (2)	39	33.91%
				Little (3)	19	16.52%
				Very little (4)	1	0.87%
		Learning process	4. ICTs improve the learning process during the COVID-19 pandemic	Very much (1)	53	46.09%
				Much (2)	42	36.52%
		Little (3)	20	17.39%		
		Very little (4)	0	0.00%		
	Motivation of the students	5. ICTs improve the motivation of the students during the COVID-19 pandemic	Very much (1)	53	46.09%	
			Much (2)	48	41.74%	
			Little (3)	14	12.17%	
			Very little (4)	0	0.00%	
	Participation of the students	6. ICTs improve the participation of the students during the COVID-19 pandemic	Very much (1)	56	48.70%	
			Much (2)	43	37.39%	
			Little (3)	15	13.04%	
			Very little (4)	1	0.87%	

Table 2 shows the validation for the questionnaire about the use of LMS in the educational field.

Table 2. Validation of the questionnaire

Variable	Dimension	Load factor	Cronbach's Alpha	Average Variance Extracted	Composite Reliability
Technology in the educational field	LMS	0.711	0.850	0.696	0.901
	Learning process	0.901			
	Motivation of the students	0.835			
	Participation of the students	0.878			

Data Analysis

The Rapidminer tool allows calculating the linear regressions to analyze the teachers' perception on the use of LMS during the COVID-19 pandemic and building the predictive models about this technological tool (See Figure 3).

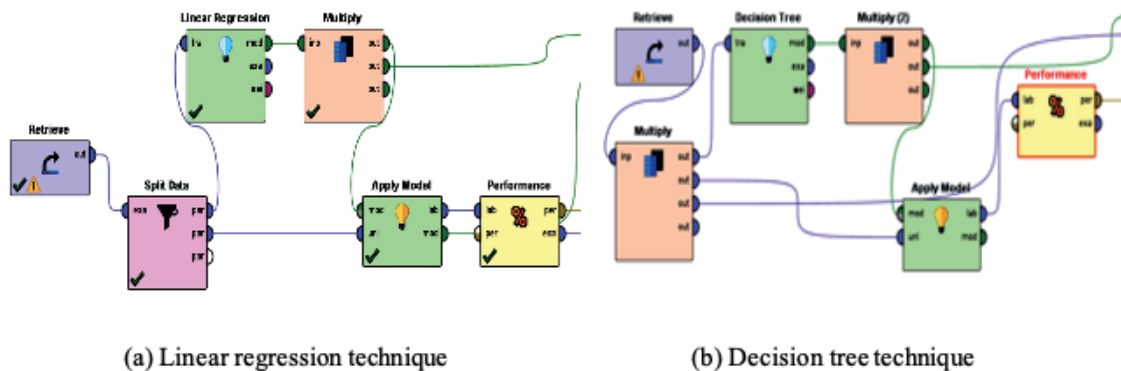


Figure 3. RapidMiner tool

In the machine learning technique, the training section is composed of 50% (n = 58), 60% (n = 69) and 70% (n = 81) of the sample and allows calculating the linear regressions to evaluate the research hypotheses. The independent variable is the performance of the school activities in LMS and the dependent variables are the learning process, motivation and participation of the students during the COVID-19 pandemic. Also, the evaluation section is composed of 50% (n = 57), 40% (n = 46) and 30% (n = 34) of the sample and allows identifying the accuracy of these linear regressions by means of the squared error.

Likewise, data science allows identifying 3 predictive models about the use of LMS and profile of the teachers (sex and academic level) through the decision tree technique. In this Machine Learning technique, the objective variables are the learning process, motivation and participation of the students during the COVID-19 pandemic.

FINDINGS

LMS facilitate very much (n = 56, 48.70%), much (n = 39, 33.91%), little (n = 19, 16.52%) and very little (n = 1, 0.87%) the performance of school activities (See Table 1). The results of machine learning technique indicate that the performance of the school activities in LMS positively influences the learning process, motivation and participation of the students during the COVID-19 pandemic (See Table 3).

Table 3. Results of machine learning technique

Hypothesis	Training	Linear regression	Conclusion	Squared error
H1: Performance of the school activities in LMS → learning process	50%	$y = 0.654x + 0.640$	Accepted: 0.654	0.545
	60%	$y = 0.596x + 0.684$	Accepted: 0.596	0.562
	70%	$y = 0.529x + 0.776$	Accepted: 0.529	0.469
H2: Performance of the school activities in LMS → motivation of the students	50%	$y = 0.504x + 0.846$	Accepted: 0.504	0.474
	60%	$y = 0.412x + 0.938$	Accepted: 0.412	0.479
	70%	$y = 0.350x + 1.015$	Accepted: 0.350	0.467
H3: Performance of the school activities in LMS → participation of the students	50%	$y = 0.604x + 0.738$	Accepted: 0.604	0.398
	60%	$y = 0.616x + 0.692$	Accepted: 0.616	0.356
	70%	$y = 0.529x + 0.776$	Accepted: 0.529	0.223

Learning Process

ICTs improve very much (n = 53, 46.09%), much (n = 42, 36.52%) and little (n = 20, 17.39%) the learning process during the COVID-19 pandemic (See Table 1). The results of machine learning technique with 50% (0.654), 60% (0.596) and 70% (0.529) of training indicate that H1 is accepted (See Table 3). Therefore, the performance of the school activities in LMS positively influences the learning process during the COVID-19 pandemic.

Table 4 presents 12 conditions of the PM1 with an accuracy of 66.96%. For example, if the teacher considers that LMS facilitate very much the performance of the school activities and has the academic level of Doctorate then ICTs improve very much the learning process during the COVID-19 pandemic.

Table 4. Conditions of the PM1

No.	LMS → performance of the school activities	Sex	Academic level	ICTs → learning process
1	Very much	-	Bachelor	Very much
2	Very much	-	Specialty	Much
3	Very much	-	Master	Very much
4	Very much	-	Doctorate	Very much
5	Much	-	-	Much
6	Little	Man	Bachelor	Much
7	Little	Woman	Bachelor	Little
8	Little	Man	Master	Little
9	Little	Woman	Master	Very much
10	Little	Man	Doctorate	Much
11	Little	Woman	Doctorate	Very much
12	Very little	-	-	Little

The sex of the educators determines 6 conditions of the PM1. For example, if the teacher considers that LMS facilitate little the performance of the school activities, is a woman and has the academic level of Bachelor then ICTs improve little the learning process during the COVID-19 pandemic.

Also, the academic level of the educators determines 10 conditions of the PM1. For example, if the teacher considers that LMS facilitate very much the performance of the school activities and has the academic level of Master then ICTs improve very much the learning process during the COVID-19 pandemic.

Motivation of the Students

ICTs improve very much (n = 53, 46.09%), much (n = 48, 41.74%) and little (n = 14, 12.17%) the motivation of the students during the COVID-19 pandemic (See Table 1). The results of machine learning technique with 50% (0.504), 60% (0.412) and 70% (0.350) of training indicate that H2 is accepted (See Table 3). Therefore, the performance of the school activities in LMS positively influences the motivation of the students during the COVID-19 pandemic.

Table 5 presents 10 conditions of the PM2 with an accuracy of 68.70%. For example, if the teacher considers that LMS facilitate very much the performance of the school activities and has the academic level of Doctorate then ICTs improve very much the motivation of the students during the COVID-19 pandemic.

Table 5. Conditions of the PM2

No.	LMS → performance of the school activities	Sex	Academic level	ICTs → motivation of the students
1	Very much	-	Bachelor	Very much
2	Very much	-	Specialty	Much
3	Very much	-	Master	Very much
4	Very much	-	Doctorate	Very much
5	Much	-	-	Much
6	Little	-	Bachelor	Much
7	Little	-	Master	Much
8	Little	Man	Doctorate	Little
9	Little	Woman	Doctorate	Much
10	Very little	-	-	Much

The sex of the educators determines 2 conditions of the PM2. For example, if the teacher considers that LMS facilitate little the performance of the school activities, is a man and has the academic level of Doctorate then ICTs improve little the motivation of the students during the COVID-19 pandemic.

Also, the academic level of the educators determines 8 conditions of the PM2. For example, if the teacher considers that LMS facilitate very much the performance of the school activities and has the academic level of Bachelor then ICTs improve very much the motivation of the students during the COVID-19 pandemic.

Participation of the Students

ICTs improve very much (n = 56, 48.70%), much (n = 43, 37.39%), little (n = 15, 13.04%) and very little (n = 1, 0.87%) the participation of the students during the COVID-19 pandemic (See Table 1). The results of machine learning technique with 50% (0.604), 60% (0.616) and 70% (0.529) of training indicate that H3 is accepted (See Table 3). Therefore, the performance of the school activities in LMS positively influences the participation of the students during the COVID-19 pandemic.

Table 6 presents 11 conditions of PM3 with an accuracy of 73.04%. For example, if the teacher considers that LMS facilitate very much the performance of the school activities and has the academic level of Doctorate then ICTs improve very much the participation of the students during the COVID-19 pandemic.

Table 6. Conditions of the PM3

No.	LMS → performance of the school activities	Sex	Academic level	ICTs → participation of the students
1	Very much	-	Bachelor	Very much
2	Very much	-	Specialty	Much
3	Very much	-	Master	Very much
4	Very much	-	Doctorate	Very much
5	Much	-	-	Much
6	Little	Man	Bachelor	Much
7	Little	Woman	Bachelor	Little
8	Little	Man	Master	Little
9	Little	Woman	Master	Much
10	Little	-	Doctorate	Very much
11	Very little	-	-	Very little

The sex of the educators determines 4 conditions of the PM3. For example, if the teacher considers that LMS facilitate little the performance of the school activities, is a woman and has the academic level of Bachelor then ICTs improve little the participation of the students during the COVID-19 pandemic.

The academic level of the educators determines 4 conditions of the PM3. For example, if the teacher considers that LMS facilitate very much the performance of the school activities and has the academic level of Bachelor then ICTs improve very much the participation of the students during the COVID-19 pandemic. Finally, Table 7 shows the Pearson correlations about LMS, learning process, motivation and participation of the students.

Table 7. Pearson correlations

	LMS	Learning process	Motivation of the students	Participation of the students
LMS	1	-	-	-
Learning process	0.500	1	-	-
Motivation of the students	0.382	0.750	1	-
Participation of the students	0.571	0.715	0.621	1

DISCUSSION

During the 21st century, teachers use LMS to build new educational spaces (Bervell, Nyagorme, & Arkorful, 2020; Capacho, Jimeno, & Salazar, 2019; Sezer & Yilmaz, 2019). As mentioned by Fathema and Akanda (2020), the use of LMS in the educational field allows the assimilation of knowledge, development of competencies and

communication. In particular, 48.70% of educators consider that LMS facilitate very much the performance of school activities. In fact, teachers can organize the discussion forums and share the multimedia resources of the courses through this technological tool. Also, LMS facilitate much ($n = 39$, 33.91%) the performance of school activities. Therefore, most of the participants have a favorable opinion about this aspect.

Learning Process

The use of technology in the educational field allows improving the conditions for the learning process (Lakarnchua, Balme, & Matthews, 2020; Nieuwoudt, 2020; Wang, 2022). For example, LMS is an educational tool that encourages the active role at any time (Annamalai et al., 2021; Salas-Rueda et al., 2022; Wahyuni et al., 2020). In fact, 46.09% of the educators think that ICTs improve very much the learning process during the COVID-19 pandemic. Further, teachers use LMS to receive and grade the assignments from anywhere. Also, ICTs improve much ($n = 42$, 36.52%) the learning process during the COVID-19 pandemic. Therefore, most of the participants have a favorable opinion about this aspect.

As mentioned by Wahyuni et al. (2020), the incorporation of LMS in the educational field facilitates the assimilation of knowledge and development of skills. According to Lincke et al. (2021), Machine Learning algorithms allow evaluating the research hypotheses by means of the linear regression technique. The results of machine learning technique on H1 are greater than 0.520, therefore, the performance of the school activities in LMS positively influences the learning process during the COVID-19 pandemic. The function, $y = 0.529x + 0.776$, allows predicting this educational phenomenon with a squared error of 0.469.

Data science identifies 12 conditions of PM1 with an accuracy of 66.96%. In this predictive model, the sex and academic level of the educators determine the relationship between the use of LMS and ICTs for the learning process through the decision tree technique. For example, if the teacher considers that LMS facilitate very much the performance of the school activities and has the academic level of Doctorate then ICTs improve very much the learning process during the COVID-19 pandemic. Likewise, the correlation coefficient on LMS and learning process is higher than 0.490.

Motivation of the Students

LMS allow the creation of educational spaces that increase the motivation of students inside and outside the classroom (Bervell, Nyagorme, & Arkorful, 2020; Koh & Kan, 2020; Sezer & Yilmaz, 2019). In particular, 46.09% of the educators consider that ICTs improve very much the motivation of the students during the COVID-19 pandemic. Educational institutions organize creative school activities in the distance modality through LMS. Also, ICTs improve much ($n = 48$, 41.74%) the motivation of the students during the COVID-19 pandemic. Therefore, most of the participants have a favorable opinion about this aspect.

In addition, Sabirova et al. (2019) explain that the use of the LMS facilitates the construction of new spaces for learning and teaching in the distance modality. The results of machine learning on H2 are higher than 0.349, therefore, the performance of the school activities in LMS positively influences the motivation of the students during the COVID-19 pandemic. The function, $y = 0.350x + 1.015$, allows predicting this educational phenomenon with a squared error of 0.467.

According to Zain et al. (2018), the use of LMS allows the planning and carrying out of student-centered activities. Data science identifies 10 conditions of the PM2 with 68.70% accuracy. In this predictive model, the sex and academic level of the educators determine the relationship between the use of LMS and ICTs for the motivation of the students through the decision tree technique. For example, if the teacher considers that LMS facilitate very much the performance of the school activities and has the academic level of Bachelor then ICTs improve very much the motivation of the students during the COVID-19 pandemic. Likewise, the correlation coefficient on LMS and motivation is greater than 0.380.

Participation of the Students

Teachers organize and carry out creative activities to facilitate the participation of students before, during and after the class through the use of technological advances (Castillo-Cuesta et al., 2022; Cheah, 2020; Wang, 2022). As Alserhan and Yahaya (2021) point out, educators use LMS to submit the online announcements,

disseminate the grades, transmit the educational materials and communicate with the students. For example, 48.70% of the educators consider that ICTs improve very much the participation of the students during the COVID-19 pandemic. In fact, educational institutions use LMS to promote the active role of the participants. Also, ICTs improve much ($n = 43$, 37.39%) the participation of the students during the COVID-19 pandemic. Therefore, most of the participants have a favorable opinion about this aspect.

Various authors (e.g., Sabirova et al., 2019; Wahyuni et al., 2020) mention that the use of LMS facilitates the participation of the students. The results of machine learning on H3 are higher than 0.520, therefore, the performance of the school activities in LMS positively influences the participation of the students during the COVID-19 pandemic. The function, $y = 0.529x + 0.776$, allows predicting this educational phenomenon with a squared error of 0.223.

Data science identifies 11 conditions of PM3 with the accuracy of 73.04%. In this predictive model, the sex and academic level of the educators determine the relationship between the use of LMS and ICTs for the participation of the students through the decision tree technique. For example, if the teacher considers that LMS facilitate very much the performance of the school activities and has the academic level of Bachelor then ICTs improve very much the participation of the students during the COVID-19 pandemic. Likewise, the correlation coefficient on LMS and participation is greater than 0.570.

Finally, educational institutions together with teachers have the possibility of improving the learning process through technology (Castillo-Cuesta et al., 2022; Kadioglu, Tacgin, & Sahin, 2020; Oinas et al., 2020). In particular, LMS transforms the functions, behavior and roles of participants during the educational process (Capacho, Jimeno, & Salazar, 2019; Lakarnchua, Balme, & Matthews, 2020; Ozkan, Cigdem, & Erdogan, 2020).

CONCLUSION

Educators use technological advances to improve the teaching-learning conditions. In particular, LMS facilitate the organization of new educational spaces for the consultation and delivery of the school activities from anywhere. The results of the machine learning technique indicate that the performance of the school activities in LMS positively influences the learning process, motivation and participation of the students during the COVID-19 pandemic.

The implications of this research are the incorporation of LMS in educational institutions to facilitate the active role of the students, update the courses in the distance modality and create new school activities. In fact, the use of LMS in the educational field is necessary due to the conditions caused by the SARS-CoV-2 virus. For example, teachers can use the LMS to organize new school activities such as discussion forums, online exams and consultation of multimedia resources at any time.

The limitations of this study are the perception of the teachers and analysis about the use of LMS and ICTs for the learning process, motivation and participation. Therefore, future research can analyze the impact this technological tool for the communication and development of skills considering the opinion of students and educators.

This research recommends that educational institutions and educators use LMS to cover the educational needs under the distance modality. In conclusion, LMS represent a technological alternative to transform the teaching-learning conditions and update the school activities of the courses during the COVID-19 pandemic.

Authors' Note: This research product received the support of the following the PAPIIME projects: PE106420 (El Aula del Futuro del CCH Vallejo), PE102920 (El Aula del Futuro del Instituto de Geofísica), PE106419 (El Aula del Futuro: de la Escuela Nacional Preparatoria 7), PE314819 (SUAYED de la Facultad de Filosofía y Letras), PE306619 (El Aula del Futuro: SUA de la Facultad de Psicología) and PE104720 (El Aula del Futuro del Instituto de Geología).

BIODATA and CONTACT ADDRESSES of AUTHORS



Dr. Ricardo-Adan SALAS-RUEDA is a full-time researcher at the Instituto de Ciencias Aplicadas y Tecnologia, Universidad Nacional Autonoma de Mexico. Dr. Ricardo-Adan gained his Ph.D. in New Technologies Design at July, 2014. His academic interest areas are educative technology, web application design, data science, machine learning and neural networks. He has 42 journal articles published in international indexes, 10 international book chapters and 4 international books.

Ricardo-Adan SALAS-RUEDA

Instituto de Ciencias Aplicadas y Tecnologia, Universidad Nacional Autonoma de Mexico

Address: Circuito Exterior S/N, Ciudad Universitaria, 04510, Mexico City, Mexico.

Phone: +55 5622 8601

E-mail: ricardo.salas@icat.unam.mx



Dr. Clara ALVARADO-ZAMORANO is a Titular Academic Technician “C” at the Instituto de Ciencias Aplicadas y Tecnologia, Universidad Nacional Autonoma de Mexico. Dra. Clara gained her Ph.D. in Research in Teaching and Learning of Experimental, Social Sciences and Mathematics at July, 2012. Her academic interest areas are pedagogy and educative technology. She has 13 journal articles published in international indexes, 4 international book chapters and 6 international books.

Clara ALVARADO-ZAMORANO

Instituto de Ciencias Aplicadas y Tecnologia, Universidad Nacional Autonoma de Mexico

Address: Circuito Exterior S/N, Ciudad Universitaria, 04510, Mexico City, Mexico.

Phone: +55 5622 8601

E-mail: clara.alvarado@icat.unam.mx

REFERENCES

- Aldiab, A., Chowdhury, H., Kootsookos, A., Alam, f., & Allhibi, H. (2019). Utilization of Learning Management Systems (LMSs) in higher education system: A case review for Saudi Arabia. *Energy Procedia*, 160, 731-737.
- Alhosban, F. & Ismaile, S. (2018). Perceived Promoters of and Barriers to Use of a Learning Management System in an Undergraduate Nursing Program. *International Journal of Emerging Technologies in Learning*, 13(2), 226-233.
- Annamalai, N., Ramayah, T., Kumar, J. A., & Osman, S. (2021). Investigating the Use of Learning Management System (LMS) for Distance Education in Malaysia: A Mixed-Method Approach. *Contemporary Educational Technology*, 13(3), ep313.
- Alserhan, S., & Yahaya, N. (2021). Teachers' Perspective on Personal Learning Environments via Learning Management Systems Platform. *International Journal of Emerging Technologies in Learning*, 16(24), 57-73.
- Bervell, B., Nyagorme, P., & Arkorful, V. (2020). LMS-Enabled Blended Learning Use Intentions among Distance Education Tutors: Examining the Mediation Role of Attitude Based on Technology-Related Stimulus-Response Theoretical Framework. *Contemporary Educational Technology*, 12(2), ep273.

- Beyatli, O., Altinay, F., & Altinay, Z. (2018). Evaluation of the Users of Edmodo Content Management System in Secondary Education. *EURASIA Journal of Mathematics, Science and Technology Education*, 14(7), 3191-3195.
- Capacho, J., Jimeno, M., & Salazar, A. (2019). Operational Indicators of the Learning Management System in Virtual Spaces Supported by ICT. *Turkish Online Journal of Distance Education*, 20(3), 103-118.
- Castillo-Cuesta, L., Ochoa-Cueva, C., & Cabrera-Solano, P. (2022). Virtual Workspaces for Enhancing Collaborative Work in EFL Learning: A Case Study in Higher Education. *International Journal of Emerging Technologies in Learning*, 17(2), 4-18.
- Cheah, C. S. (2020). Factors Contributing to the Difficulties in Teaching and Learning of Computer Programming: A Literature Review. *Contemporary Educational Technology*, 12(2), ep272.
- Fathema, N. & Akanda, M. H. (2020). Effects of instructors' academic disciplines and prior experience with learning management systems: A study about the use of Canvas. *Australasian Journal of Educational Technology*, 36(4), 113-125.
- Gibeault, M. J. (2018). Organization of Materials and Accessing the Library in Blackboard: A Learner-centered Usability Study. *The Journal of Academic Librarianship*, 44(2), 190-195.
- Hanafi, Y., Murtadho, N., Ikhsan, M. A., & Diyana, T. N. (2020). Reinforcing Public University Student's Worship Education by Developing and Implementing Mobile- Learning Management System in the ADDIE Instructional Design Model. *International Journal of Interactive Mobile Technologies*, 14(2), 215-240.
- Immekus, J. C., Jeong, T. & Yoo, J. E. (2022). Machine learning procedures for predictor variable selection for schoolwork-related anxiety: evidence from PISA 2015 mathematics, reading, and science assessments. *Large-scale Assessments in Education*, 10, 1-12.
- Juhanak, L., Zounek, J., & Rohlikova, L. (2019). Using process mining to analyze students' quiz-taking behavior patterns in a learning management system. *Computers in Human Behavior*, 92, 496-506.
- Kadioglu, M., Tacgin, Z., & Sahin, N. (2020). Instructional Design and Material Development Progress to eLearning Environments: A Sample of Obstetrical Nursing Education. *Contemporary Educational Technology*, 12(1), ep265.
- Koh, J. H. L. & Kan, R. Y. P. (2020). Perceptions of learning management system quality, satisfaction, and usage: Differences among students of the arts. *Australasian Journal of Educational Technology*, 36(3), 26-40.
- Lakarnchua, O., Balme, S., & Matthews, A. (2020). Insights from the implementation of a flipped classroom approach with the use of a commercial learning management system. *Turkish Online Journal of Distance Education*, 21(3), 63-76.
- Lincke, A., Jansen, M., Milrad, M., & Berge, E. (2021). The performance of some machine learning approaches and a rich context model in student answer prediction. *Research and Practice in Technology Enhanced Learning*, 16, 1-10.
- Liu, H. (2016). An Analysis on Blended Learning Pattern Based on Blackboard Network Platform. *International Journal of Emerging Technologies in Learning*, 11(9), 4-8.
- Muñoz-Arteaga, J., Muñoz-Zavala, A. E., & Cardona-Reyes, H. (2022). Challenges of inclusive teaching at elementary school level during COVID-19. *Campus Virtuales*, 11(1), 125-135.
- Nieuwoudt, J. E. (2020). Investigating synchronous and asynchronous class attendance as predictors of academic success in online education. *Australasian Journal of Educational Technology*, 36(3), 15-25.
- Nti, I. K., Akyeramfo-Sam, S., Bediako-Kyeremeh, B., & Agyemang, S. (2022). Prediction of social media effects on students' academic performance using Machine Learning Algorithms (MLAs). *Journal of Computers in Education*, 9, 195-223.
- Ohliati, J. & Abbas, B. S. (2019). Measuring Students Satisfaction in Using Learning Management System. *International Journal of Emerging Technologies in Learning*, 14(4), 180-189.

- Oinas, S. E., Thuneberg, H., Vainikainen, M. P., & Hotulainen, R. (2020). Technology-enhanced Feedback Profiles and their Associations with Learning and Academic Well-being Indicators in Basic Education. *Contemporary Educational Technology, 12*(2), ep271.
- Ozkan, U., Cigdem, H., & Erdogan, T. (2020). Artificial neural network approach to predict lms acceptance of vocational school students. *Turkish Online Journal of Distance Education, 21*(3), 156-169.
- Moonsamy, D. & Govender, I. (2018). Use of Blackboard Learning Management System: An Empirical Study of Staff Behavior at a South African University. *EURASIA Journal of Mathematics, Science and Technology Education, 14*(7), 3069-3082.
- Muñoz, A., Delgado, R., Rubio, E., Grilo, C., & Basto-Fernandes, V. (2017). Forum participation plugin for Moodle: Development and Discussion. *Procedia Computer Science, 121*, 982-989.
- Rashid, M., Guo, Q., & Babenko, O. (2020). The Influence of Students' Perceptions of Learning Environment on Coping with Academic Challenges: A Structural Equation Modeling Study. *Teaching and Learning in Medicine, 32*(2), 204-217.
- Sabirova, F. M., Shurygin, V. Y., Deryagin, A. V., & Sahabiev, I. A. (2019). Historical and Biographical Approaches towards Teachers Training in Learning Physics Using Moodle LMS. *EURASIA Journal of Mathematics, Science and Technology Education, 15*(3), 1-8.
- Salas-Rueda, R. A. (2022). Use of flipped classroom in the teaching-learning process on descriptive statistics. *Turkish Online Journal of Distance Education, 23*(4), 53-64.
- Salas-Rueda, R.-A., Ramirez-Ortega, J., Alvarado-Zamorano, C., & Dominguez-Hernandez, A. (2022). Students' Perception About the Incorporation of Technological Tools in the Educational Field During the COVID-19 Pandemic. *Online Journal of Communication and Media Technologies, 12*(3), e202218.
- Salas-Rueda, R. A., Ramirez-Ortega, J., Martinez-Ramirez, S. M., & Alvarado-Zamorano, C. (2023). Use of Machine Learning algorithms to analyze Moodle and smartphones in the educational process of Physics. *Texto Livre, 16*, e41293.
- Sanchez-Gonzalez, M., & Castro-Higuera, A. (2022). Mentoring for university professors in the fase of the Covid-19: evaluation of a case. *Campus Virtuales, 11*(1), 181-200.
- Sezer, B. & Yilmaz, R. (2019). Learning management system acceptance scale (LMSAS): A validity and reliability study. *Australasian Journal of Educational Technology, 35*(3), 15-30.
- Ueda, H., Furukawa, M., Yamaji, k., & Nakamura, M. (2018). SCORMAdaptiveQuiz: Implementation of Adaptive e-Learning for Moodle. *Procedia Computer Science, 126*, 2261-2270.
- Wahyuni, S., Erman, E., Sudikan, S. Y., & Jatmiko, B. (2020). Edmodo-Based Interactive Teaching Materials as an Alternative Media for Science Learning to Improve Critical Thinking Skills of Junior High School Students. *International Journal of Interactive Mobile Technologies, 14*(9), 166-181.
- Wang, L. (2022). Influence of Teacher Behaviors on Student Activities in Information-Based Classroom Teaching. *International Journal of Emerging Technologies in Learning, 17*(2), 19-31.
- Xue, H. (2022). A New Integrated Teaching Mode for Labor Education Course Based on STEAM Education. *International Journal of Emerging Technologies in Learning, 17*(2), 128-142.
- Yagci, M. (2022). Educational data mining: prediction of students' academic performance using machine learning algorithms. *Smart Learning Environments, 9*, 1-11.
- Zain, N. M., Fadil, N. F., & Hadi, A. A. (2018). Learning Management System: An Experience and Perception Study from Medical Imaging Lecturers and Scholars in a Private University. *International Journal of Interactive Mobile Technologies, 9*, 174-180.
- Zanjani, N., Edwards, S. L., Nykvist, S. & Geva, S. (2017). The important elements of LMS design that affect user engagement with e-learning tools within LMSs in the higher education sector. *Australasian Journal of Educational Technology, 33*(1), 19-31.

DEVELOPMENT OF MOBILE EDUCATIONAL MATERIAL FOR NURSES: A PROCESS IMPROVEMENT STUDY

Dr. Ayse OZKARAMAN

ORCID: 0000-0002-0507-4100
Faculty of Health Sciences
Eskisehir Osmangazi University
Eskisehir, TURKIYE

Dr. Ozlem KERSU

ORCID: 0000-0003-3592-2892
Faculty of Health Sciences
Eskisehir Osmangazi University
Eskisehir, TURKIYE

Dr. Fusun UZGOR

ORCID: 0000-0002-4233-7774
Faculty of Fethiye Health Sciences
Mugla Sitki Kocman University
Mugla, TURKIYE

Dr. Merve CAKIRLI

ORCID: 0000-0003-0363-4642
Faculty of Health Sciences
Eskisehir Osmangazi University
Eskisehir, TURKIYE

Dr. Ozer CELIK

ORCID: 0000-0002-4409-3101
Faculty of Science
Eskisehir Osmangazi University
Eskisehir, TURKIYE

Burcin DANACI

ORCID: 0000-0001-9517-5441
Department of Social Facilities Economic Enterprise
Eskisehir Osmangazi University
Eskisehir, TURKIYE

Dr. Mesut AYDEMIR

ORCID: 0000-0002-2035-1292
Open Education Faculty
Anadolu University
Eskisehir, TURKIYE

Received: 27/12/2022 **Accepted:** 05/04/2023

ABSTRACT

In the nursing profession, post-graduate in-service trainings are scheduled to increase efficiency and improve the quality of service. There are barriers to participation in training programs due to some reasons such as the intense work pace, incompatible shifts, a lack of personnel, the training program is not being at the knowledge and skill level of the personnel to be trained, the poor physical environment of the training environment. The purpose of this methodological study is to develop mobile training material to provide nurses working in university hospital with professional literature and also, to evaluate its visual design, reliability and the quality of information in the developed training material. The information quality, reliability, readability and visual design of the mobile training material developed for use on Android and IOS smartphones was assessed by 10 experts, twice, by means of the Discern Measurement Questionnaire and Visual Design Control Scale. After the first expert evaluation, the content was updated and a second evaluation completed. Content validity index (CVI) analyzes were performed. The Discern Measurement Questionnaire's total score for the training material configured for smartphones was calculated at 70.80 ± 2.57 out of 75. CVI analysis results of the Discern Measurement Questionnaire and Visual Design Control Scale scales of the training material were found to be 0.75 and 0.78, respectively. According to Gagne's events of instructions, the information quality and the reliability of the training material configured for smartphones is high and this training material is validated.

Keywords: Educational material, Gagne's learning events, distance learning, mobile application, smartphone, nurse.

INTRODUCTION

In our modern age, rapid changes and development in the fields of science and technology are accompanied by new and emerging information. One way to acquire new knowledge as a means of staying current with frequent change and development is through education. Education, which entails training individuals for a particular purpose, is carried out with the aim of "changing the behaviors of individuals in line with determined targets and developing individual abilities in various aspects" (Chaghari et al., 2017; Senviren, 2014). The Continuing Medical Education Accreditation Board emphasizes the importance of well-structured continuing education for healthcare professionals in delivering quality care to individuals as in other disciplines (American Association of Continuing Medical Education, 2017).

The nursing profession, which holds important positions in the healthcare industry, is based on theoretical-scientific knowledge and requires a range of practical skills (Taylan, Alan, and Kadioglu, 2012). Beginning with the fulfillment of physical needs, the nursing profession is an independent profession that also develops theories, makes holistic evaluations and bears social responsibilities together with constant development and changing technology (Goris et al., 2014; Taylan, Alan, and Kadioglu, 2012). Considering these aspects, the nursing profession has the power to induce significant change and transformation in the field of health. The continuity of education is something frequently emphasized from the very start of the profession up to the present as a way to maintain such power (Chaghari et al., 2017). The Ministry of Health in our country published a Ministry of Health In-Service Training Regulation dated 11/12/2009 and numbered B.10.0.SEG.0.7Ikinci00.03/15296, determining the procedures and principles of the in-service training program (Ministry of Health In-Service Training Regulation, 2016).

In the nursing profession, post-graduate in-service trainings are scheduled to increase efficiency and improve the quality of service, reduce errors and accidents and improve service presentation (Altin, 2013). These trainings contribute to greater success and productivity of the members of the profession in their duties and the outward display of a positive attitude (Senviren, 2014). A majority of nurses have identified the necessity of postgraduate compliance training in the studies conducted (Bugdayli and Akyurek, 2017; Chaghari et al., 2017; Kol, Ilaslan and Turkay, 2017). In addition to the numerous positive effects of training programs organized for nurses working after graduation, negative results can also be seen, including the training program is not being at the knowledge and skill level of the personnel to be trained, an unwillingness of personnel to learn, the poor physical environment of the training environment, a non-compliance with the

training materials by training subjects and a lack of evaluation at the end of each training. Furthermore, there are barriers to participation in training programs due to personal reasons such as the intense work pace necessary for health institutions, incompatible shifts and a lack of personnel (Senviren, 2014). In studies conducted on this subject, 33% of employees stated that they did not participate in training programs due to lack of available time (Bugdayli and Akyurek, 2017). In 2018 and 2019, 17 administrative and 12 occupational trainings were organized for nurses working in our institution, 59 lecturers took part in these trainings and each training event lasted an average of 45-60 minutes. The participation rate was limited to 32.1% due to reasons such as working overtime, being off duty and not wanting to spend a off day at the institution in training. In 2020 and 2021, in turn, trainings were organized on online platforms such as Zoom and Microsoft Teams instead of face-to-face training due to the Covid-19 pandemic. However, full participation still could not be ensured due to the change of workplace of nurses and extremely busy working hours as a result of the pandemic. Additionally, the number of events organized by the training unit was also limited. The trainings organized may cause, in addition to the time and labor losses of the trainers, a slight motivation, time and financial loss of the nurses coming to the hospital and spending a off day in training. For these reasons, the trainings should be organized in a way to prevent time, labor and financial losses while updating knowledge and increasing the motivation of nurses, thereby contributing positively to patient care. Studies emphasize that Gagne's 9 events of instruction theory used in nursing education is effective, increases the knowledge level of nurses and nursing students and contributes to the retention of the knowledge (Miner et al., 2015; Woo, 2016). In addition, distance education and health experts draw attention to the benefit of Gagne's teaching theory in remote education applications (Buscombe, 2013; Woo, 2016). Gagne argued that events of instruction help to cause the desired behavior to be learned and that these events sometimes occurred spontaneously during the interaction of the student with the material. However, Gagne also emphasized that events of instruction should be carefully organized by the designer (Kumtepe et al., 2019; Lo & Hsieh, 2020). Gagne's teaching theory requires each instruction event to gain attention, stimulate, inform students of the objective, stimulate recall of previously learned information and skills for new teaching, present stimulating materials, provide guidance to students, elicit performance, provide feedback, assess performance and enhance retention and transfer (Bas, 2012). However, in a literature review using Cochrane, CINAHL, Pubmed, Google Scholar and Google search engines, no study was found on the effectiveness of a mobile training package structured by incorporating Gagne's events of instruction for nurses' education. It was also determined during searches made in the Google Play Store and Apple Store that there is no application available in the Turkish language that nurses could use to obtain professional information and update their professional knowledge.

PURPOSE OF THE STUDY

This study was planned with the objective of developing mobile training material to provide nurses working in a university hospital with professional information, and a subsequent evaluation of content validity for quality, reliability of information and suitability of visual design. Accordingly, the questions of this research are:

- 1) Is the information contained in the mobile training material of good quality and reliability?
- 2) Is the mobile training material suitable in terms of visual design?
- 3) Is the mobile training material valid?

METHOD

This methodological study is part of a larger study to determine the impact of mobile in-service training on the knowledge level of nurses working in a hospital in Turkiye and was carried out in two stages. First stage; the development of Turkish mobile training material, the second stage is the evaluation of the validity of the mobile training material in terms of information quality and reliability, and visual design suitability (Halain et al., 2022; Uysal et al., 2021; Uzgor, Ozkaraman & Korkmaz, 2020; Zamanzadeh et al., 2015).

Development of the Mobile Training Material

In this stage, in order to determine the scope of the mobile training material necessary, meetings were held with nursing services managers of the affiliated university hospital to determine training needs of the nurses. As a consequence of these meetings, a content plan of the mobile training material was created (Figure 1). 8 experts in nursing and 3 experts in nursing education organized the mobile training material, abiding by the content plan determined according to Gagne's 9 events of instruction as follows:

- 1) *Gaining attention:* Nurses were informed of the objectives, targets and scope of the mobile training material. The text of the training material was organized using large fonts, images, contrasting colors and icons. In addition, interaction with the training material by nurses was planned by incorporating case studies, videos, games and filling in forms used in the field. High-impact videos shot by experts on the subject and uploaded to the address "www.youtube.com" were selected and used to attract interest and attention towards learning. Puzzles and matching games were also created for nurses to better learn and transfer information. Subjects that require extra emphasis to attract the attention of learners were expressed in different font styles, colors and characters.
- 2) *Informing learners of the objective:* In order to inform the nurses of the objectives, they were asked to complete each of the training material modules (6 pieces), and gain at least 70 points from 2 assessment tests consisting of 50 questions in the last module.
- 3) *Stimulating recall of prior learning:* Nurses were asked to fill in forms used in the hospital, which were then incorporated into the modules to help users recall information they had learned before. In addition, questions were asked prior to a PowerPoint presentation in order to facilitate nurses recalling subjects they had learned previously.
- 4) *Presenting the material:* PowerPoint presentations were prepared for the modules created within the scope of nurses' training material, which included the following information: job descriptions of employees, patient rights, procedures for identifying and verifying patient identification information, procedures for the safe transfer of patients, procedures for identifying situations that affect patient safety adversely, instructions for preparing patients for surgery, care instructions for patients under restriction, instructions for verbal order requests and rules to ensure patient privacy, waste management procedures, drug safety procedures, instructions for entrance-exit rules in intensive care units, the safety reporting system, emergencies and codes, transfusion safety procedures, drug applications and fluid therapy, wound care, catheter applications and care, evaluation of vital signs, death process instruction and diabetes and insulin applications (Figure 2). Images, animations and tables were also included in the presentations. Information was provided slowly, from the simple to the complex and from the known to the unknown. Additionally, active use of the interface created within the application was made possible by researchers in order to update the information, games, puzzles and videos in the PowerPoint presentations.
- 5) *Providing learning guidance:* In order to guide nurses throughout the application, forward and backward buttons were placed on each screen, and a feedback button regarding the completion of the subjects in each module and tips for solving puzzles was also included.
- 6) *Eliciting performance:* Exercises were created to apply what was learned from the application. Through these tasks, nurses were provided with the opportunity to see how much they had learned.
- 7) *Providing feedback:* An interface was created within the application in which researchers could check the completion status of each module by the nurses as well as nurses' answers to the evaluation questions. Nurses were also provided with feedback by means of this interface.
- 8) *Evaluation:* 50 questions consisting of two sections were prepared in accordance with the measurement and evaluation technique to determine the extent to which nurses had learned the targeted achievements. Questions were intended to be asked by repeating each group in two separate time periods, as a pre-evaluation and a final evaluation. Nurses were able to record their answers and then evaluate their own progress. In addition, researchers were provided with the opportunity to evaluate the answers to each question and the level of success via the interface of the application.

9) *Enhancing retention*: The mobile training material is a portable learning interface that can be used 24/7 by nurses. In addition, there is an opportunity to download presentations in the application to smartphones. These features can help when there is difficulty in recalling or when related health practices are forgotten, and also to ensure retention through repetition.

Budget support was provided to a University Scientific Research Project Unit (Project No: xxxxxx) for mobile use of the training material prepared by researchers by transferring the content to Android and IOS smartphones. At this stage, a mobile application was developed through collaboration with the software company.

In the mobile training material application, blue tones were preferred to represent institutionalism. Screen resolution set to 1334x750px as the base. The mobile training material has been responsively designed for use on phones with different screen sizes. SFProDisplayBold was used as the font to make the application more distinctive and catchier.



Figure 1. Shows a screenshot of mobile app home page

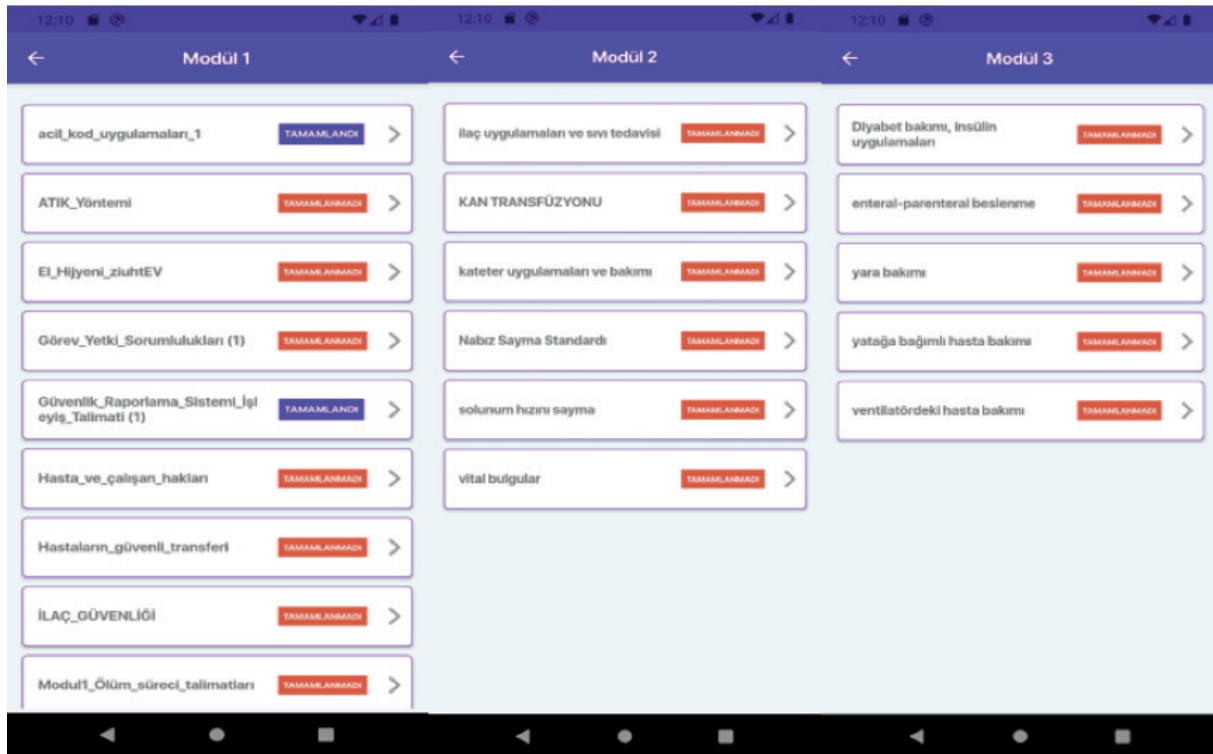


Figure 2. Shows a screenshot of training modules

The Interior of the Mobile Training Material

An interface has been developed for access to user information in mobile training material, whether or not users have completed modules, the completion times of the modules, the status of completing the pre-evaluation and post-evaluation questions, evaluating the changes in the answers given to the pre-evaluation and post-evaluation questions, to receive feedback on the use of mobile training material. With this interface, the movements of the users through the mobile training material were made traceable by the researchers. In addition, this interface, researchers can add new modules to mobile training materials and update the information and applications contained in existing modules.

Data Collection and Analysis

The mobile training material configured for smartphones was evaluated in terms of information quality, information reliability, readability and visual design by 10 experts (nursing education specialists, distance education specialists, nurses, computer engineers) using Discern Measurement Questionnaire and Visual Design Control scale. Changes were made in the content in line with the opinions received from the experts after an initial evaluation. The content was then evaluated for the second time by the same experts in terms of information quality, reliability, readability and visual design. At the end of the second evaluation, CVI was calculated using a 5-point likert scale ranging from 1 to 5 (no, partially, yes) for the Decern Measurement Questionnaire. In this study, it is recommended that the minimum CVI value for the Discern Measurement Questionnaire be 0.50. A 3-point likert scale ranging from 1 (very good) to 3 (weak) was used for the Visual Control scale and the CVI was calculated. For Visual Design Control, it is recommended that the minimum CVI value be 0.30 (Lynn, 1986).

The Scale

Discern measurement Questionnaire (Quality Criteria for Consumer Health Information): This is a scale used to evaluate the reliability and information quality of training material. It was developed by Charnock et al. (Charnock et al., 1999) and translated into Turkish by Gokdogan et al. in our country (Gokdogan, 2003).

The questionnaire consists of a total of 16 questions; the first eight (1-8) measure information reliability and the next 7 (9-15) gauge quality of the information. The last question (16) provides an overall general evaluation of the material. A minimum of 15 and a maximum of 75 points can be obtained from the first 15 questions in the measurement questionnaire. The 16th item is evaluated separately. A low score indicates low information quality and reliability of the material while a high score indicates that these features are exceptional (Lynn, 1986).

Visual design control scale: The scale, developed by Smaldino et al. (2005), consists of 24 items including integrity, arrangement, verbal elements, strikingness, software and multimedia use (Smaldino et al., 2005). The scoring of the scale is as follows: 3 = very good, 2 = acceptable and 1 = poor. In a study by Korucu et al., the internal consistency reliability coefficient of the scale was found to be 0.93 for the entire scale (Korucu et al., 2016).

Ethics Approval and Written Informed Consents Statements

Prior to starting the study, written permission dated XXX and numbered XXX was obtained from the institution where the study was conducted and from the relevant ethics committee.

FINDINGS

Distribution Of the Information Quality and Information Reliability Scores of the Mobile Training Material

The first and second evaluation mean scores of the experts according to the Discern measurement questionnaire regarding information quality and reliability of the training material configured for smartphones are presented in Table 1.

The highest mean scores given by the experts in the first evaluation were for the 1st, 2nd and 6th items (4.90 ± 0.31), and the lowest mean score was attributed to the 13th item (2.30 ± 1.56) in the Discern measurement questionnaire. The mean value of the 16th question, in which a general evaluation of the reliability and quality of the training material was made, was 4.10 ± 0.56 out of five. On examination of the results of the second evaluation, the highest mean scores were in the 1, 2, 3, 4, 6, 10, 12, and 14th items (5.00 ± 0.00), and the lowest mean scores were in the 5th and 7th items (3.90 ± 0.31). The general evaluation score was calculated as 4.90 ± 0.31 out of 5 (Table 1).

In the first evaluation of the training material configured for smartphones with the Discern measurement questionnaire, the mean score was 64.00 ± 5.64 out of 75. The mean score of the information quality from the Discern measurement questionnaire sub-dimensions was recorded as 36.4 ± 3.56 , and the mean score of information reliability as 27.6 ± 3.83 . The results obtained from the first evaluation indicated that the information quality and reliability of the training material configured for smartphones was adequate. According to the Discern measurement questionnaire, which was used to determine the reliability and quality of the training material configured for smartphones, it was determined that the opinions obtained from experts were statistically moderately in agreement with each other (Kendall's $W = 0.459$, $p < 0.001$) (Table 1).

According to the second evaluation results, the Discern measurement questionnaire score of the training material configured for smartphones was 70.80 ± 2.57 out of 75. The mean score of the information quality from the Discern measurement questionnaire sub-dimensions was determined as 37.3 ± 0.94 , and the mean score of the information reliability as 33.5 ± 1.71 . According to results obtained from the second evaluation, the information quality and reliability of the training material configured for smartphones was high. According to the Discern measurement questionnaire, the statistical agreement of the opinions of experts was moderate (Kendall's $W = 0.664$, $p < 0.001$) (Table 1).

Table 1. Distribution of the mean scores of the Discern Measurement Tool items of the mobile training material

Discern Measurement Tool Question Items	mean±sd	
	First evaluation	Second evaluation
Is its objective clear?	4.90 ± 0.31	5.00 ± 0.00
Are the objectives achievable?	4.90 ± 0.31	5.00 ± 0.00
Is it relevant to the subject?	4.80 ± 0.42	5.00 ± 0.00
Are the resources stated clearly?	4.60 ± 0.84	5.00 ± 0.00
Is the date of the reported or used information stated clearly?	4.60 ± 0.84	3.90 ± 0.31
Is it impartial and consistent?	4.90 ± 0.31	5.00 ± 0.00
Does it provide details on additional information or supportive resources?	4.20 ± 0.63	3.90 ± 0.31
Are uncertain aspects mentioned?	3.60 ± 1.26	4.50 ± 0.52
Does it describe how each treatment is administered?	4.60 ± 0.69	4.80 ± 0.42
Does it describe the benefits of each treatment?	4.80 ± 0.42	5.00 ± 0.00
Does it describe the risks of each treatment?	4.60 ± 0.69	4.60 ± 0.51
Does it describe what will happen in the absence of treatment?	4.10 ± 0.87	5.00 ± 0.00
Does it describe how treatment options affect the quality of life?	2.30 ± 1.56	4.60 ± 0.51
Has the possibility of the presence of more than one treatment option been explained?	4.30 ± 0.67	5.00 ± 0.00
Does it provide support for the patient in making decisions?	2.90 ± 1.72	4.50 ± 0.70
General evaluation	4.10 ± 0.56	4.90 ± 0.31

Table 2. Distribution of mean scores of the information quality and reliability of the mobile training material

Evaluation time		N	Mean±sd	Min	Max	Kendall's W	p
First	Information quality	10	36.4±3.56	29	40	0.463	<0.001
	Information reliability	10	27.6±3.83	20	33	0.448	<0.001
	Total	10	64.00±5.64	49	71	0.459	<0.001
Second	Information quality	10	37.3±0.94	35	38	0.881	<0.001
	Information reliability	10	33.5±1.71	31	35	0.297	0.002
	Total	10	70.80±2.57	66	73	0.664	<0.001

Distribution of the Visual Design Scale Scores of the Mobile Training Material

When the first evaluation result of the experts was examined in Table 3, the experts expressed a “very good” opinion for the “integrity” sub-dimension, while they indicated an “acceptable” score for the “arrangement”, “strikingness”, “verbal elements” and “software” sub-dimensions. The experts gave a “poor” rating to these statements due to the absence of sound and music in the training material. The visual design control scale total score was calculated as 50.20 ±9.36 out of 72. According to the visual design control scale, the expert opinions were determined to be moderately concordant (Kendall's W= 0.607, p<0.001) (Table 3).

When the results of the second evaluation of the experts were examined, it was found that the experts gave a “very good” rating to all sub-dimensions of the Visual Design Control Scale except for the multimedia use. The visual design control scale total score was totaled as 64.40 ±5.92 out of 72. According to the visual design control scale, the opinions of the experts were moderately concordant (Kendall's W= 0.672, p<0.001) (Table 3).

Mobile Training Material Validity Analysis Results

In the CVI analysis conducted to investigate the validity of the mobile education package in the study, both scales were evaluated on an item-by-item basis and on the sum of the items, and their results were given in Table 4 and Table 5. According to Lynn (1986), in the evaluation made by 10 experts using a five-point Likert assessment questionnaire, For the information validity of the training material, a minimum CVI value of 0.50 is recommended. It is recommended to be 0.30 for visual design validity using a triple Likert assessment questionnaire.¹⁶ In the analysis conducted for the validity of the information in this study, the I-CVI for each item from 0.0 to 1.0, while the S-CVI is 0.75 for (Table 4). According to these results, it can be said that the information validity of the mobile training material has an acceptable CVI value.

In the analysis conducted for the validity of visual design in the study, the I-CVI for each item ranged from 0.0 Dec 1.0, while for the S-CVI it was 0.78 (Table 5). According to these results, it can be said that the visual design validity of the mobile training material has an acceptable CVI value.

Table 3. Distribution of the Visual Design Scale mean scores of the mobile training material

Items	N	mean±sd	
		First evaluation	Second evaluation
INTEGRITY			
Alignment	10	2.50±0.52	2.90±0.31
Image	10	2.60±0.51	2.90±0.31
Balance	10	2.60±0.51	2.90±0.31
Style	10	2.60±0.51	2.90±0.31
Color chart	10	2.60±0.51	2.90±0.31
Color suitability	10	2.50±0.52	2.90±0.31
Total	10	2.56±0.49	2.90±0.31
ARRANGEMENT			
Proximity	10	2.00±0.81	2.70±0.48
Orientation	10	2.20±0.63	2.90±0.31
Image and background color contrasts	10	2.30±0.48	2.90±0.31
Compatibility	10	2.30±0.48	2.90±0.31
Total	10	2.20±0.53	2.85±0.31
VERBAL ELEMENTS			
Font	10	1.70±0.82	2.80±0.42
Font size and spacing	10	1.70±0.82	2.50±0.52
Total	10	1.70±0.78	2.85±0.31
STRIKINGNESS			
Striking	10	2.20±0.42	2.90±0.31
Pattern	10	2.20±0.42	2.90±0.31
Interaction	10	2.20±0.63	2.90±0.31
Total	10	2.20±0.44	2.90±0.31
SOFTWARE-RELATED COMPONENTS			
Drawing attention/Increasing motivation	10	2.30±0.48	2.80±0.42
Ease of Use	10	2.20±0.63	2.90±0.31
Ensuring active participation	10	2.30±0.48	2.80±0.42
Feedback effectiveness	10	2.20±0.63	2.80±0.42
Incorporation of Relevant and Understandable Documentation	10	2.10±0.56	2.90±0.31
Total	10	2.16±0.56	2.84±0.32

MULTIMEDIA USE			
Audio	10	1.00±0.00	1.00±0.00
Music	10	1.00±0.00	1.00±0.00
Video	10	1.00±0.00	2.40±0.96
Didactic Games	10	2.20±0.63	3.00±0.00
	Total	1.30±0.15	1.85±0.24
Total Score	10	50.20±9.36	64.40±5.92
Kendall's W	10	0.607	0.672
P	10	<0.001	<0.001

Table 4. The relevance ratings on the Discern Measurement Tool by ten experts

Item	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Expert 7	Expert 8	Expert 9	Expert 10	Agreement	I-CVI
Q1	5,00	5,00	5,00	5,00	5,00	5,00	5,00	5,00	5,00	5,00	10	1.0
Q2	5,00	5,00	5,00	5,00	5,00	5,00	5,00	5,00	5,00	5,00	10	1.0
Q3	5,00	5,00	5,00	5,00	5,00	5,00	5,00	5,00	5,00	5,00	10	1.0
Q4	5,00	5,00	5,00	5,00	5,00	5,00	5,00	5,00	5,00	5,00	10	1.0
Q5	4,00	4,00	4,00	4,00	4,00	4,00	4,00	4,00	3,00	4,00	0	0.0
Q6	5,00	5,00	5,00	5,00	5,00	5,00	5,00	5,00	5,00	5,00	10	1.0
Q7	4,00	4,00	4,00	4,00	4,00	4,00	4,00	4,00	3,00	4,00	0	0.0
Q8	5,00	5,00	5,00	5,00	4,00	4,00	4,00	4,00	4,00	5,00	5	0.50
Q9	5,00	5,00	4,00	4,00	5,00	5,00	5,00	5,00	5,00	5,00	8	0.80
Q10	5,00	5,00	5,00	5,00	5,00	5,00	5,00	5,00	5,00	5,00	10	1.0
Q11	5,00	4,00	4,00	4,00	5,00	5,00	5,00	5,00	4,00	5,00	6	0.60
Q12	5,00	5,00	5,00	5,00	5,00	5,00	5,00	5,00	5,00	5,00	10	1.0
Q13	4,00	5,00	4,00	4,00	5,00	5,00	5,00	5,00	4,00	5,00	6	0.60
Q14	5,00	5,00	5,00	5,00	5,00	5,00	5,00	5,00	5,00	5,00	10	1.0
Q15	4,00	4,00	5,00	4,00	5,00	5,00	5,00	5,00	3,00	5,00	6	0.60
Q16	5,00	5,00	4,00	5,00	5,00	5,00	5,00	5,00	5,00	5,00	9	0.90
Proportion relevance	0.75	0.75	0.63	0.63	0.81	0.81	0.81	0.81	0.62	0.88	S-CVI/Ave	0.75
The average proportion of items judged as relevant across the ten experts											0.75	
Cronbach Alpha: 0.85												

Table 5. Distribution of the Visual Design Scale mean scores of the mobile training material

Item	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Expert 7	Expert 8	Expert 9	Expert 10	Agreement	I-CVI
Q1	3,00	3,00	3,00	2,00	3,00	3,00	3,00	3,00	3,00	3,00	9	0.90
Q2	3,00	3,00	3,00	2,00	3,00	3,00	3,00	3,00	3,00	3,00	9	0.90
Q3	3,00	3,00	3,00	2,00	3,00	3,00	3,00	3,00	3,00	3,00	9	0.90
Q4	3,00	3,00	3,00	2,00	3,00	3,00	3,00	3,00	3,00	3,00	9	0.90
Q5	3,00	3,00	3,00	2,00	3,00	3,00	3,00	3,00	3,00	3,00	9	0.90
Q6	3,00	3,00	3,00	2,00	3,00	3,00	3,00	3,00	3,00	3,00	9	0.90
Q7	2,00	3,00	3,00	2,00	2,00	3,00	3,00	3,00	3,00	3,00	7	0.70
Q8	3,00	3,00	3,00	2,00	3,00	3,00	3,00	3,00	3,00	3,00	9	0.90
Q9	3,00	3,00	3,00	2,00	3,00	3,00	3,00	3,00	3,00	3,00	9	0.90
Q10	3,00	3,00	3,00	2,00	3,00	3,00	3,00	3,00	3,00	3,00	9	0.90
Q11	3,00	3,00	3,00	2,00	3,00	2,00	3,00	3,00	3,00	3,00	8	0.80

Q12	2,00	3,00	3,00	2,00	2,00	2,00	3,00	3,00	2,00	3,00	5	0.50
Q13	3,00	3,00	3,00	2,00	3,00	3,00	3,00	3,00	3,00	3,00	9	0.90
Q14	3,00	3,00	3,00	2,00	3,00	3,00	3,00	3,00	3,00	3,00	9	0.90
Q15	3,00	3,00	3,00	2,00	3,00	3,00	3,00	3,00	3,00	3,00	9	0.90
Q16	3,00	3,00	3,00	2,00	3,00	3,00	3,00	3,00	3,00	3,00	9	0.90
Q17	3,00	3,00	3,00	2,00	3,00	3,00	3,00	3,00	3,00	3,00	9	0.90
Q18	3,00	3,00	3,00	2,00	3,00	3,00	3,00	3,00	3,00	2,00	8	0.80
Q19	2,00	3,00	3,00	2,00	3,00	3,00	3,00	3,00	3,00	3,00	8	0.80
Q20	3,00	3,00	3,00	2,00	3,00	3,00	3,00	3,00	3,00	3,00	9	0.90
Q21	3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00	10	1.0
Q22	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	0	0.0
Q23	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	0	0.0
Q24	1,00	1,00	1,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00	7	0.70
Proportion relevance											S-CVI/Ave	0.78
The average proportion of items judged as relevant across the nine experts											0.78	
Cronbach Alpha:											0.94	

DISCUSSIONS AND CONCLUSION

With new and developing technology, many activities performed in daily life can be performed without time or place restrictions. In our country, the Ministry of Health has created and implemented web-based training programs (WTEP) in hospitals. While technology-supported continuous trainings are maintained on the web, developments in this field have also led to the concept of mobile learning (Ozdamar Keskin and Kilinc, 2015).

The most important indicator of the development of mobile devices is the presence of operating systems developed for mobile platforms. The operating systems with the widest use are Android, within the body of Google, iOS developed by Apple and Windows Mobile operating system produced by Microsoft (<http://ab.org.tr/ab14/bildiri/227.pdf>). It can be predicted that with the download of training applications configured to these operating systems to mobile devices, nurses will participate in trainings at any place and time, gain new knowledge and skills and reflect this new knowledge in patient care. However, it should be noted that mobile learning like WTEP may also have some disadvantages, including more effort and time required by trainers for structuring a training program and more effort required by health education personnel. Trainings made in this manner are not created individually, technical requirements may not be fully met and health personnel may not want to use WTEP or mobile applications (Yildirim, 2009). For these reasons, it is recommended that every detail of structured distance training be planned carefully. In this study, which was intended as a process improvement, mobile training material for nurses was developed over 24 months, necessitating more trainer effort and technical support. In order to attract the attention and interest of the target group for which the training was planned, and to develop a partnership in achieving the purpose of the training, firstly meetings with nurse managers in the hospital were held to determine the specific training needs of nurses, and content was created accordingly. Subsequently, mobile training material was developed and technical support was obtained for the transfer of content to Android and IOS smartphones by a software company under the guidance of a distance education specialist.

Studies (Buscombe, 2013; Woo, 2016) emphasize that the mobile training packages will be beneficial when structured considering the disadvantages of learning with mobile devices and situations that can motivate learning in adult education. In this regard, healthcare professionals and distance education experts often bring up the usefulness of Gagne's teaching theory (Buscombe, 2013; Woo, 2016). In addition, studies emphasize that distance e-learning is effective in health education, positively affects success and increases self-efficacy levels of health employees (Casebeer et al., 2010; Du et al., 2013; Ozturk and Dinc, 2014). In this study, the mobile training material was arranged according to Gagne's 9 events of instructions in order to motivate nurses to acquire new professional knowledge. Within the scope of the study, the information quality of the

mobile training material was 37.3 ± 0.94 , information reliability was 33.5 ± 1.71 and the total evaluation score was 70.80 ± 2.57 with a good level. It was determined that the 10 expert opinions were moderately concordant for information quality and reliability (Kendall $W = 0.664$). The Kendall W coefficient is a value used to show the level of agreement among many experts who evaluate a situation according to an ordinal scale. According to the Kendall W , “0 point” indicates the lack of concordance among experts and “1 point” indicates a full concordance. The score varies between 0 and 1 (Meijering, Kampen & Tobi, 2013).

In the evaluation of the validity of educational materials, the content validity index (CVI) is used (Halain et al., 2022). The value of CVI varies according to the number of experts evaluating it and the scale. CVI analysis evaluates the content validity of the questionnaire on an item-by-item basis (I-CVI) and at the scale level (S-CVI). I-CVI is calculated by dividing the number of experts who give the “very relevant” rating for each item by the total number of experts, and the fact that I-CVI > 0.79 indicates that the items are related (Zamanzadeh et al., 2015). Lynn (1986) states that the number of experts evaluating the CVI value varies according to the likert type of the scale being evaluated. in the evaluation conducted by 10 experts using a five-likert evaluation questionnaire, it is recommended that the CVI value of the educational material be at least 0.50 for information validity. Halain et al., reported that an educational information web page designed for family members who have relatives in the Intensive Care Unit (ICU) they developed has acceptable CVI values (0.83) and was validated in terms of content and relevance (Halain et al., 2022).

According to the evidence, 16,28,29 in this study, it can be said that the validity of mobile educational material is acceptable with I-CVI 0.0-1.0 for each item and 0.75 for S-CVI in the analysis conducted for the information validity of mobile educational material according to DISCERN measurement questionnaire.

At the end of evaluations made for the visual design suitability of the mobile training material in the study, the following had “very good” levels: integrity 2.90 ± 0.31 , arrangement 2.90 ± 0.31 , verbal elements 2.85 ± 0.31 , strikingness 2.90 ± 0.31 , software-related components 2.84 ± 0.32 and multimedia use 1.85 ± 0.24 . On the other hand, expert opinions were moderately compatible with each other in terms of the visual suitability of the mobile training material (Kendall $W=0.672$). Lynn (1986) emphasizes that the CVI value of a questionnaire evaluated by 10 experts using the triple likert evaluation questionnaire is 0.30. In our research, it can be said that the visual design validity of the mobile educational material evaluated by 10 experts using the likert-type Visual Design Scale of 3 is acceptable (S-CVI: 0.78).

According to the evidence (Halain et al., 2022; Lynn, 1986; Zamanzadeh et al., 2015) in this study, it can be said that the validity of mobile educational material is acceptable with I-CVI 0.0-1.0 for each item and 0.78 for S-CVI in the analysis conducted for the visual design validity of mobile educational material according to Visual Design Scale measurement questionnaire.

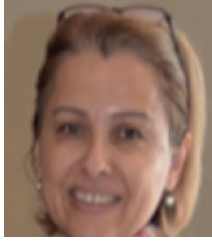
Following these stages, permission was received from both the Google Play Store and Apple Store authorities to ensuring the use of the mobile training material developed for nurses on Android and IOS smartphones. The mobile application was indexed and made available in both stores (Fig. 1). The mobile training material developed over two years in line with the results obtained is now suitable and ready to be used by nurses.

The mobile training material developed during the research process was prepared in Turkish. This situation prevents the use of this mobile training package in countries where different languages are spoken.

In the orientation trainings of nurses who have just started to work, Turkish mobile training material, developed to enable working nurses to update their professional knowledge and practices, is ready to be used on phones with proven Android and IOS operating systems, installed on application stores. Nurses can use this educational material without any time and space restrictions by obtaining permission from researchers.

Acknowledgements: The authors thank Fatma Ovenler, Meral Gungor, Kevser Karaoglu, Ozlem Musluk, Hatice Can Ugural, Yasemin Altun and Ceyda Alioglu for their support in the development of the educational material.

BIODATA and CONTACT ADDRESSES of AUTHORS



Assoc. Prof. Ayse OZKARAMAN is a Associate Professor of Department of Nursing at Health Sciences Faculty, Eskisehir Osmangazi University. Dr. Ayse Ozkaraman gained his Ph.D. in Nursing at September, 2014. Her academic interest areas are nursing, chronic disease, educational futures, open and distance learning, She has over than 15 journal articles published in international indexes, over than 15 international book chapters and other national and international articles, papers submitted to international meetings.

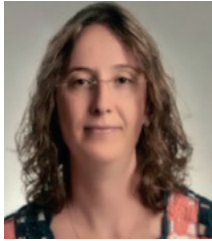
Ayşe OZKARAMAN

Faculty of Health Sciences, Department of Nursing

Address: Eskisehir Osmangazi University, Meselik Campus, 26040, Odunpazari, Eskisehir, Turkiye

Phone: +90 2222393750/1548

E-mail: aokaraman@ogu.edu.tr



Asst. Prof. Ozlem KERSU works as an assistant professor at Eskisehir Osmangazi University. She completed her doctorate program in Surgical Diseases Nursing in 2020. She is interested in issues; surgical diseases nursing, critical care nursing, nursing care quality, breast cancer prevention, patient or employee health and safety, ergonomics in healthcare facilities and ergonomic arrangements for healthcare professionals. There are scientific studies in quality of life of surgical nurses, ergonomics in critical care nursing, nursing care quality, nursing practices in surgical diseases nursing, breast cancer prevention in women.

Ozlem KERSU

Faculty of Health Sciences, Department of Nursing

Address: Eskisehir Osmangazi University, Meselik Campus, 26040, Odunpazari, Eskisehir, Turkiye

Phone: +90 2222393750/1548

E-mail: ozlem_8420@hotmail.com



Dr. Fusun UZGOR is a Dr. Research Assistant at Faculty of Fethiye Health Sciences, Mugla Sitki Kocman University. Dr. Fusun Uzgor gained her Ph.D. in nursing at September, 2023. Her academic interest areas are internal medicine nursing, chronic diseases, hemodialysis, anti TNF drugs, mobile applications, oncology nursing. She has articles and book chapters on chronic diseases and nursing care in national and international indexes, papers submitted to international meetings. She has supported projects by Universtiy, The Scientific and Technological Research Council of Turkiye and Other Official Institutions.

Fusun UZGOR

Faculty of Fethiye Health Sciences, Department of Nursing,

Address: Mugla Sitki Kocman University, Faculty of Fethiye Health Sciences, 48300 Fethiye, Mugla

Phone: +90 2522111000

E-mail: efsunyldz949@gmail.com



Dr. Merve CAKIRLI is a Dr. Research Assistant at Faculty of Health Sciences, Eskisehir Osmangazi University. Dr. Merve Cakirli gained her Ph.D. in Department of Child Health and Disease Nursing at August, 2023. Her academic interest areas are child health, newborn, social pediatrie, artificial intelligence in health. She has articles and book chapters on pediatric nursing in national and international indexes, papers submitted to international meetings. She has 4 supported projects by Universtiy and The Scientific and Technological Research Council of Turkiye.

Merve CAKIRLI

Faculty of Health Sciences, Department of Nursing,

Address: Eskisehir Osmangazi University, Meselik Campus, 26040, Odunpazari, Eskisehir, Turkiye

Phone: +90 2222393750/1528

E-mail: mcakirli@ogu.edu.tr



Assoc. Prof. Ozer CELIK is a Associate Professor of Department of Mathematics-Computer. Dr. Ozer Celik gained his Ph.D. in mathematics-computer department at 2019. His academic interest areas are Computer Science, Computer Vision, Artificial Intelligence, Computer Learning and Pattern Recognition, Engineering and Technology. He has over than 15 journal articles published in international indexes.

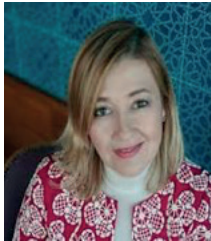
Ozer CELIK

Faculty of Science, Department of Mathematics and Computer Science,

Address: Eskisehir Osmangazi University, Meselik Campus, 26040, Eskisehir, Turkiye

Phone: +90 222 2393750

E-mail: ozerc@ogu.edu.tr



Burcin DANACI works as a manager in Eskisehir Osmangazi University Department of Social Facilities Economic Enterprise. She worked as a nurse between 1992-2013. Between 2014-2021, he served as the Health Care Services manager of Eskisehir Osmangazi University Health, Practice and Research Hospital. She has been teaching patient and employee safety courses at the undergraduate level since 2014. She has interests in and has studies in the fields of patient and employee safety and nursing.

Burcin DANACI

Department of Social Facilities Economic Enterprise,

Address: Eskisehir Osmangazi University, Meselik Campus, 26040, Eskisehir, Turkiye

Phone: +90 222 2393750

E-mail: bdanaci7@ogu.edu.tr



Assist. Prof. Mesut AYDEMIR is an assistant professor at Open Education Faculty, Distance Education Department, Anadolu University. Asst. Prof. Mesut Aydemir gained his Ph.D. in Distance Education Department in 2019. His academic interest areas are online learning, recognition of prior learning, e-learning technology, enhanced learning, blended learning, distance learning, Instructional Technology, ICT in Education, mobile learning, teaching materials, social media in education, computer supported collaborative learning, andragogy, virtual collaboration. He has articles on e-learning,

open and distance education in national and international indexes, papers submitted to international meetings. He has many supported projects by Universtiy and The Scientific and Technological Research Council of Turkiye, Erasmus+.

Mesut AYDEMİR
Open Education Faculty, Distance Education Department,
Address: Anadolu University, Yunus Emre Campus, 26470, Tepebasi, Eskisehir, Turkiye
Phone: +90 0222 335 05 80/2050
E-mail: mesutaydemir@anadolu.edu.tr

REFERENCES

- Altın P (2013) In-service training effects on human performance: In terms of health assessment, Master Thesis, Beykent University Social Sciences Institute, Istanbul.
- American Association of Continuing Medical Education. "Importance CME" (2017) <http://aacmet.org/cme/importance-of-cme/>
- Bas G (2012) Effects of Gagne's Model of Events of Instruction on Students' Academic Achievement and Attitudes Towards English Course, *Journal of Uludag University Faculty of Education*, 25(2), 433-457.
- Bugdayli G, Akyurek CE (2017) The Views of Nurses About On-the-Job Training Activities: A Sample of a University Hospital, *Journal of research and development in nursing*, 19(1), 14-25.
- Buscombe C (2013) Using Gagne's theory to teach procedural skills, *The Clinical Teacher*, 10(5), 302-307.
- Casebeer L, Brown J, Roepke N et al. (2010) Evidence-based choices of physicians: A comparative analysis of physicians participating in internet CME and non-participants, *BMC Medical Education.*, Jun, 10, 10:42. doi: 10.1186/1472-6920-10-42.
- Chaghari M, Saffari M, Ebadi A et al. (2017) Empowering education: A new model for in-service training of nursing staff, *Journal of Advances in Medical Education & Professionalism*, Jan, 5(1), 26-32.
- Charnock D, Shepperd S, Needham G et al. (1999) DISCERN:an instrument for judging the quality of written consumer health information on treatment choices, *Journal of Epidemiology and Community Health*, 53(2), 105-111.
- Du S, Liu Z, Yin H et al. (2013) Web-based distance learning for nurse education: a systematic review. *International Nursing Review*; Jun; 60(2):167-177
- Gokdogan F (2003) Yazili materyallerin kalitesinin gozden gecirilmesi, *Onkoloji Hemsireligi Dernegi Bulteni*, 8-16. (In Turkish).
- Goris S, Kilic Z, Ceyhan O (2014) Nurses' Professional Values and Affecting Factors, *Journal of Psychiatric Nursing*, 5(3), 197-142.
- Halain AA, Yoong TL, Chan CM et al. (2022) Development and validation of an educational information web page for family members with relatives in the intensive care unit. *Nurse Education in Practice*; 61:103324.
- Kol E, **İlaslan** E and Turkay M (2017) Training Needs of Clinical Nurses at an University Hospital in Turkey, *Nurse Education in Practice*, 22, 15-20.
- Korucu AT, Usta E and Sezer C (2016) An Evaluation of Android Operating Systems' Graphical User Interface in Terms of Visual Design Principles, *The Journal of Turkish Social Research*, 1-16.
- Kumtepe AT, Atasoy E, Kaya O, et al. An interaction framework for open and distance learning: Learning outcomes, motivation, satisfaction, and perception. *AJIT-e*. 2019;10(36):1-20
- Lo WL, Hsieh MC. Teaching communication skills: Using Gagne's model as an illustration. *Tzu Chi Medical Journal*. 2020;32(1):19-25
- Meijering JV, Kampen JK, Tobi H. Quantifying the development of agreement among experts in Delphi studies. *Technological Forecasting & Social Change*. 2013;80:1607-1614.

- Miner A, Mallow J, Theeke L et al. (2015) Using Gagne's 9 Events of Instruction to Enhance Student Performance and Course Evaluations in Undergraduate Nursing Course, *Nurse Educ*, May-Jun, 40(3), 152-154. <https://doi.org/10.1097/NNE.000000000000138>
- Lynn MR (1986). Determination and quantification of content validity. *Nurs. Res.* 1986; 35 (6), 381–37,
- Ozdamar Keskin N, Kilinc H (2015) Mobil Ogrenme Uygulamalarina Yonelik Gelistirme Platformlarinin Karsilastirilmasi ve Ornek Uygulamalar, *Acikogretim Uygulamalari ve Arastirmalari Dergisi*, 1(3), 68-90. (In Turkish).
- Ozturk D, Dinc L (2014) Effect of Web-Based Education on Nursing Students Urinary Catheterization Knowledge and Skills, *Nurse Education Today*, 34(5), 802-8. DOI: 10.1016/j.nedt.2013.08.007
- Smaldino E, Russell JD, Heinich R et al. (2005) *Instructional Media and Technologies for Learning* (8th edition), Merrill Prentice Hall, USA.
- Senviren B (2014) In service training in the health ministry and in healt institution, Master Thesis, Beykent University Social Sciences Institute, Istanbul.
- Taylan S, Alan S and Kadioglu S (2012) Roles of Nursing and Autonomy, *Journal of Research and Development in Nursing*, 3, 67-73.
- Uzgor, F., Ozkaraman, A., & Korkmaz, C., (2020). The Effect Of Mobile Application On Anti-Tnf Drug Adherence Of Ankylosing Spondylitis Patients: Pilot Study (Conference paper). 2nd International Congress of Internal Medicine Nursing, Izmir, Turkey
- T.C. Saglik Bakanligi, (2009) "Saglik Bakanligi Hizmet Ici Egitim Yonetmeligi". <https://dosyab.saglik.gov.tr/Eklenti/279,hieyonetmelikpdf.pdf?> (In Turkish)
- Turk E, Basar ME, Mutlu O et al. (2018) "Universite icin android tabanlı mobil uygulaması ve geliştirme sürecinde öğrenilenler". Available from <http://ab.org.tr/ab14/bildiri/227.pdf> ,17.01.2018.
- Uysal, N., Bagcivan, G., Ozkaraman, A., Karaaslan Eser, A., Cetin, F., Caliskan, B. B., ... & Soylu, Y. (2021). Empowering caregivers in the radiotherapy process: the results of a randomized controlled trial. *Supportive Care in Cancer*, 29, 2395-2404.
- Woo WH (2016) Using Gagne's instructional model in phlebotomy education, *Advances in Medical Education and Practice*, 7, 511-516. doi: 10.2147/AMEP.S110357
- Yildirim S (2009) "Web tabanlı eğitim: Tasarım ve Uygulama İlkeleri" I. Guncelleme 9 EylulYG
- Y J. Erisim: <http://ocw.metu.edu.tr/course/view.php?id=29&lang=tr>. (In Turkish).
- Zamanzadeh V, Ghahramanian A, Rassouli M et al. (2015) Design and implementation content validity Study: development of an instrument for measuring patient-centered communication. *Journal of Caring Sciences*;4(5):165–78.

A COMPARISON OF FOREIGN LANGUAGE ANXIETY IN TWO DIFFERENT SETTINGS: ONLINE VS CLASSROOM

Gizem SIMSEK

ORCID: 0000-0002-6495-9275
School of Foreign Languages
National Defence University
Istanbul, TURKIYE

Dr. Meral CEYLAN CAPAR

ORCID: 0000-0003-2884-1971
Education Faculty
Anadolu University
Eskisehir, TURKIYE

Received: 31/01/2023 **Accepted:** 03/07/2023

ABSTRACT

The purpose of the study was to examine and compare the foreign language anxiety (FLA) levels of English preparatory school students in two settings namely online and in person classroom lessons. An explanatory mixed-method research design was adopted to accomplish the aim. Two questionnaires were used in the first part to collect quantitative data, and the sample cohort consisted of 234 students from six Turkish state universities. The quantitative data were examined through descriptive and inferential statistics. The findings showed that moderate levels of FLA were present in both online and in person classroom instruction among participants. It was discovered that the FLA levels in two settings differed in a statistically significant way. In consonance with quantitative results, semi-structured interviews with 10 volunteers were done to collect further data. Thematic analysis was used to resolve the qualitative data from the interviews, and as a result, four key themes – interaction, anxiety, problems, and language points – emerged. Students preferred classroom settings for interaction since they could interact in person classroom lessons. Additionally, it was shown that technical issues such as disconnections and speech interruptions caused distress in language learners.

Keywords: EFL, foreign language anxiety, hybrid learning, online language anxiety.

INTRODUCTION

Since the 1970s, anxiety has received a great deal of critical attention thanks to the groundbreaking research of Guiora et al. (1972), Chastain (1975), Kleinmann (1977), and Scovel (1978). According to Guiora (1972), learning a language makes people feel dreadful about themselves and the outside world, which leads to unsettling psychological positions. Anxiety is “a subjective experience of tension, fear, nervousness, and worry coupled with an activation of the autonomic nervous system,” according to a renowned study by Horwitz et al. (1986). (p.126). Additionally, they sought to define Foreign Language Anxiety (FLA) and demonstrated that FLA differs from general anxiety in that it is a particular anxiety reaction. They described FLA as a conceptually distinct variable in this section. They pointed out three situation-specific anxieties: 1. communication apprehension (CA), 2. test anxiety (TA), and 3. fear of negative evaluation (FNE). FLA.

The classroom setting is crucial in the EFL context since students learn the target language almost exclusively in the classroom. The educational setting has the ability to both worsen and improve FLA. Therefore, it is crucial to consider how FLA is impacted by the classroom setting. Students also bring a variety of characteristics to the classroom, some of which may hinder language learning even if they have no bearing on the learning process. There are many factors that can cause anxiety, including the quantity of students,

the activities' goals, the lesson's level of difficulty (Kitano, 2001; Tani-Fukichi, 2005), the nature of the interactions (Koch & Terrel, 1991; Price, 1991), error correction, failure-related anxiety, and personal breakdown (Mak, 2011). Other factors that have been identified as contributing to FLA include student competence levels (Liu, 2006; Pichette, 2009; Toth, 2010), assessment (Liu & Jackson, 2008; Elkhafafi, 2005), learner attitudes (Yan & Horwitz, 2008), and vocabulary limitations (Kocak, 2010).

As a result of technology development and current needs, learning has grown outside of the classroom and developed in numerous venues, including online platforms. The learner and the educational process are no longer separated by physical obstacles thanks to online education. Online platforms can now access more pupils as a result. Additionally, numerous lectures have been delivered to students online. One of the issues is online content that encourages language acquisition. The online language learning context differs from the classroom setting and has its own unique features in some areas, such as interaction type, feedback, technological proficiency, self-direction, and remoteness, making investigation in this context necessary to improve and enhance language learning.

In comparison to classroom settings, it was discovered that there hasn't been much research on the anxiety factor in online settings (Barkanyi & Melchor-Couto, 2016; Bollinger, 2017; Chametzky, 2019; Doan, 2020b; Donahoe, 2010; Hurd & Xiao, 2010; Hurd, 2007; Majid et al, 2012; Martin & Alvarez-Valdivia, 2017; Pichette, 2009; Russell, 2020; Shirvan & Taherian, 2018; Yang & Quadir, 2018). Despite the fact that online language learning has already been researched prior to the pandemic (Doan, 2016; Hurd, 2007; Pichette, 2009; Russell, 2020), the importance of study in this area has been highlighted as a result of the Covid-19 outbreak (Doan, 2020b).

Anxiety affects language learning, according to decades' worth of research. It is important to look into how anxious learners are because the majority of language learners have expressed feelings of being overloaded or frightened (Horwitz et al., 1986). To find solutions, it's also important to look into the stressful environment that makes students anxious. Numerous studies have shown that anxiety reduces language proficiency (Krashen, 1981), and this effect extends beyond traditional classroom settings to other contexts including distance learning or online learning (Xiao & Wong, 2014). (Hurd & Xiao, 2010). According to a well-known study by Hurd (2007a), anxiety-inducing factors in distance foreign language programs include a lack of quick feedback, difficulty assessing individual growth, remoteness, and a lack of commitment to independent learning. The Covid-19 pandemic has led to an increase in online learning, making it imperative to conduct research on distant language learning anxiety.

It has been known that worry hinders language acquisition and achievement in a classroom setting. Additionally, students revealed that while producing in a foreign language, they struggle, worry, and often experience bodily pain like a rapid heartbeat (Horwitz et al., 1986). Additionally, it has been determined that FLA has a deleterious impact on linguistic achievement (Aida, 1994; Liu, & Zhang, 2013). In order to take the required steps and develop the language learning process to gather the maximum efficiency, it is vital to assess the anxiety levels of language learners both in face-to-face and online learning, as well as to investigate the origins of worry. As a result, the current study concentrated on analyzing the anxiety levels of foreign language students in two distinct situations, namely in-person and online courses.

Given the aforementioned information, this study used the following research questions to achieve the aforementioned goals and add to the field of language learning anxiety:

1. What are the anxiety levels of preparatory school students in state universities in Turkiye?
 1. a- What is the anxiety level of learners in conventional language classroom?
 1. b- What is the anxiety level of learners in online language class?
 1. c- Is there a difference in foreign language anxiety levels between the two types of learning settings: conventional vs online?
2. What are the learners' opinions about the two settings in terms of their language anxiety level: conventional vs online?

METHOD

The study focused to explore preparatory students' language learning anxiety levels in two disparate environments: classroom and online lessons. In order to display learners' anxiety levels, quantitative data was collected and then to examine the anxiety levels in broader manner semi-structured interviews were carried out. In this fashion, an explanatory mixed-method design was adapted. The advantages of mixed methods design have been discussed by a number of academics (Greene et al., 1989; Holmes, 2007; Tashakkori & Teddlie, 2010). In their analysis of 57 empirical mixed-method studies, Greene et al. (1989) pointed out that using two models can help researchers grasp their study topics more thoroughly. In a similar vein, Holmes (2007) claimed that clarifying the results through the use of mixed methods is useful. Creswell (2014) also made a broadly similar conclusion, stating that mixed methods design has the "strength of drawing on both qualitative and quantitative research" and that it lessens "the limitations of both approaches" (p. 386). Thus, the study comprised of two phases. An online survey was used in the study's initial phase to gauge the participants' levels of anxiety. Survey design aids in illustrating a population's trends, attitudes, or opinions by numerically analyzing sample. (Creswell, 2014). Numerous advantages of the survey design include affordability, viability, and utility. Most importantly, surveys are frequently used in social sciences to question preconceived notions about behavior and clarify how societies operate. Thus, two Likert-type scales were used to measure the participants' FLA levels. In order to comprehend the viewpoint of the learners better, semi-structured interviews with volunteers were conducted in the second phase of the study. Creswell (2014) notes that qualitative research promotes a thorough understanding of attitudes and behavior. Consequently, semi-structured interviews were employed to gather qualitative data in order to investigate the participants' viewpoints on anxiety in a more comprehensive way.

Given that semi-structured interviews were conducted to learn more about learners' attitudes in two different contexts after the analysis of quantitative data that was acquired using two scales, the current study used a mixed-methods approach, namely an explanatory sequential design.

Participants

Convenience sampling, one of the non-probability sampling techniques, was used to identify the sample group. 234 prep school students from 6 state universities in Turkiye as shown in table 1. that used blended learning took part in the study's first phase on a voluntary basis and answered the questionnaire. Ten volunteers from those students who participated in the study's second phase were interviewed.

Table 1. Age and gender distribution of the participants

	N
Afyon Kocatepe University	8
Anadolu University	21
Eskisehir Technical University	5
Izmir Democracy University	33
Izmir Institute of Technology	104
Izmir Kâtip Celebi University	65

Participants were prep school students engaged in both in-person and online English programs during the spring semester of the 2021–2022 academic year. Accordingly, they had already reached B1 level proficiency. The participants were assigned as B1 level even though each institution has its own testing and evaluation procedures. They were, therefore, considered to have a level of English proficiency sufficient to comprehend and reply to the questions.

The age range of the participants, as determined by the demographic data gathered, was 18 to 25. Male students represented 52.99% (124) of the participants in terms of gender, while female students represented 47.01% (110) of the participants. Table 2 below shows the precise breakdown of participants' ages and genders.

Table 2. Age and gender distribution of the participants

Age	N	Gender	N
18	62	Male	124
19	74	Female	110
20	64		
21	32		
25	2		

Data Collection and Analysis

There were mainly two instruments to collect the quantitative data. The Turkish version of the Foreign Language Classroom Anxiety Scale (FLCAS) (Horwitz et al., 1986) developed by Aydin et al. (2017) and the Online World Languages Anxiety Scale (OWLAS) developed by Chametzky (2019) were respectively adopted to measure anxiety levels as the study's objective was to investigate and compare the anxiety levels of the learners in two different settings. The former scale was used to assess participant anxiety levels in classroom practice, whilst the latter scale was used to look into participant anxiety levels in online courses. The two scales are comparable because, according to Chametzky (2019), OWLAS was modified for the online context using FLCAS as the stimulus. Therefore, it was decided that the two questionnaires may be used to measure the anxiety component in two separate contexts.

Participants were asked additional demographic questions as part of a single online questionnaire created from the scales. IBM SPSS (Statistical Package for the Social Sciences) software was used to evaluate the qualitative data from the online survey. Descriptive statistics were used to present the data in a concise manner. To determine whether there was a significant difference in the mean scores in the two situations, the participants' FLA levels were averaged, and a sample t-test was conducted. In the current investigation, one sample t-test was deemed adequate to summarize the results because the two mean scores were collected from the same sample cohort.

Semi-structured interviews were conducted in the study's second phase to elicit participants' perspectives on the two aforementioned situations. According to quantitative data findings received from the questionnaires, the interview questions were created. The researcher also developed interview rules that included crucial subjects to discuss all throughout the interviews. In light of the pertinent literature review and the objectives of the current investigation, interview questions were subsequently devised. 11 Turkish interview questions about in-person and online English classes were included. The questions were designed after consulting with two subject-matter specialists. Finally, the consent of the research advisor was assured. To make the participants feel comfortable sharing their perspectives, the interviews were held in Turkish. The interviews were done, recorded, and then the transcripts were created. Thematic analysis (Braun and Clarke, 2006) which involves six stages namely 'familiarizing with the data set', 'coding', 'generating initial themes', 'developing and reviewing themes', 'refining, defining and naming themes', and 'reporting' was used to examine the transcripts.

Turkish Version of Foreign Language Classroom Anxiety Scale (FLCAS)

For several reasons, Aydin et al. (2016) created a Turkish version of FLCAS (Horwitz et al., 1986). The study made clear how important it is to administer FLCAS in a variety of locations and scenarios in order to obtain detailed results. It was noted that the data gathered by the original scale would be impacted by proficiency levels, cultural and intercultural factors, and educational situations. Aydin et al. translated and modified the FLCAS items for use in a Turkish EFL environment (2016). 85 third- and fourth-year English language teaching students from Balikesir University participated in the study. Three stages made up the study's methodology: translation, administration, and analysis. The scale was translated into Turkish in the first section by five subject-matter specialists. Then, three panels were used to compare the five translations. The English version of the scale was administered to the participants in the middle of the academic year 2015–2016 after agreement was reached on the items. The Turkish version of the scale was given to the participants

after a one-month delay. SPSS software was used to conduct statistical analysis in the last section. Analysis showed that the Turkish version's Cronbach's Alpha level was .86 whereas the English version was assessed in terms of internal consistency. .77. Findings on construct validity showed that the rotated two factors in the Turkish version explained 73.58 of the Variance. In conclusion, the reliability coefficient for the Turkish version was higher than for the English version. It was agreed that the Turkish FLCAS version made it easy to gauge Turkish learners' levels of anxiety about learning a foreign language. Therefore, the Turkish version of FLCAS developed by Aydın et al. (2016) was used in the current study to test participants' proficiency in foreign language classrooms, and the study's Cronbach's Alpha coefficient showed a sufficient reliability with a value of .94.

Online World Language Anxiety Scale (OWLAS)

Chametzky created the Online World Languages Anxiety Scale (OWLAS) (2019). According to the author, the FLCAS scale was prompted by concurrent disparities and correspondences. The scale consists of 33 questions, similar to FLCAS, plus 4 questions about demographic data, were included in the pilot study. There is no broad description of participants because there are only four questions that ask for restricted demographic information. Since there are many different things that students feel and experience that can create anxiety, Chametzky divided the statements on the scale into 12 categories. These 12 categories were named as follows: 1) comfort, 2) embarrassment, 3) concern, fear, and overwhelm, 4) help, 5) linguistic interference, 6) listening, 7) inadequacies, 8) oral production, 9) the need to practice saying or writing before submission, 10) positive thinking, 11) putting oneself down, and 12) demographics.

Chametzky (2019) conducted a pilot study with seven individuals who had registered in at least one online foreign language class to examine the applicability, validity, and reliability of OWLAS. There is no information regarding the participants' age, gender, or school of attendance because their demographics were not mentioned in the article. As a result, Chametzky (2019) has previously made a point about the sample size. Due to the tiny sample size, Cronbach's alpha was determined to be 1.0 and had a high level of internal consistency. The pilot study's standard deviation, as stated, varied from .4 to 1.83. Four experts in the field reviewed and evaluated the questions' reliability and validity, and changes were made as a result. Accordingly, the scale has been found to be accurate and trustworthy for assessing anxiety related to online foreign language learning. Thus, 234 individuals in the current study were given the OWLAS to measure their degrees of online foreign language anxiety. When the scale's internal consistency was evaluated, the reliability analysis yielded a Cronbach's Alpha coefficient of .87, which is considered a satisfactory result.

Semi-structured Interviews

Semi-structured interviews were undertaken to thoroughly examine the participants' opinions and perceptions of anxiety. The reliability of the study is referred to as validity in research technique. Validity is occasionally cited as a threat to qualitative research because these approaches often do not offer statistics or quantification of responses (see Becker, 1996). However, when researchers use methods that provide detailed description of a respondent's perspective, the validity of the data is increased; information is gathered directly from the source and enables interactive participation (Ahlin, 2019). By asking the same set of questions to new participants during a subsequent round of interviews, it is possible to increase the number of responses on a particular topic, for example, if an intriguing point was raised in one interview but was not covered by the entire sample. These decrease the reliability concerns. The first stage of the current study, which involved analyzing the participants' FLA levels via an online questionnaire, yielded findings and results that guided the construction of the interview questions. Additionally, the researcher created interview guidelines with important topics to cover throughout the interviews. In this way, the interview questions were developed in line with the pertinent literature review and the study's goals. Eleven Turkish questions about classroom and online English lessons made up the interview questions. Two subject-matter specialists were consulted for their thoughts as the questions were being developed. After the necessary revisions were made, they were presented to the advisor. In conclusion, the research advisor's approval was guaranteed. Additionally, the researcher developed some additional questions during the interviews based on the answers of the participants. The interviews were conducted via using an online platform and they were recorded.

FINDINGS

Descriptive statistics were used to illustrate the FLA levels of the prep students, and the mean scores from the questionnaire were computed. Additionally, using descriptive statistics, frequencies and participant percentages were determined in the same way. The number of participants who experienced each of the three categories of anxiety—low, moderate, and high—was also confirmed in order to show the participants' anxiety levels in detail. The results are shown in table 3 below.

Table 3. The level of FLA in in-person classroom lessons

	N	M
FLA in classroom	234	89.34
	Frequencies	Percentages
Low level of classroom anxiety	70	29.92
Moderate level of classroom anxiety	154	65.81
High level of classroom anxiety	10	4.27
Total	234	100

The findings indicate that 234 English preparatory school students who took part in the survey had a mean score of 89.34 in face-to-face English lessons and moderate levels of foreign language classroom anxiety. Additionally, as shown in the table, the study showed that 65.81 percent of participants ($f=154$) had moderate levels of anxiety. A third of the participants ($f=70$) also displayed low levels of anxiety, while 4.27 percent ($f=10$) of them displayed significant levels of anxiety related to learning a foreign language.

Similar to the first inquiry, the second one examined participants' FLA levels but in an entirely different context: online classes. The mean score was determined using SPSS, and identical to the first question, descriptive statistics were used. Table 4 below provides a full analysis of the results.

Table 4. The level of FLA in online lessons

	N	M
FLA in online lessons	234	98.17
	Frequencies	Percentages
Low level of classroom anxiety	18	7.69
Moderate level of classroom anxiety	204	87.18
High level of classroom anxiety	12	5.13
Total	234	100

With a mean score of 98.17 in their online English courses, the results showed that the 234 English preparatory school students who participated in this study reported a moderate level of online foreign language anxiety. Additionally, the majority of students, or more than half of the participants ($f=204$), had moderate levels of anxiety, as seen in the table. In addition, 5.13 percent of individuals reported high levels of anxiety related to learning a foreign language, compared to 7.69 percent who reported low levels.

One sample t-test was performed because the third question involved comparing the FLA levels in the two situations. According to the research, there was a substantial, robust, and positive correlation between foreign language online anxiety scores and foreign language classroom anxiety scores ($r=.645$, $p0.001$). The study showed that the anxiety scores in the classroom and online had a statistically significant average difference ($t_{233}=9.484$, $p0.001$). Foreign language classroom anxiety levels were on average 8.83 points lower than scores on foreign language online anxiety (95% CI: 7.00, 19.67).

Table 5. Paired sample t-test

	Paired Differences				
	Mean	Std. Deviation	Std. Error	95% Confidence Interval of the Difference	
				Lower	Upper
Classroom – Online	-8.83761	14.25516	.93189	-10.67361	-7.00160
Significance					
	t	df	One-Sided p	Two-Sided p	
Classroom - Online	-9.484	233	<.001	<.001	

Semi-structured interviews were done in accordance with the analysis and findings of the quantitative data in order to learn the participants' opinions and impressions. Braun and Clarke's thematic analysis (TA) was used to analyze the interviews (2006). There were six phases of TA used in total. Major themes and sub-themes that emerged from the data were segregated. After the transcripts from the recordings were carefully examined, 4 primary themes and 11 sub-themes were created. Themes are displayed in the following Figure 1.

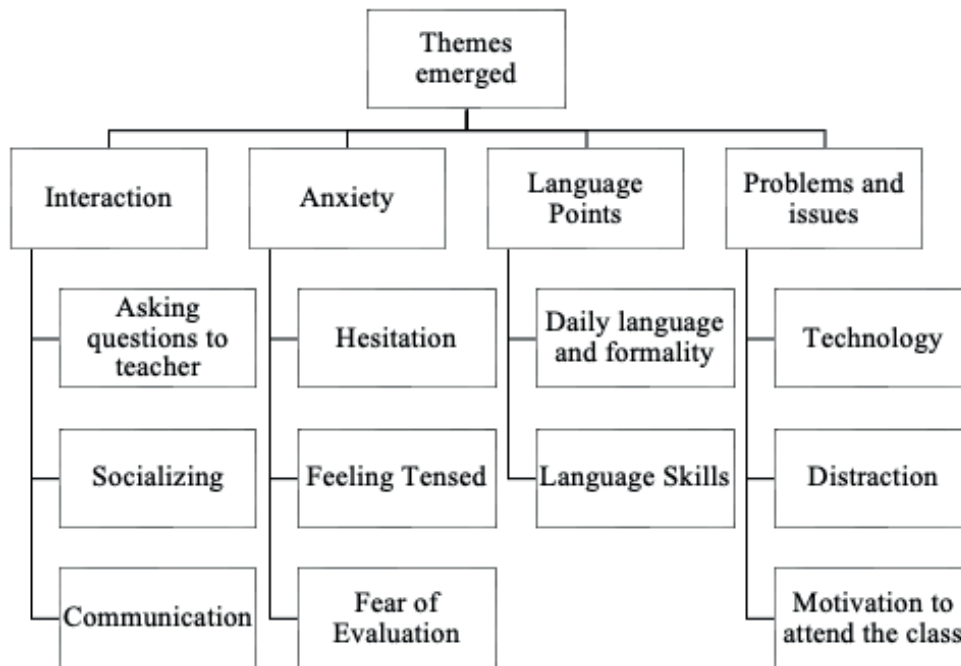


Figure 1. Themes emerged

When they did not understand the learning material in either environment, the learners reported that they refrained from offering any remarks or answering a question in English. In fact, many were hesitant to ask questions, showing that they were confused by the material. In addition, a few pupils said that the aforementioned incident occurred in a classroom context. They went on to say that being in the classroom in front of so many people created stress and directed them to keep quiet. Some students found that this condition improved in the online environment since they felt more at ease there. The learners reported feeling anxious during the sessions when there were unfamiliar language points, such as new terminology. Some students gave this tense sensation a higher definition in the classroom since they had access to online dictionaries and translation tools during online classes. In both contexts, more than half of the students reported refraining from speaking English during class because they were concerned about other people's reactions.

The investigation showed that every learner encountered technical issues with learning the English language during the online lessons. In fact, the participants deemed online schooling to be technologically deficient. All of the students admitted that having their internet connection taken off had upset them. The voice-related problem was the most technical one mentioned. They indicated that they got apprehensive and anxious whenever there was a voice interruption during the online lectures. Voice interruptions and voice resonance occasionally occurred as a result of connection issues, which frequently produced a stressful situation. With regard to assignments and homework, online schooling also has this issue. The students discovered that they were unable to post their assignments or homework as a result of bugs that had developed in the software used to provide online classes.

The preference of the learners was for both in-person instruction and online sessions. Their desire to attend the seminar was one of the factors that influenced their decision. They added that because they didn't open their cameras or tighten their seat belts while taking online classes at their homes or dorms, they felt more at ease. However, five of them admitted that having to get up, get ready, and go to school made them feel inspired and compelled. Since they tried to be in the classroom, their need to commute and move led them to study before class and pay attention to learn English there. The students went on to say that they periodically required a break from the life fluency that was taught in online sessions.

DISCUSSIONS AND CONCLUSION

The descriptive analysis revealed that the students had a moderate degree of FLA during the in-person classroom lectures with a mean FLA score of 89.34. This can be interpreted to signify that even though the mean score was not particularly high, pupils nonetheless experienced anxiety throughout classroom English classes. Students that have modest anxiety may be classified as somewhat anxious (Horwitz, 2008). In other words, there are situations where kids experience stress. In order to learn more about these events and their underlying reasons, semi-structured interviews were conducted. According to the interviews, several students became anxious when they lacked the language needed to complete a task. Korkmaz and Mirici also acknowledged the same source of anxiousness (2021). They also found that students shied away from speaking in front of their peers for fear that their friends would be critical of their public speaking skills. This study revealed the similar outcome, with numerous students admitting they were hesitant to speak in front of their peers in class out of a fear of being judged. Additionally, numerous students admitted to being shy, which made it difficult for them to speak the target language because it made them feel uncomfortable. Due to the fact that the students thought of themselves as shy, their worry could have been a type of trait anxiety. Because of this, during face-to-face classroom instruction, the students felt uneasy in particular circumstances, which explains the finding of moderate-level anxiety. It's crucial to give students stress-relieving activities, like employing comedy in the classroom, to help them (Oxford, 2016).

In scenarios that mirrored those in the classroom, the students showed signs of nervousness, as the interviews revealed. Participants first stated that they preferred the classroom setting for communication because they could employ nonverbal cues like gesture and mimicry. They were hesitant as a result and skipped online lessons. Learning may be just as effective online as it can in a physical classroom, claims Chametzky (2021). However, employing an online venue has a number of limitations (Chametzky, 2016a) and variations (Cochran & Benuto, 2016). Participants also remarked that the technology issues during the online lectures were stressful. To avoid communication breakdowns or sound changes during the sessions, which in the current study had made students uncomfortable, it is crucial to update and improve technology tools for online classrooms. In the study by Chametzky (2013a), this issue is described as the fact that teachers and students would experience extreme stress if they were unaware of inequalities in online engagement. Because of this ignorance, learners may become frustrated and leave the class, which is a highly undesired behavior (Lee & Choi, 2011). Eygu and Karaman's study is another that backs up the findings in terms of interaction (2013). They discovered that in order to foster a sense of community and minimize social isolation, it is crucial to give online learners access to interactive features like chat, discussion boards, private messaging, and face-to-face connection. The participants in the current study may have been apprehensive about developing healthy communication with their professors and peers because they did not have the opportunity to connect online as Eygu and Karaman recommend. As a result of the aforementioned factors, learners in online sessions reported moderate levels of anxiety.

The findings of the present study are different from those of studies by Pichette (2009) and Baez-Holley (2013), which revealed no differences in two scenarios with French speakers who were learning either English or Spanish. In two different learning environments, Côte and Gaffney's study from 2021 discovered a substantial difference in the degrees of anxiety. However, the difference they discovered goes against the direction of the present study. In other words, they discovered that students in the online environment experienced less anxiety and contributed more to the lesson, whereas in the present study, students showed less anxiety in the classroom than in the online environment. As in the current study, further examination through interviews revealed that learners experience anguish when there is a technological problem during the online classes, it is probable that the contradictory findings are related to learners' technological ability or technological breakdowns. The current study's findings, while different from several other research (Côte & Gaffney 2021; Pichette, 2009), are in line with those of Kaisar and Chowdhury (2020). The researchers discovered that students felt less apprehensive in traditional classroom settings than they did in online courses. It is important to highlight that Kaisar and Chowdhury (2020) and Côte and Gaffney (2021) did their studies during the Coronavirus pandemic, which may have had an impact on the students' affective states.

The majority of students reported that in the classroom setting, they could raise questions directly to the teacher and get a prompt response. Additionally, students supported a school environment because they saw nonverbal communication in action. The lack of voice interruptions or connectivity troubles during online classes was noted by students as a communication impediment. White (2003) noted that the particular setting of distance learning offers an additional scope that can have a significant impact on affect because learners are unattended while attempting to regulate their anxiety. This is because the teacher is absent there and there is hardly any direct peer assistance. Similar to this, Zhang and Cui (2010) asserted that studying a language online might be more compelling than other topics, particularly in reference to speaking abilities given the lack of an instructor to see student production, offer feedback, and assess student performance. These may be the causes of the participants' increased anxiety in online classes in the current study.

When they could not understand the learning material, the students' affective states became tense. A fear of being judged by others was also mentioned by over half of the students. This result backs with an earlier study by Korkmaz and Mirici (2021), which discovered that students avoided speaking in front of their peers out of fear that they could be mocked or even laughed at. Similar to this, the participants in the current study said they were afraid of being judged when speaking in front of their peers.

Some of the participants in the study claimed that they prepared more thoroughly for the in-person classes because they felt anxious about speaking in front of so many people. This result is consistent with a study conducted by Kim (2017), which discovered that students in online classes were less concerned about potential mistakes because they couldn't watch their peers make them. In online classes, students said that having technical issues made them concerned about the subject matter. The majority of students reported feeling anxious when taking an online course since voice breaks or internet disconnections could occur.

The current study has some restrictions. First off, a rather small sample size was used in the study, which involved 234 English preparatory school students from 6 state colleges. The findings cannot be applied to all students at English preparatory schools because there were other state and private universities. In the present study, anxiety levels and the causes of those anxieties were investigated using an explanatory mixed-method approach. Additional recommendations are provided in light of the present study's limitations. The current study used just interviews to gather qualitative data; other qualitative methods, such as reflection papers, diaries, or think-aloud exercises, can be used to gain a deeper understanding of learners' affective status. As the current study only included students in preparatory schools, other study groups, such as college students from other faculties, high school students, and elementary school students, can be looked into in order to broaden the study's focus. Since the results of the current study showed that learners' FLA levels were much greater in online lessons than in classroom settings, it is important to analyze the online language learning environment from a variety of perspectives with regard to the anxiety phenomena.

Some ramifications for those involved in foreign language instruction are suggested by the current study. The findings of the current study suggest that anxiety is a problem for foreign language students both in traditional classroom settings and online. As a result, it's critical to take preventative measures and use methods or activities, such as reminiscing exercises, to lower learners' anxiety levels. Positive psychology was used to conduct an experimental study by Jin et al. in 2021. In the study, the experimental group that participated

in the reminiscing activity experienced much lower levels of anxiety than the control group. Therefore, it is crucial that lecturers include assignments that reduce students' anxiety levels. The source of anxiety status was another significant discovery. In online sessions, students acknowledged a number of circumstances that make them more anxious. One of the circumstances was a technology issue. Therefore, resolving technical issues and enhancing mechanical systems might ease the distress felt by students. Additionally, students said that their inability to observe nonverbal cues during online lectures prevented them from participating in the assignments. Therefore, selecting appropriate activities for the environment is essential.

The current study looked at learners' anxiety levels in two different settings and discovered that English prep students had a moderate degree of FLA. However, the mean FLA level score in the online context was much higher than in the classroom. The study also looked at how students perceived the two environments, and it found that certain factors, such technology issues, and issues with interaction, made online classes stressful for students. The study concludes that it is necessary for language learners to take effective measures and engage in activities that lower their FLA levels.

Authors' Note: This study was partly presented at the 5th International Open & Distance Learning (IODL) Conference held in Eskisehir, Turkiye, on September 2022. Some parts were published in the conference proceedings.

BIODATA and CONTACT ADDRESSES of AUTHORS



Gizem SIMSEK is a lecturer in English at School of Foreign Languages in National Defence University. Gizem did her MA in English Language Teaching, in 2022. She is currently a Ph.D. student in English Language Teaching in Anadolu University. She is interested in learner autonomy, technology and artificial intelligence in language learning, and classroom interaction in ELT. She has an article about classroom interaction published and a conference paper about foreign language anxiety.

Gizem SIMSEK
School of Foreign Languages
Address: School of Foreign Languages, National Defence University, Istanbul, Turkiye.
Phone: +90 5344809302
E-mail: gizemsimsek.096@gmail.com



Dr. Meral CEYLAN CAPAR is an Assistant Professor of English Language Teaching Program at the Education Faculty, Anadolu University. Dr. Ceylan Capar gained her Ph.D. in English Language Teaching, in 2014. Her academic interest areas are academic writing, teacher training, integrating technology and mindfulness in teaching English, learner autonomy, and critical thinking in ELT. She has over than 10 journal articles published in international indexes, 2 international book chapters and other national and international articles, and papers submitted to international meetings.

Meral CEYLAN CAPAR
English Language Teaching Department, Education Faculty
Address: Anadolu University, 26470, Eskisehir, Turkiye.
Phone: +90 2223350580
E-mail: meralceylan@anadolu.edu.tr

REFERENCES

- Aida, Y. (1994). Examination of Horwitz, Horwitz, and Cope's construct of foreign language anxiety: The case of students of Japanese. *The modern language journal*, 78(2), 155-168.
- Ahlin, E. M., (2019). Semi-structured interviews with expert practitioners: Their validity and significant contribution to translational research. In Sage Research Methods Cases Part 2. SAGE Publications, Ltd., <https://doi.org/10.4135/9781526466037>
- Aydin, S., Harputlu, L., Guzel, S., & Genc, D. (2016). A Turkish version of foreign language anxiety scale: Reliability and validity. *Procedia-Social and Behavioral Sciences*, 232, 250-256.
- Baez-Holley, M. (2013). Foreign language anxiety in the classroom and in an online environment (Doctoral dissertation, Indiana State University).
- Barkanyi, Z., & Melchor-Couto, S. (2017). Foreign language anxiety on a massive open online language course. *CALL in a climate of change: adapting to turbulent global conditions*, 24.
- Bollinger, A. (2017). *Foreign language anxiety in traditional and distance learning foreign language classrooms*. (Doctoral Dissertations and Projects). Liberty University, VA.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative research in psychology*, 3(2), 77-101.
- Chametzky, B. (2013a). Generalizability and the theory of offsetting the affective filter. *The Grounded Theory Review*, 12(2).
- Chametzky, B. (2016a). Contradictions in e-learning: The naturalness of unnaturally learning online. *The Online Journal of Distance Education and e-Learning*, 4(1), 15-27.
- Chametzky, B. (2019). The online world languages anxiety Scale (OWLAS). *Creative Education*, 10(1), 59-77.
- Chametzky, B. (2021). *Communication in online learning: Being meaningful and reducing isolation*. In Research Anthology on Developing Effective Online Learning Courses (pp. 1184-1205). IGI Global.
- Chastain, K. (1975). Affective and ability factors in second language acquisition. *Language Learning* 25(1), 153-161.
- Cochran, C., & Benuto, L. (2016). Faculty transitions to online instruction: A qualitative case study. *The Online Journal of Distance Education and e-Learning*, 4(3), 42-54.
- Côte, S., & Gaffney, C. (2021). The effect of synchronous computer-mediated communication on beginner L2 learners' foreign language anxiety and participation. *The Language Learning Journal*, 49(1), 105-116.
- Creswell, J. W. (2014). *A concise introduction to mixed methods research*. SAGE publications.
- Dogan, Y. (2020). Effect of foreign language classroom anxiety on Turkish EFL learners' online learning anxiety. In Y. Dogan (Eds.), *Academic studies in foreign language education* (pp. 21-35). Livre de Lyon.
- Dogan, Y. (2020). Universite ogrencilerinin uzaktan cevrim-ici yabanci dil ogrenmeye yonelik goruslerinin degerlendirilmesi. *Turk Egitim Bilimleri Dergisi*, 18(1), 483-504.
- Donahoe, T. (2010). *Language anxiety in the online environment: An exploratory study of a secondary online Spanish class*. Pepperdine University.
- Elkhafaifi, H. (2005). Listening comprehension and anxiety in the Arabic language classroom. *The Modern language Journal*, 89, 206-220.
- Eygu, H., & Karaman, S. (2013). A study on the satisfaction perceptions of the distance education students. *Kirikkale University Journal of Social Sciences*, 3(1), 36-59.

- Guiora, A. Z., B. Beit-Hallahmi, R. C. Brannon, C. Y. Dull & T. Scovel (1972). The effects of experimentally induced changes in ego states on pronunciation ability in a second language: An exploratory study. *Comprehensive Psychiatry* 13(5), 421–428.
- Horwitz EK (2008). *Becoming a language teacher: A practical guide to second language learning and teaching*. Boston, MA: Allyn and Bacon.
- Horwitz, E.K., Horwitz, M.B. and Cope, J. (1986) Foreign language classroom anxiety. *The Modern Language Journal*, 70 (2), 125–132.
- Hurd, S. (2007). Anxiety and non-anxiety in a distance language learning environment: The distance factor as a modifying influence. *System*, 35(4), 487-508.
- Hurd, S. (2007). Distant voices: Learners' stories about the affective side of learning a language at a distance. *International Journal of Innovation in Language Learning and Teaching*, 1(2), 242-259.
- Hurd, S., & Xiao, J. (2010). Anxiety and affective control among distance language learners in China and the UK. *RELC Journal*, 41(2), 183-200.
- Jin, Y., Dewaele, J. M., & MacIntyre, P. D. (2021). Reducing anxiety in the foreign language classroom: A positive psychology approach. *System*, 101, 102604.
- Kaisar, M. T., & Chowdhury, S. Y. (2020). Foreign Language Virtual Class Room: Anxiety Creator or Healer?. *English Language Teaching*, 13(11), 130-139.
- Kim, J. O. (2017). A study on foreign language anxiety of college students in an intensive English program. *영어교과교육*, 16, 77-93.
- Kitano, K. (2001). Anxiety in the college Japanese language classroom. *The Modern Language Journal*, 85(4), 549-566.
- Kleinmann, H. H. (1977). Avoidance behavior in adult second language acquisition. *Language Learning* 27(1), 93–107.
- Kocak, M. (2010). A novice teacher's action research on EFL learners' speaking anxiety. *Procedia-Social and Behavioral Sciences*, 3, 138-143.
- Koch, A. S., & Terrell, T. D. (1991). Affective reactions of foreign language students to natural approach activities and teaching techniques. In E. K. Horwitz & D. J. Young (Eds.), *Language anxiety: From theory and research to classroom implications* (pp. 109-126). Upper Saddle River, NJ: Prentice Hall.
- Korkmaz, S., & Mirici, I. H. (2021). Converting a conventional flipped class into a synchronous online flipped class during COVID-19: university students' self-regulation skills and anxiety. *Interactive Learning Environments*, volume?1-13.
- Krashen, S. (1981). Second language acquisition. *Second Language Learning*, 3(7), 19-39.
- Lee, Y., & Choi, J. (2011). A review of online course dropout research: Implications for practice and future research. *Educational Technology Research and Development*, 59(5), 593–618.
- Liu, M. (2006). Anxiety in Chinese EFL students at different proficiency levels. *System*, 34(3), 301-316.
- Liu, M., & Jackson, J. (2008). An exploration of Chinese EFL learners' unwillingness to communicate and foreign language anxiety. *The Modern Language Journal*, 92(1), 71-86.
- Liu, M., & Zhang, X. (2013). An investigation of Chinese university students' foreign language anxiety and English learning motivation. *English Linguistics Research*, 2(1), 1-13.
- Majid, F.A., Sharil, W. N. E. H., Luanan, J. E., & Nadzri, F. A. (2012). A Study on the on-line language learning anxiety among adult learners. *International Journal of e-Education, e-Business, e-Management and e-Learning*, 2(3), 187.
- Mak, B. (2011). An exploration of speaking-in-class anxiety with Chinese ESL learners. *System*, 39(2), 202-214.

- Martin, S., & Alvarez Valdivia, I. M. (2017). Students' feedback beliefs and anxiety in online foreign language oral tasks. *International Journal of Educational Technology in Higher Education*, 14(1), 1-15.
- Oxford, R. (2016). 2 *Toward a Psychology of Well-Being for Language Learners: The 'EMPATHICS' Vision*. In P. MacIntyre, T. Gregersen & S. Mercer (Ed.), *Positive Psychology in SLA* (pp. 10-88). Bristol, Blue Ridge Summit: Multilingual Matters.
- Pichette, F. (2009). Second language anxiety and distance language learning. *Foreign Language Annals*, 42(1), 77-93.
- Price, M. L. (1991). The subjective experience of foreign language anxiety: Interviews with highly anxious students. In E. K. Horwitz & D. J. Young (Eds.), *Language anxiety: From theory and research to classroom implications* (pp. 101-108). Upper Saddle River, NJ: Prentice-Hall.
- Russell, V. (2020). Language anxiety and the online learner. *Foreign Language Annals*, 53(2), 338-352.
- Scovel, T. (1978). The effect of affect on foreign language learning: A review of the anxiety research. *Language Learning* 28.1, 129-142.
- Tani-Fukichi, N. (2005). Japanese learner psychology and assessment of affect in foreign language study. *The Language Teacher*, 29(4), 3-10.
- Toth, Z. (2010). *Foreign language anxiety and the advanced language learner: A study of Hungarian students of English as a foreign language*. Newcastle upon Tyne: Cambridge Scholars.
- Yan, J. X., & Horwitz, E. K. (2008). Learners' perceptions of how anxiety interacts with personal and instructional factors to influence their achievement in English: A qualitative analysis of EFL learners in China. *Language Learning*, 58(1), 151-183.

FLIPPED CLASSROOM MODEL WITH YOUNG LEARNERS' VOCABULARY LEARNING IN PRIMARY ELT CLASSROOMS

Pinar SIK

ORCID: 0000-0001-5722-3916
Bagcilar Primary School
National Ministry of Education
Istanbul, TURKIYE

Dr. Ece ZEHİR TOPKAYA

ORCID: 0000-0001-5364-7551
Faculty of Education
Izmir Demokrasi University
Izmir, TURKIYE

Received: 02/12/2022 **Accepted:** 02/05/2023

ABSTRACT

This mixed-method study explored the effect of the flipped classroom model (FCM) on vocabulary learning of young English language learners and their perceptions and experiences about FCM practices. Two intact groups of 4th-grade students in a state primary school in Turkiye were randomly assigned as experimental (N = 32) and control (N = 33) groups. The quantitative data related to vocabulary learning were collected through three measurement tests. The qualitative data were obtained via semi-structured face-to-face interviews with 19 volunteer students from the experimental group. The results revealed that the levels of vocabulary learning and retention for the experimental group students were statistically significantly higher than those of the control group students ($p < 0.05$). The qualitative data analysis also confirmed the effectiveness of the model for vocabulary learning and revealed its efficiency for language classes of young English language learners. Accordingly, suggestions were made for the FCM implementation.

Keywords: Flipped classroom, young learners, ELT, vocabulary learning.

INTRODUCTION

With technological developments and changes in our perceptions of education, alternative technology-based learning models have emerged (Ringstaff & Kelley, 2002). Mainly unique characteristics of today's learners as digital natives accustomed to accessing information quickly and carrying out multiple tasks at the same time (Prensky, 2001) have led educators to use technology and its affordances as assistants and supporters of teaching and learning processes to create better learning environments and provide learners with more meaningful learning opportunities (Bolat, 2016). Therefore, different digital pedagogies have gained prominence, and researchers have started exploring ways to use them effectively.

One such pedagogical approach to instruction is the flipped classroom model (FCM), which defines a learning process in which teacher-centred traditional approaches and learning environments are reversed (Bishop & Verleger, 2013). That is, in teacher-centred traditional approaches, the lesson content is transferred to learners by the teacher in the classroom environment. The subject is reinforced by the student mainly with homework practices at out-of-class processes. In contrast, in the FCM, students watch and study course videos and other e-materials prepared by teachers outside the classroom before the lesson. They study the subject deeply with different active learning activities in the classroom.

The FCM has been found to provide more time and opportunities to English language learners for extensive and intensive language input and output (Han, 2015). For instance, several studies have shown that the FCM supports the language skills of English language learners (Ekmekci, 2014; Mehring, 2016; Ozkal, 2019). In addition, more engaging in-class activities such as collaborative tasks, games, real-life experiments, and role-

play presentations might occur in the language classrooms since the time spent on teacher presentations can now be used for more complex, time-demanding, hands-on, and minds-on learning (Ozkal, 2019).

As widely acknowledged, vocabulary knowledge is fundamental for English language learners to develop their language skills. It is especially crucial to improve their comprehension and production of the language (Schmitt, 2010). Language teachers utilise many explicit and implicit instructional strategies to assist learners in expanding their vocabulary knowledge, such as semantic mapping, reading aloud, dramatizing, and using dictionaries and flashcards (Woodard, 1998). Studies have already indicated that teaching vocabulary using technological tools improves vocabulary learning and captures students' interest as it is more motivating and attractive for today's digital learners (see, for example, Fahandezh & Mohammadi, 2021; Hazar, 2020; Hermagustiana & Rusmawaty, 2017; Jabali & Walker, 2021; Johnston & Barker, 2002; Liman-Kaban, 2022; Utku & Dolgunsoz, 2018). As Kirmizi and Komec (2019) suggest, to improve students' vocabulary knowledge, it is fundamental to find more functional methods to engage them in meaningful and enjoyable contexts. In response to this need, therefore, the FCM can be regarded as one through which vocabulary learning can bring contentment for both language teachers and learners in the English as a Foreign/Second Language (EFL/ESL) classroom to develop and improve students' knowledge and use of the vocabulary items.

The Turkish Primary School English Language Teaching Programme of the Ministry of National Education (MoNE) predominantly centres on speaking and listening skills and is based on effective language use (MoNE, 2018). Specifically, the first four years of English language teaching and learning put more emphasis on vocabulary learning and speaking chunks that learners would use in meaningful communicative activities and develop their communicative competence (MoNE, 2018). Given this significant place of vocabulary learning for young learners at beginner levels and the time-demanding communicative activities required for effective learning, it becomes evident that further studies are needed to clarify the potential effect of the FCM on primary school learners' vocabulary learning process as well as its likely challenges.

There is a dearth of research investigating whether the FCM model can be utilized effectively and efficiently in EFL young learners' classes to help learners attain the intended learning outcomes. The studies in the FCM literature show that it has been chiefly implemented and researched at the university level (Day & Foley, 2006; Lage, Platt & Treglia, 2000; Morevac, Williams, Aguilar-Roca & O'Dowd, 2010; Pierce & Fox, 2012; Stone, 2012) and high school or secondary school levels (Kong, 2014; Smith, 2015; Wiginton, 2013), and in subject areas such as mathematics (McGivney-Burelle & Xue, 2013; Ozdemir, Agirman-Aydin, Kucuk-Demir, 2020), history (Murphree, 2014), engineering (Mason, Shuman & Cook, 2013), statistics (Strayer, 2012), and pharmacy (Pierce & Fox, 2012).

In EFL/ESL settings, the use of the FCM was also mainly investigated at the university level (Hung, 2015; Kvashnina & Martynko, 2016; Leis, Tohei, & Cooke, 2015; Shaffer, 2016) and high school level (Al-Harbi & Alshumaimeri, 2016; Mehring, 2016). Fewer studies have been conducted at the primary and secondary school levels (Unal & Unal, 2017; Yang, 2017). The researchers in EFL mostly explored the use of the FCM in general academic success in second language learning (Ishikawa et al., 2015; Unal & Unal, 2017; Yang, 2017), grammar teaching (Al-Harbi & Alshumaimeri, 2016; Zainuddin & Halili, 2015), pronunciation (Yang & Chen, 2020), and vocabulary (Kang, 2015) as well as four basic skills; reading (Huang & Hong, 2016), listening (Roth & Suppasetsee, 2016), writing (Farah, 2014; Leis, Tohei & Cooke, 2015), and speaking (Wu, Hsieh & Yang, 2017). Also, some studies investigated the FCM's effect on learner autonomy (Han, 2015), student engagement and satisfaction (Alsowat, 2016), confidence (Mehring, 2015), motivation (Chen Hsieh, Wu & Marek, 2016), attitudes and perceptions (Prefume, 2015) in EFL classrooms. Most of these studies concluded that the FCM is a practical instructional approach to bring about the intended learning gains (Unal & Unal, 2017; Yang, 2017). Moreover, positive opinions and positive experiences related to the FCM were reported by these studies (Alsowat, 2016; Al-Zahrani, 2015; Farah, 2014) regarding increased learner interest and engagement and active participation in activities carried out in the classroom (Chen Hsieh, Wu & Marek, 2016; Zainuddin & Halili, 2015).

Although there has been a growing interest in international FCM research in EFL/ESL contexts, the studies in Türkiye are limited and mainly conducted at the university and high school levels. Those studies carried out at the university level mainly investigated the impact of the FCM on the language learning success of EFL learners (Boyraz, 2014; Orhan, 2019; Saglam, 2016; Unsal, 2021). In some studies, language skills were

also examined, and significant results were revealed for university students' writing (Altas & Mede, 2021; Ekmekci, 2014; Engin, 2014; Iyitoglu, 2018; Umutlu, 2016), speaking skills (Koroglu; 2015; Koroglu & Cakir, 2017). Besides, Basal (2012; 2015) examined the views and perceptions of pre-service English language teachers and concluded that they were highly positively related to the FCM implementations. In addition, there are a few studies at the high school level that explored the FCM's effect on self-directed learning readiness and attitudes towards the English course (Ceylaner, 2016), students' autonomy levels and attitudes towards the FCM use (Edis, 2017) and motivation and technological attitudes (Komec, 2018).

The studies of the FCM, specifically on the vocabulary knowledge of EFL learners, are relatively scarce on a global and Turkish scale. The studies abroad mainly explored the effect of the FCM on the vocabulary learning of EFL university students (Alnuhayt, 2018; Chen Hsieh, Wu & Marek, 2016; Kang, 2015; Kim, 2018; Sun, 2016; Zhang et al., 2016). These studies investigated the efficacy of flipped learning on university students' learning of new English vocabulary items (Alnuhayt, 2018; Sun, 2016; Zhang et al., 2016; Kang, 2015), acquisition of receptive and productive vocabulary (Kim, 2018), the learning of English idioms for written and verbal communication (Chen Hsieh, Wu & Marek, 2016), their attitudes towards flipped learning in the EFL vocabulary class (Alnuhayt, 2018). The studies in the Turkish EFL context are also relatively scarce. Ozkal (2019), in his master thesis, explored the FCM's effect on university students' English proficiency and the learning of new English vocabulary items. Moreover, Kirmizi and Komec (2019) conducted a study to reveal the FCM effect on high school students' vocabulary learning and revealed significant results. These studies revealed that the FCM effectively and significantly promoted the vocabulary development of EFL learners. Besides, the results indicated learners' positive attitudes towards the FCM.

Despite the numerous studies summarized above which explored the use of the FCM at different school levels, there needs to be more research that investigates whether the FCM can be offered as an instructional approach in young learners' classes. In a recent study, Sahin (2022) investigated the effects of the FCM on young learners' vocabulary learning and retention, along with their opinions related to the flipping process. Besides, Liman-Kaban (2022), in her study, revealed a positive impact of gamified flipped learning on young learners' vocabulary learning in a private Turkish school. However, especially in EFL/ESL settings, the available research literature does not reveal much about the FCM implementation in young learners' classes.

To this end, by designing the classes as flipped and organizing the lesson content for young EFL students, the current research study aimed to reveal the possible potential effect of the FCM on young EFL learners' learning of English vocabulary items in the Turkish context to present the learners' views and experiences of and attitudes towards the FCM, and to explore advantages and challenges of the FCM. Concerning these aims, the following research questions were formulated:

1. Is there an effect of the FCM on the vocabulary learning of young EFL learners?
2. Is there a difference in students' vocabulary learning between the experimental group and the control group?
3. Is there a difference in students' vocabulary retention between the experimental group and the control group?
4. What are the perceptions and suggestions of the young EFL learners towards the FCM use in English language learning?
5. What are the FCM experiences of the young EFL learners during the FCM use in terms of the study method and parental help?

FLIPPED CLASSROOM MODEL

As Basal (2015) argues, the FCM has its roots in constructivist learning theory emphasizing a student-centred approach and personalized-differentiated learning, which qualifies it as a pedagogically sound and principled approach.

The FCM is the inversion of the teaching system that has been around for years. Instead of the traditional systems in which students learn the lesson content at school and reinforce it via homework activities at home, it advocates a system where students learn the subject outside the classroom. As described by Bishop and Verleger (2013), it is "an educational technique that consists of two parts: interactive group

learning activities inside the classroom, and direct computer-based individual instruction outside the classroom” (p.5).

According to Bergmann and Sams (2012), the fundamental purpose of the FCM is to optimize the time spent face-to-face with learners in the learning process. For this, the teacher prepares the course content in formats such as videos and presentations and enables learners to access these contents before the lesson. Students watch the content and do some activities, such as taking online quizzes and notes. When they come to the classroom as prepared, after a short review, lecture or question and answer part, the relevant subject is reinforced in depth with examples, problems, and various activities, increasing student-student and student-teacher interaction and making learning more permanent (Bergmann & Sams, 2012; Flipped Learning Network-FLN, 2014; Stone, 2012; Unal & Unal, 2017). Using the FCM requires better planning and monitoring than the traditional approach. To achieve success, teachers need to plan both in-class and out-of-class activities appropriately and effectively. The FCM also demands changes in learners’ roles as students are expected to understand the subject with videos, audio recordings, and texts and prepare for the lesson during the time spent outside the classroom. They assume responsibility for learning and accessing materials wherever and whenever they want and as often as needed (Enfield, 2013; Fulton, 2012; Gencer, 2015; Rutkowski & Moscinska, 2013). Since the FCM provides students with advance preparation opportunities, it enables them to participate in face-to-face lessons efficiently (McLaughlin et al., 2014), allowing them to show themselves fulfilling their responsibilities, knowledge, and skills. At the same time, taking an active role in the activities increases students’ motivation and enables them to focus on the difficulties faced in individual learning in the classroom (Foust, 2012; Jenkins, 2012).

Although the FCM is highly student-centred, there needs to be more information in the literature about how young learners cope with the video lessons and what study skills they use while studying at home. Of the few studies conducted with young learners, Nayci (2017) found that the primary school students on a flipped social study lesson described the video-watching process as enjoyable and contributing to their learning process. Kaya (2021) investigated the role of the FCM on 4th-grade learners’ basic language skills in Turkish language lessons over a 9-week FCM implementation. Besides, Ozcelik (2021) examined the positive impact on 4th-grade learners’ speaking skills in EFL classrooms via a study including pre-test, post-test, and interviews with learners. In a recent study, Sahin (2022) investigated the effects of the FCM on 4th-grade learners’ vocabulary learning. The teachers’ observations and parents’ perspectives on using the FCM for vocabulary development were also revealed in her study. The results indicated that the learners’ ICT and multiple language skills, including writing and speaking, developed alongside their social skills and collaboration. Also, classroom management and behavioural problems were observed to decrease (Kaya, 2021). Regarding the challenges, the studies showed that technical video problems and internet access difficulties were among the most cited ones (Kaya, 2021; Nayci, 2017).

Similarly, there needs to be more information about the role of parents in FCM. Nayci (2017), Kaya (2021), and Sahin (2022) reported parents’ positive opinions about FCM use as it included the use of technology for educational purposes. In Nayci’s study, parents also stated that the FCM provided the opportunity to evaluate students’ learning. In Kaya’s study, the parents of disadvantaged students also observed development in their children’s social skills and behaviours. Similarly, in Sahin’s (2022) study, parents had a similar view as they expressed that the FCM improves children’s vocabulary knowledge and pronunciation skills as well as their classroom performance and self-confidence. However, they also expressed difficulties related to computer and internet access, problems with the absence of teacher support during the learning process, adaptation to the new method at the beginning, and an increased workload (Nayci, 2017; Kaya, 2021; Sahin, 2022).

Criticisms of Flipped Classroom Model

The biggest argument against the FCM is that the internet or required technologies may not be accessible to every student making it difficult for them to access the course contents. Moreover, the technical inadequacies arising from the digital systems used during the FCM implementation might disrupt learning. Although, accessing information at the desired time and place is considered convenient, in such an internet-based learning system, students, especially young learners, may need help accessing and viewing video lectures and podcasts. Otherwise, deficiencies or delays may occur in the learning process (Redmond, 2014).

Different studies also report the workload the FCM creates for learners and teachers as the top challenges of the model (Turan & Akdag-Cimen, 2019; Unal & Unal, 2017). Preparing the pre-class materials was found to be time-consuming by the teachers. To overcome this problem, Unal and Unal (2017) recommend starting the FCM slowly and preparing the materials progressively.

Nevertheless, another criticism of the model is the inability to control whether the students keep studying the video lessons and the uncertainty of how the students who do not watch the video before the class survives in the classroom (Bergmann & Sams, 2012; Milman, 2012; Unal & Unal, 2017). In this respect, the EBA (Education Information Network) system is expanding its functions and providing more produced during COVID-19, enabling teachers to share videos and activities that students can study online. While the teachers can supervise the students' study rates for the videos and related activities, the time spent on each video, the number of repetitions for watching the video lessons, and whether the students carefully study the video lessons are not guaranteed by this system. However, to guarantee that learners study the videos, teachers may provide follow-up activities for students, such as small quizzes or review activities related to lesson videos on the EBA platform so that they can see whether the videos are studied carefully, and activities are completed for each student.

Moreover, Enfield (2013) states that in face-to-face education, learners own the opportunity to ask questions and immediately correct mistakes and misunderstandings. However, they are deprived of these opportunities while learning with video lessons at home which may result in demotivation and failing learning performance. In support of this argument, some studies in the literature reveal that students struggle to keep up with video lessons and stay motivated in a self-learning environment, especially when they encounter a problem where clear guidance from the teacher is needed (Redmond, 2014). When learners may not receive immediate feedback for their learning mistakes, they may not follow the lessons, and learning may not be achieved (Jenkins, 2012).

Flipped Classroom Model in Foreign Language Teaching and Learning

Regarding the use of technology in foreign language teaching, Karahan (2001) expresses that designing learning environments with technology-based opportunities for learning-teaching languages in different ways provides learners with a quality learning experience, develops their foreign language learning skills, and increases their interest and motivation. Moreover, using foreign-language tools with audio-visual and interactive features makes learning more accessible, creates student-centred interactive learning environments, and enables students to be active in learning (Boyaz, 2014). Having similar claims, the FCM is also potentially effective in foreign language teaching (Huang & Hong, 2016).

Many researchers have suggested that the FCM can be used as a basis for developing different foreign language skills such as reading, writing, speaking, and listening (Alsowat, 2016; Farah, 2014; Hung, 2015; Mehring, 2016). As well as language development, the FCM has been offered to develop motivation, learner autonomy, metacognitive skills, attitudes, and perception (Leis, Tohei & Cooke, 2015; Mehring, 2016; Prefume, 2015).

Despite their efforts to diversify their teaching with various activities and methods, foreign language teachers may need more time and availability as most classes include didactic lectures for vocabulary teaching or grammar explanations. However, in foreign language teaching, students must be allowed to participate in communicative activities and meaningful skill tasks to acquire the foreign language effectively. For this reason, grammar subjects or vocabulary items in foreign language teaching classes could be delivered through videos outside the classroom. The FCM implementations occur in the classroom and significantly contribute to language learning through more communicative and meaningful language activities. The teacher can offer opportunities for cooperative work, discussion, question-answer, and evaluation activities conducted in face-to-face learning environments and engage students in authentic learning situations that ensure meaningful and enjoyable learning contexts through the extra time gained with the help of flipped videos (Ozkal, 2019).

On the other hand, Little (1991) suggested that a shared responsibility in making decisions for the studying process ensures more effective and more permanent learning. The FCM students are assigned to study the lesson videos before classes, for which they decide when and where to study and the study pace and method. Thus, the FCM might be an alternative approach to encourage students to take on responsibilities and learn autonomously.

Another area the FCM contributes to language learning is qualified feedback during in-class activities (Fulton, 2012; Harper, Green & Fernandez-Toro, 2012). Mehring (2016) also suggested that language skills can be improved by language teachers giving immediate feedback to learners while using the target language in active learning activities. The students getting feedback and comments from their teachers may be aware of their abilities and the points they need to improve and develop better language learning strategies which helped them to improve meta-cognitively as well.

Studies have found that integrating technology into education enhances students' motivation for learning (Chen Hsieh, Wu & Marek, 2016; Komec, 2018). Since today's learners are defined as digital natives, technology-enhanced learning could motivate them, and the FCM could also take their attention as they are interested in technology. Thus, using technology in foreign language education could be effective for young learners in primary classrooms to improve their language skills. The studies in the global literature have generally been conducted with university or high school students, but implementing the FCM with young learners is very scarce. Thus, to address the gap in the literature regarding the use of the FCM in young learners' English language classes, this study set out to be the prominent research to explore the FCM in vocabulary teaching for young learners in Türkiye.

METHODOLOGY

Research Design

The mixed-method approach was utilised to determine the impact of the FCM on the vocabulary learning of young EFL learners. Two intact 4th-grade groups studying at a public primary school were assigned as the experimental (n=32) and the control group (n=33). While the experimental group received the FCM, the control group was taught using a traditional vocabulary teaching approach. Adopting the Explanatory Sequential Design, which includes quantitative and qualitative data collection methods (Creswell, 2012), the data were collected in two consecutive phases. The first phase was based on a quasi-time series experimental design in which three measurements were taken to examine the expected significant difference in vocabulary learning performance of both groups. In the second phase, semi-structured interviews were held with volunteer students from the experimental group to gather rich and detailed information about the FCM implementation and their FCM experiences.

Setting and Participants

This study was conducted in the Spring Term of the 2018-2019 teaching year for over four weeks in a state primary school in Istanbul, Türkiye, with the participation of 65 (n= 32 experimental and n=33 control group) 4th grade English language learners. The experimental group consisted of sixteen male and sixteen female students, and the control group consisted of seventeen male and sixteen female students whose ages were between 9 and 10. For the qualitative part of the study, nineteen volunteer students (8 male and 11 female) were interviewed to gain insight into their experiences and opinions about the FCM.

Two English written exam scores of the students from the Fall Term were evaluated to ensure equivalence between the groups regarding their English language levels. The result indicated that the mean values of both experimental ($\bar{X}= 86.63$) and control groups ($\bar{X}= 85.30$) regarding their exam results were similar. There was no significant difference between them ($U = 494.000, p =.654$), which confirmed that both groups were equal regarding their English proficiency.

Data Collection Instruments and Procedures

Three vocabulary tests named Measurement 1 and 2 and a Delayed test were performed, and semi-structured interviews were utilized to obtain the quantitative and qualitative data. First, to be able to decide the vocabulary items included in the measurement tests, a screening test (Tekin, 2004) which comprised 16 different clothing vocabulary items, was developed by the researcher (Appendix 1) and applied to students to ensure that the vocabulary items were all unknown by the participants. Based on the screening test results and considering the students' cognitive development and cultural familiarity, 12 items were selected, and Measurement 1, Measurement 2, and Delayed tests were designed. Also, the researcher prepared three

different tests to eliminate students' coding the places of words via their visual memory. All the tests were checked by three primary school teachers, two English teachers, and an academic expert in teaching young learners concerning face and content validity (Appendix 2).

The interview protocol comprised 14 questions prepared by the researchers. It included two sections: opinions related to the out-of-class process and related to the in-class process (Appendix 3). The initial draft of the interview questions was examined by an academic expert on teaching young learners, for their content validity. Several rounds of development were made for further validation of the interview protocol, and the instrument was given its final form.

As for the data collection procedures, in the quantitative phase, the Measurement 1 test was distributed to the experimental group of students at the beginning of the in-class vocabulary lesson to determine the effect of flipped video that the experimental group of students watched on their vocabulary learning. Then, to reveal the impact of the FCM classroom implementation on vocabulary learning, the Measurement 2 test was applied to both groups of students at the end of the lesson. Meanwhile, the control group received the traditional in-class vocabulary lesson. Four weeks after the FCM treatment, both groups of students were given the delayed test to examine the effect of the pedagogical approaches on students' retention of the vocabulary items. In the qualitative data collection phase, semi-structured interviews were carried out with 19 volunteer students from the experimental group after the flipping treatment (see Figure 1).

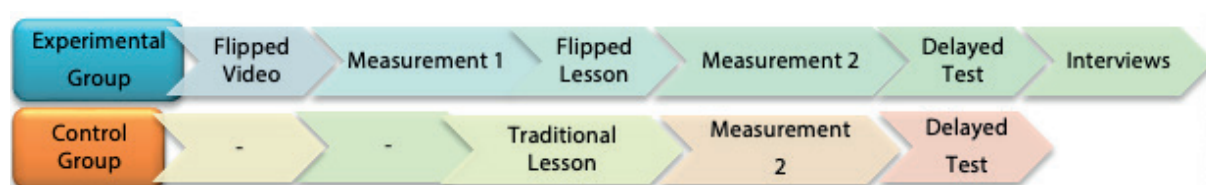


Figure 1. Data Collection Phases in the Study

Preparations and Implementation of the Flipped Classroom Model

The study took place over 12 weeks, including the preparations, implementation, delayed test, and interviews. Table 1 displays the steps and activities.

Table 1. Steps and Activities of the Study

Steps	Activities
Preparation Weeks 1-2-3-4	Official consent was obtained
	A digital platform (teacher website) was created on Weebly
	The achievement tests were applied to check the groups' equality
	A unit was chosen (Unit 8-Clothes)
	A vocabulary screening test was prepared and applied
	A flipped video, including the clothing items, was prepared
	The activities were designed, and data collection instruments were prepared
Implementation Weeks 5-6-7	The parents' meeting was held to inform them about the FCM implementations
	A pilot study was conducted before the main study
	The experimental group of students watched the flipped video
	Measurement 1 test was applied to the experimental group of students
	The experimental group of students had a flipped vocabulary lesson
Interviews and delayed test Weeks 8-9-10-11-12	Measurement 2 test was applied to the experimental group of students
	Measurement 2 test was applied to the control group of students after the PPP vocabulary lesson
	The semi-structured interviews were applied to the experimental group
	After four weeks, the Delayed test was applied to both groups

After obtaining all formal permissions from the Ministry of Education and the school administration, the parents were invited to the school and informed about the FCM. Their formal consent for their child to participate in the study and interviews was requested, and all parents gave their informed consent for the study and interviews.

Twelve vocabulary items about clothes from Unit 8, "My Clothes," in the 4th-grade teaching programme were selected after the vocabulary screening test, which was done to ensure the participants did not know the vocabulary items. Then, the flipped video was prepared and presented via the Weebly (Appendix 4) website for the experimental group of students to study at home. The materials (games, hand-outs, and activities) were produced, Measurement 1, Measurement 2 test, and delayed test were prepared, and semi-structured interview questions were completed. After the parents' meeting was held and the FCM was explained, the main study was conducted.

Meanwhile, the control group of students received a traditional vocabulary lesson in which the vocabulary items were presented and practised via the PPP (present-practice-produce) approach. They were asked to complete their homework at home.

Data Analysis

SPSS 20 (Statistical Package for Social Sciences) software was used to analyse the quantitative data. Firstly, the distribution of normality of the data was examined for the Measurement 1, Measurement 2 tests, and the delayed test. It was determined that the data did not show normal distribution according to skewness and kurtosis values. Therefore, the Mann-Whitney U test was used to analyse the mean scores and the standard deviation for the test scores. The skewness values of the Measurement 1, 2, and delayed tests were found to be -1.31, -2.50, and -1.15 (SE= -1.31, SE= -2.50, SE= -1.15). Respectively, the kurtosis of the exam scores were 0.18, 5.84, and -.065 ($KU= 0.18$, $KU= 5.84$, $KU= -.065$).

According to the Friedman test results, there was a statistically significant difference in the experimental group of students Measurement 1, Measurement 2 tests and delayed test data results $X^2(2)=7.194$, $p=0.027$. Following this, to examine where the differences occur, Wilcoxon signed-rank tests were applied separately for each test data. The Wilcoxon Signed Ranks Test was used to compare the difference between Measurement 1 and Measurement 2 and the delayed test results of the experimental group students.

Secondly, the qualitative data gathered via the semi-structured interviews were obtained by sound recordings and were transformed into text. Then, these texts were analysed with the inductive content analysis technique, which is an objective and systematic expression of the content (Cohen, 2007). Key codes such as benefits, difficulties, and challenges or positive sides of flipping were mentioned under specific themes and categories. For the validity of the qualitative data, first, the researchers identified the codes, themes, and categories. Then, an external expert who had been teaching and doing research on teaching young English language learners at the university analysed the data to check the initial analysis. Then, the researchers and the expert met to discuss the analysis to reach a consensus. After two rounds of consensus-seeking, the final codes, themes, and categories were determined.

RESULTS

RQ.1: Is there any Effect of the FCM on the Vocabulary Learning of Young EFL Learners?

According to the Friedman test results, there was a statistically significant difference in the experimental group of students' Measurement 1, Measurement 2, and the delayed test results ($X^2(2) =7.194$, $p=0.027$). Following this, Wilcoxon signed-rank tests were run to detect the differences across three measurements (see Table 2).

Table 2. Results of Wilcoxon Signed-rank Test for Differences between the Experimental Group Tests

Experimental Group		N	Mean Rank	Sum of Ranks	Z	p
M 1*	Negative Ranks	2	1.75	3.50	-2.627	.009
	Positive Ranks	9	6.94	62.50		
M 2*	Ties	21				
M 1 Delayed test	Negative Ranks	9	8.78	79.00	-.119	.905
	Positive Ranks	8	9.25	74.00		
	Ties	15				
M 2 Delayed test	Negative Ranks	13	9.94	124.00	-2.925	.003
	Positive Ranks	3	4.00	12.00		
	Ties	16				

*M 1: Measurement 1, M 2: Measurement 2

A significant difference between Measurement 1 ($\bar{X} = 9.6$) and Measurement 2 ($\bar{X} = 11.4$) was found ($Z = -2.627$, $p = 0.009$), which means the FCM lesson did elicit a statistically significant change in students' vocabulary learning performances. While no significant difference was found between Measurement 1 and the delayed test ($Z = -.119$, $p = 0.905$), a statistically significant difference was observed between Measurement 2 and delayed tests ($Z = -2.925$, $p = 0.003$). Based on the findings, the FCM was effectively increased the students' vocabulary learning in the experimental group. Furthermore, the experimental group of students was assessed with the Measurement 1 test to see how flipped video they studied at home affected their vocabulary learning results ($\bar{X} = 9.6$). All in all, 26 out of 32 students successfully recalled all 12 vocabulary items by the flipped video.

RQ.2: Is there a Difference in Students' Vocabulary Learning between the Experimental Group and the Control Group?

The Mann-Whitney U test was used to examine whether there were differences between the experimental and control groups' Measurement 2 test results (see Table 3).

Table 3. Results of Mann-Whitney U Test for Experimental and Control Group Students' Measurement 2 Tests

Group	N	Mean Rank	Sum of Ranks	\bar{X}	U	z	p
Experimental Group	32	39.56	1266.00	11.4	318.000	-3.153	.002
Control Group	33	26.64	879.00	9.6			

A statistically significant difference was found between the experimental and control group' Measurement 2 test scores ($U = 318.000$, $p = .002$). When the mean value is examined, it is seen that this difference is in favour of the experimental group ($\bar{X} = 11.4$, $\bar{X} = 9.6$).

RQ.3: Is there any Difference in Students' Vocabulary Retention between the Experimental Group and the Control Group?

After four weeks following the implementation phase, the delayed test was applied to the groups to evaluate the retention of the vocabulary items. The Mann-Whitney U test was used in the analysis, and the results are given in Table 4.

Table 4. Experimental and Control Group Students' Delayed Test Results

Group	N	Mean Rank	Sum of Ranks	\bar{X}	U	z	p
Experimental Group	32	39.23	1255.50	9.7	328,500	-2.700	.007
Control Group	33	26.95	889.50	7.5			

A statistically significant difference was found between the delayed test scores in favour of the experimental group ($U = 328.500$, $p = .007$). According to these results, the retention level of the vocabulary items by the experimental group receiving the FCM ($\bar{X} = 9.72$) was higher than that of the control group ($\bar{X} = 7.48$), which was taught by the traditional teaching method. It could be inferred that the content, activities, and materials prepared according to the FCM, including the video and online support, reinforced the students' vocabulary learning which led to more permanent learning.

RQ.4: What are the Perceptions and Suggestions of the Young EFL Learners towards the FCM Use in English Language Learning?

The analysis of the interview data yielded two main categories: the FCM process at home and the FCM in the classroom. They were further analysed under two themes as students' positive and negative perceptions. Table 5 below demonstrates the themes and categories of students' positive opinions of the flipped video lesson at home.

Table 5. Students' Positive Views of the Flipped Video Lesson at Home

Themes	Categories	Students' Codes
Studying in Silence	Studying free from disturbing factors occurring in the classroom	S1, S2, S3, S4, S6, S9, S10, S11, S12, S18, S19
	Learning more efficiently and permanently	S2, S6, S9, S10, S12, S18
	Learning more fluently and comfortably without any intervention	S3, S11, S12, S18, S19
	Having an increase in concentration on content	S2, S3, S6, S10
Reinforcement with Replay Monitoring	Learning permanently with continually repeating	S1, S3, S4, S9, S11, S12, S13, S14, S18
	Manipulating the video according to his/her learning pace	S1, S3, S5, S8, S11, S14, S18
	Learning the content more quickly	S4, S18
	Studying his/her own as he /she adjusts the learning pace	S1, S5

Impact of Technology Use	Being digital natives and owing tendency to technology	S2, S15, S17
	Realising the use of the internet as a learning tool outside of the classroom	S2, S17
Comfort of Studying Environment	Studying in a physically relaxed and comfortable atmosphere	S1, S7, S18
	Having the convenience to stop and give pause in the physical needs	S1, S18

The results show that most students have positive opinions about the flipped video lesson they studied at home. The most reported advantage of the FCM was studying in silence ($f=11$). The young learners said they favoured the lesson because they studied without disturbing factors occurring in the classroom. For instance, S2 indicated, “Studying the lesson at home is very positive as the surrounding is tranquil everywhere and nobody speaks. I pay attention better and memorize words better”. Besides this, students expressed that they learned more efficiently and permanently concerning the increased concentration on the content. For example, S3 said, “When someone makes noise in the classroom, our attention may be distorted, and we may not learn. But we are more comfortable at home”.

Another major theme is the importance of reinforcement with replay monitoring ($f=11$). The students stated that they learned the content more quickly and efficiently as they could manipulate the vocabulary video according to his/her learning pace. Learning with continual repeating helped them memorize words permanently. Accordingly, S4 said, “It was better because I memorized it easily because I could watch it all over again.”

Following this, the flipped lessons were also found to be motivating and engaging as students use the impact of technology for educational purposes ($f=5$). As digital natives of this century, the students expressed that they were pleased to learn with technology.

Lastly, three students preferred to learn at home with the comfort of studying in the FCM. Related to this, S1 expressed his opinion as “It was nice to work at home. I am usually too thirsty; I could drink water easily”. Students may have physical needs during the lessons, and with the convenience of the FCM, they could meet them comfortably.

Furthermore, the students expressed positive opinions about applying the FCM in the English lesson. As a result of the data analysis, three major themes were found, as shown in Table 6.

Table 6. Students’ Positive Views of the Flipped Classroom Model in English Lesson

Themes	Categories	Students’ Codes
Increasing and Facilitating Learning	Providing accessible and successful participation in classroom activities and increasing active participation	S1, S2, S4, S5, S10, S11, S12, S13, S14, S15, S16, S17
	Learning efficiently and permanently by doing more hands-on activities	S1, S2, S3, S4, S5, S9, S14, S15, S18
	Enhancing the development of self-confidence in language learning by entering the class prepared	S1, S4, S5, S8, S12, S13, S14, S16, S17
	Having an increase in teacher’s modelling frequency	S2, S9, S12, S13, S14, S15, S18
	Improving language skills and enhancing audio-visual memory	S1, S2, S7, S18
	Having a preference for doing homework with the teacher in the classroom	S4, S7, S13, S14, S16
	Proving adjustments according to their individual learning pace	S4, S12, S14, S17
	Increasing the exposure of language input and resources for the further studies	S1, S9, S18
	Increase in student-student interaction and collaboration	S5, S14

	Guiding for further study and investigating	S2, S9, S10, S12
Guiding students' learning effort & autonomy	Raising awareness of vocabulary and language learning	S1, S10, S18
	Evaluating our free time at home with language learning	S2, S17
Overcoming affective barriers	Enabling to cope with a lack of self-confidence stemming from stress, shyness, and peer pressure	S13, S14, S16, S17

From the viewpoint of almost all students ($f=17$), learning English via the FCM has benefits in increasing and facilitating learning. The students reported that they could efficiently and successfully participate in classroom activities. The new model increased their active participation. S16 expressed, "I was having difficulties with doing homework at home, but it was better and easier when we did the homework at school. By studying the lesson at home, the activities at the school were simpler". Also, they expressed that they could learn more efficiently and permanently as flipping allocated more time for hands-on activities and games. S1 pointed out, "We have more time for activities. We learn better by doing more activities. I think the more we do, the more we learn".

Moreover, the students added that they felt more confident during the lesson, and their fears of English diminished via efficiently. S14 indicated, "As we learned at home and worked well in advance, the words were in our mind already. So, when we do activities in school, we never forget them; they stay in our minds permanently".

Additionally, it was reported by the students that the FCM improved their learning effort and learning autonomy ($f=7$). Regarding this category, S18 reported the following views "We can see the differences between the spelling and pronunciation of the sounds of the letters. The sounds like "sh" used to confuse me. We can look up and remember from the video anytime". Besides, the students reported that flipping the classroom eased them to cope with a lack of self-confidence stemming from stress, shyness, and peer pressure in the classroom ($f=4$).

Out of nineteen students, eight suggested some potential challenges of flipping which are displayed in Table 7.

Table 7. Students' Views on Challenges of the Flipped Classroom Model

Themes	Categories	Students' Codes
Absence of teacher's help or assistance	Inability to seek help and ask questions to teacher /No immediate feedback	S8, S15, S19
	Fear of making mistakes by studying alone	S4, S8, S19
Problems with technology use	Lack of teachers' sufficient direction before the lesson	S3, S8, S19
	The possible threats of being lonely at an internet portal	S6
Concerns about potential problems	No access to the internet or a computer	S5, S7, S8
	Lack of technological skills	S5

As Table 7 shows, the students raised concerns about the absence of a teacher's help or assistance ($f=6$), problems with technology use ($f=4$), and concerns about potential problems ($f=4$). For instance, having worries and concerns about technology and the internet S5 stated, "There is internet at our home, but once the internet is cut off, we cannot watch the videos so that we can fall behind the lessons."

Finally, at the end of the interview, the students were asked for suggestions related to the FCM in English, as shown in Table 8.

Table 8. Students' Suggestions for the Flipped Classroom Model

Themes	Students' Codes
Giving homework at the end of a flipped lesson	S1, S7, S9, S10, S12
Turkish meanings included in the video	S4, S5, S12
More videos for previous units and vocabulary items	S7
Including the transcript of the conversation and listening activities at the end	S18
Adding a song at the end of the lesson	S6

Eight participant students were pleased with everything and did not express any suggestions for improving flipped lessons. However, nine of nineteen students suggested developing the FCM in English lessons. While five of the students expressed that they would like to be given homework again at the end of the lesson, on the other hand, three students preferred the Turkish meanings of the words in the video. Besides, more videos for previous units for revision and speaking activities and role-play dialogues at the end of the video were the suggestions expressed by the students. Finally, one female student said that she would like videos to have songs at the end of the video.

Besides, the interviewee students were asked to give their opinions about applying the FCM in other school subjects such as religious culture, math, or science. Nine students expressed that flipping is applicable to other subjects like maths, science, or religious culture. Relating to this, a Syrian student was pleased to study the content from the video at home as she could not follow the lessons because of language problems. She expressed, "I would like other lessons, science, social, math to be flipped, and I would rather study at home because I cannot follow the lessons well because they are not Arabic." However, ten students mentioned that flipping was only convenient for English lessons. Especially for maths lessons, the students preferred to study at school as they would need to ask questions and take immediate feedback from their teacher.

RQ.5: What are the FCM Experiences of the Young EFL Learners during the FCM Use in terms of the Study Method and Parental Help?

Aside from their positive and negative perceptions, the students were asked to report on their FCM experiences regarding the study method, other resources they used, and the amount of parental help students required while studying the video. Table 9 shows the study method the students used while studying the flipped video.

Table 9. Study Methods Students Used during the Flipped Video Studying

Themes	Students' Codes
Listen, repeat, and, take notes	S2, S3, S4, S6, S8, S9, S10, S12, S13, S14, S15, S16, S17, S18
Listen and repeat only	S1, S5, S7, S11, S19
Listen, repeat, take notes and draw pictures	S18
Use association techniques	S2

Most students ($f=14$) answered that they listened, repeated, and took notes in their notebooks. On the other hand, some students ($f=5$) indicated that they listed and repeated several times without taking notes. While one student listened, repeated, took notes, and drew pictures in her notebook, another participant student used association techniques, such as memorizing the words with a Turkish word with similar pronunciation.

Additionally, ten students indicated they also needed help checking their understanding of the vocabulary items. They reported using several different resources (see Table 10).

Table 10. Other Resources Students Used during the Flipped Video Studying

Themes	Students' Codes
Look up the dictionary	S3, S4, S6, S10
Use the internet to check the meaning	S2, S9, S10, S12
Ask his/her friend or teacher during the lesson	S5, S12, S14
Check vocabulary items from the course book	S1, S9

As can be seen, the students used internet sources, dictionaries, and the course book to verify what they had learned from the video. The FCM led them to explore other resources when they wanted to be sure or learn more about the topic. Besides, the interview responses revealed that the students required parental help while studying the flipped video. Table 11 shows the three themes that emerged from the analysis.

Table 11. Parental Help Students Required during the Flipped Video Studying

Themes	Students' Codes
Accessing the video site	S3, S4, S6, S7, S8, S9, S10, S11, S13, S14, S15, S16, S18, S19
Practicing vocabulary items and reinforcement	S3, S4, S5, S7, S9, S10, S12, S14, S15, S18
Asking for explanations for unclear points (meanings, spelling, or pronunciation)	S1, S4, S6, S7, S13, S16

Although S2 and S17 did not require any assistance from their parents during the flipping process, most students ($f=17$) asked for parental help in four cases. Most frequently, the students needed technical help from their parents to find the video site, open the video ($f=14$), and practice vocabulary items for reinforcement ($f=10$). In addition, some students ($f=6$) needed to ask for explanations for unclear points (meanings, spelling, or pronunciation). On this issue, S16 commented, "I asked my parents the words, and they helped me. Since she has time, we can ask our mother if we do not understand at home. However, the teacher sometimes does not have time at school, so we cannot ask questions".

DISCUSSION

This study, based on a mixed method research design, adopted the FCM in teaching English language lessons to young learners in a public primary school in Turkiye and aimed to examine the effects of the FCM on the students' vocabulary learning performance and retention of these items. The qualitative data results were supported by semi-structured interviews with the young learners about flipping experiences and perceptions in the ELT classroom.

When the Measurement 2 test results of the experimental group and control groups of students were examined, it could be seen that the vocabulary learning results of the students in the experimental group were significantly higher ($\bar{X} = 11.4$) than the control group ($\bar{X} = 9.6$) ($p < 0.05$). It has been concluded that students studying with the FCM are more successful in learning vocabulary than students studying in the traditional classroom model. When the studies on the FCM are evaluated in general, the studies examining the effects of the model on academic achievement were conducted with different education levels and study groups. In this study, it was found that the model has a significant effect on student achievement. Thus, the results of this study were similar to the results of many studies in the literature (Balıkcı, 2015; Boyraz, 2014; Caliskan, 2016; Cibik, 2017; Ekmekci, 2014; Fahandezh & Mohammadi, 2021; Farah, 2014; Hao, 2016; Hung, 2015; Iyitoglu, 2018; Komec, 2018; Koroglu, 2015; Kaya, 2021; Kvashnina & Martynko, 2016; Leis, Tohei, & Cooke, 2015; Ozcelik, 2021; Saglam, 2016; Shaffer, 2016; Sahin, 2022; Utku, & Dolgunsoz, 2018).

One of the most prominent features of the FCM is that most of the class time is allocated to active learning activities, discussion, and group work (Bergmann & Sams, 2012). To this end, active learning activities conducted in the classroom positively affected students' better learning of vocabulary items. Similarly, Street, Gilliland, McNeil & Royal (2015) emphasized in their study that the FCM increases success because it enables in-class active learning experiences, interactive materials, peer interaction, collaboration, question-answer, and discussions.

As well as active learning opportunities, the FCM includes the advantages of individual learning (Bishop & Verleger, 2013). As also stated by the students during the interviews, the FCM allowed them to learn at their own pace by repeatedly watching the videos. As a part of the individual learning process, the students could study the lesson comfortably at home, whenever they want, and flexibly. However, in traditional education models, students need to have the chance to watch the course again. Therefore, it can be expressed that the ability to stop and restart the lesson in the learning process and repeat it as often as needed enabled students to manage their learning responsibilities and understand the lesson more clearly (Han, 2015; Ozcelik, 2021).

In addition, the vocabulary success of the experimental group could be attributed to the fact that the students fulfilled homework activities in the classroom under the guidance of the teacher; the teacher was able to provide immediate feedback, and the collaboration and interaction between the teacher and other students were higher compared to the traditional classroom. As Berrett (2012) suggests, the FCM offers students the opportunity to develop their high-level thinking with teachers' guidance and other students' support. The students in the experimental group had the opportunity to do more activities, to ask their questions to the teacher, and to receive immediate feedback. In addition, the fact that these activities were carried out in the classroom with the assistance of the teacher and their peers, without being perceived as homework, therefore, the psychological comfort of being able to get feedback and access teacher help immediately, may have contributed to their success (Sirakaya, 2015).

Moreover, as Fulton (2012) suggests, the FCM offers more diversified content than the traditional education model as it involves technology, attracting today's learners' attention and raising their motivation. The use of multimedia technologies in presenting the course to students and the presentation, video, audio, and visual technologies used to create a practical course has a positive effect on learning success (Fulton, 2012). According to the findings obtained from interviews analysis within the scope of the research, today's learners are enthusiastic about technology use in their lessons, and they are motivated to learn via technological tools more than traditional methods. In addition, it could be suggested that the use of technology has an effect on students' motivation which relatively affect their success as well (Karahan, 2001; Utku & Dolgunsoz, 2018).

Within the scope of this study, the participant students were also evaluated in terms of their level retention of these vocabulary items. According to the result of the delayed tests administered four weeks after the flipped class experience, it was found that the retention level of the students from the FCM group was higher than those taught by the traditional learning method, and this difference was significant ($p < 0.05$). This result reveals that the FCM provides better permanent learning, which is congruent with the results of several other studies (Boyraz, 2014; Kim, Kim, Khera & Getman, 2014; Sirakaya, 2015; Sahin, 2022). In addition to the results related to vocabulary learning and retention, the results obtained from the semi-structured interviews with the students about the FCM show that most students have positive opinions about the method. In addition, most participants defined the FCM as a flexible and fun method that increases learning permanence and facilitates learning. They expressed positive thoughts about the continuation of the method for the English lesson as well as the idea of using it in different school subjects. In parallel with the findings of this study, many studies that conclude that students have positive views are also included in the literature (Boyraz, 2014; Day & Foley, 2006; Farah, 2014; Hung, 2015; Edis, 2016; Iyitoglu, 2018; Kaya, 2021; Kong, 2014; Lage, Platt & Treglia, 2000; Ozcelik, 2021; Pierce & Fox, 2012; Sahin, 2022).

The interview results yielded two main categories for the positive aspects of the FCM: the FCM at home and the FCM in English language lessons. Related to opinions of the FCM at home, most students emphasised the advantage of studying in a quiet and comfortable environment without any disturbance in the classes. Studies show that studying in silence enables students to reveal their mental capacities and think creatively (Elmore & McPeak, 2019). Also, on the use and impact of silence concluded that silence could provide a fruitful basis for a deeper understanding of classroom practice (Ollin, 2008). As well as offering opportunities for students to study in silence, the FCM helped them focus without distraction and listen deeply and carefully, enabling them to absorb and remember the content better.

Another point that the students found effective in learning at home is that they had the opportunity to learn at their own pace as they repeated the video course as many times as needed. Although the students have different mental capacities and learning paces, the limited classroom time and environment may hinder the teachers from explaining the subject as many times as the students fully comprehend; however, the students had the chance to do it at home via the FCM. Similarly, Zappe et al. (2009) stated that the ability to pause, repeat and rewind the videos allows students to learn as much as they want and whenever they need and assists them in making the subjects easier to understand.

Furthermore, another positive sub-theme that emerged during the semi-structured interviews is related to its effectiveness in learning English. The mostly referred advantage of the FCM model in learning is that it enables students to have advance preparation which increases the active participation of students during the lesson. The students stated that by receiving the basic information, watching the videos, and getting prepared before the lesson, they were able to participate in the classroom activities more willingly and fulfil the tasks more successfully during the lesson. As supported by the studies in the literature, the students, by getting prior knowledge of the subject, felt more confident, their interest and engagement increased, and they actively participated in activities carried out in the classroom (Basal, 2015; Zainuddin & Halili, 2015; Sirakaya, 2015).

In the interviews, the students stated that the FCM fundamentally affected developing a positive attitude toward the English course. The students reported that the advance preparation opportunity helped them to decrease the fear of making mistakes and having misunderstandings about the subject. In addition, having learned the vocabulary items, the students could fulfil the lesson tasks quickly, so they defined themselves as successful in learning English. This result can be interpreted as the FCM helping the students eliminate affective barriers for English lessons, develop positive attitudes towards the lesson and improve their confidence. Similarly, in his study, Nayci (2017) revealed that young learners have high self-esteem, motivation, and interest in academic activities in the FCM. Likewise, in the study conducted by Guc (2017), students stated that their success increased with the FCM applications, they could comprehend the content better, they participated in the lesson more actively, and having studied the lesson beforehand increased their participation in the lesson.

Moreover, the result of semi-structured interviews revealed that almost all the students were eager to have more English lessons based on the FCM. This situation may result from today's students, referred to as digital natives (Prensky, 2001), who are highly interested in technology and use technology and the internet in every part of their lives for nearly all their needs and purposes. Therefore, using the internet and technology for studying and learning new things may have been enjoyed and preferred as they are familiar with watching videos online. Reaching similar results, Pierce and Fox (2012) also suggested that the FCM is an applicable method for today's learners as the students already use the internet and technology for various purposes such as doing homework, entertainment, and communicating with each other; therefore, the FCM may have captured their interest and eagerness.

Furthermore, regarding the effect of the FCM on learning, the students stated that having learned the vocabulary items before the lesson, they had the opportunity to devote more time to various activities, practices, and games during the lesson compared to traditional lessons, so that the efficiency of the lesson increased. The result is consistent with the findings of Kaya's study (2021), which expressed that young learners could participate in various activities such as questions and answers, discussions, and creating materials in flipped Turkish classes. Similarly, in the study conducted by Topalak (2016), the participant students expressed that they could do more practice for piano lessons as they had learned the theory part of the lesson via the FCM. In addition, as the activities prepared by the teacher were based on group and pair work tasks, the students emphasized that the interaction and collaboration between each student increased during these activities. Similarly in the study of Unal & Unal (2017), the learners expressed that the FCM allowed more space to communicate with the teacher and other students better than the traditional classrooms. Therefore, it could be inferred that the FCM contributes positively to student interaction (Turan & Goktas, 2015).

Finally, in the FCM, the students were expected to determine the place and the time for studying the video. They were responsible for deciding the methods they would use to learn the vocabulary items. The interviews revealed that the students used different methods to learn words, solved the points they did not understand

by referring to various sources, and structured their learning. It has been observed that having students decide their study method for learning the items stimulated their sense of responsibility and encouraged them to find their best method for learning vocabulary. As similarly supported by literature, the results of Ozcelik's study (2021) suggested that young learners' awareness about the stages and features of producing a spoken output increased. They expressed that they realised speaking could be improved by spending sufficient time and effort on it. Also, the students' interviews yielded that the students were able to shape their learning process according to their preferences in the FCM, which also corresponds to their learning and learner autonomy (Bishop & Verleger, 2013; Han, 2015).

Apart from the positive opinions related to the FCM, this research also presents the possible challenges of the FCM from the students' perspectives. They mainly mentioned that the possible challenge of the model was the absence of the teacher during the video study period at home. As the video-watching process does not include any interaction between the students and the teacher, the students expressed their concerns about needing teacher assistance with any possible misunderstandings that might occur while studying. In case a need to ask questions might occur during the video study process, the need for more communication between students and the teacher might cause a decrease in their motivation and difficulty in their learning. In the literature, the absence of teachers' help and immediate feedback were expressed as a problem by students while watching videos (Guc, 2017; Sirakaya, 2015; Yavuz, 2016). Likewise, in Sahin's (2022) study, students' parents also expressed teacher absence as a problem, and the teacher's lack of physical authority during the learning process could have undesirable consequences. The parents pointed out that the learners not receiving support from the teacher during the video-watching process might ignore the lessons (Sahin, 2022). To eliminate this disadvantage, teachers might use social media platforms in the implementation process and establish communication for misunderstood topics or any questions.

The second challenge mentioned was accessing the technological facilities to study the video lesson. For FCM implementations, technological instruments are indispensable, therefore; the inadequacies of these instruments and the inability of most students to access the internet and computers make the model's applicability difficult. In his study, Yavuz (2016) emphasized that the participants needing the internet access required to watch videos and the equipment such as smartphones, tablets, laptops, or desktop computers required for pre-study might cause fundamental problems for the flipped implementations. In addition, Ozcelik's (2021) study, findings revealed that participant students sharing computer and technological instruments with other family members at home could face some problems with watching the video lessons. Thus, the teacher needs to consider students' access to technological instruments and internet connection when using the FCM. In addition, Strayer (2012) emphasized that the model entails students learning the lesson content outside of the classroom via technological devices, thus; it includes the risk of students having distracted by other sites instead of focusing on learning and studying the video. Primarily in terms of young students, the need to establish effective communication with parents and express the need for their observation and supervision arises at this point.

Besides, the interviewee students were asked to give their opinions about applying the FCM in other lessons like religious culture, math, or science. Most students expressed that the FCM could be implemented in all school subjects; some expressed that the FCM is better for school subjects based more on verbal skills rather than mathematical ones, as students might need more immediate feedback for these subjects. Similarly, Demiralay (2014) in her study indicated that the participant students were in favour of the FCM implementations in verbal lessons such as English, social studies, and religious culture lesson, while some students were hesitant to use the model in mathematical subjects as they might need to ask questions.

Besides, the interviewee students were also asked about their experiences during the FCM process regarding parental help they required during the study process, the study method, and the sources they used to comprehend the lesson. First, although some students did not require parental help, most expressed needing their parents' assistance to enter the flipped video website, asking for an explanation for unclear points and revising the newly learned items. In parallel with these findings, in Sahin (2022) study, the participant parents remarked that students asked for help, especially at the beginning of the flipping process, to enter the video site and for explanations of the images they did not understand. As many studies suggest, parental involvement in children's education from an early age significantly affects educational achievement (Wairimu, Macharia & Muiru, 2016; Gulevska, 2017). Thus, educators encourage parental involvement to support academic success and motivation. As suggested during the interviews, for the FCM implementation,

parental help is fundamental. Therefore, the FCM might be suggested as an excellent opportunity to involve parents in a child's education and establish effective communication between parents and educators.

Apart from the parental help during the video studying process, the students decided on their study method for the vocabulary items. While most expressed that they listened, repeated, and took notes, some expressed that they drew pictures and used association techniques. Furthermore, students expressed that they benefited from several sources during the study process, such as looking up the dictionary, using the internet and the course book to check meaning, and asking their classmates. Concerning this, as emphasised in the Common European Framework of Reference (CEFR), involving learners in planning, monitoring, and evaluating their learning and encouraging them to reflect on the process of their learning helps learners develop learner autonomy (Council of Europe, 2001). All in all, the FCM provides the opportunity for learners to realise their learning methods and allows them to be independent students. Thus, it could be an alternative method for fostering learner autonomy.

In light of the qualitative and quantitative data gathered in this research, the FCM could be suggested to create learning environments that support young learners' language learning in ELT classrooms.

LIMITATIONS

In this research study, the participant students were chosen according to some criteria, such as the student's academic achievement and motivation; therefore, the study results were affected by the students' readiness level and were limited to these specific groups. In addition, this study was conducted with a limited number of students with two separate groups as experimental and control. The results need to be generalised as the study was limited to one school term of experiment and one unit of concrete vocabulary teaching.

CONCLUSION

This study makes the following conclusions:

- The FCM is an effective way of improving the vocabulary learning achievements of primary school students. Both quantitative and qualitative data support that the FCM improves students' vocabulary learning performance.
- The FCM provides more permanent learning for vocabulary learning of primary school students. The vocabulary retention level of the students studying with the FCM is higher than those learning with the traditional learning method.
- The FCM provides more learning opportunities for learners. Since vocabulary teaching, which takes most of the time in English lessons, occurs outside the class. In-class time is allocated to student-centred and active learning activities such as various games, hands-on activities, and role-plays, increasing students' exposure to the target language.
- Learning vocabulary items via flipped video, as indicated in the study, is one of the students' most favourable factors of the FCM. They could study a video lesson at home where they were not distracted and could concentrate fully on it.
- The FCM can be considered an educationally effective model as the students in the study considered the model effective and beneficial in providing pre-preparation for the lesson.
- The FCM provides personalised learning opportunities for the students. The students expressed that through the opportunities the FCM offered, they could learn at their own pace and with their study methods.
- The present study also reveals that the students used various study techniques for learning vocabulary items in the video. Various study skills must be presented to students and taught to students to help them better develop autonomy in their learning.
- To sum up, with the conclusions mentioned throughout this study, the FCM has improved students' vocabulary learning proficiency and positively impacted young learners' English language learning. With the conclusions reached in this research, the FCM could be integrated into the English language teaching of primary school learners as a practical solution for their language learning.

BIODATA and CONTACT ADDRESSES of AUTHORS



Pinar SIK is an English Language teacher at National Ministry of Education in Istanbul, Turkiye. She gained her master degree in **Canakkale 18 Mart University** Department of English Language Teaching. Her master thesis is based on the flipped classroom model in young learners' language education. She has been teaching English to young learners for ten years in public schools. Her academic interest areas are young learners' language learning, educational technology and use of internet and e-games in language learning.

Pinar SIK
Bagcilar Primary School
Address: Bagcilar Primary School, 34200, Istanbul, Turkiye
Phone: +90 5455315002
E-mail: pinarsalve@gmail.com



Prof. Dr. Ece ZEHİR TOPKAYA is a full professor at Izmir Demokrasi University, Faculty of Education, Department of Foreign Language Education, Division of English Language Teaching. She has taught several courses at undergraduate and graduate levels including Information Technologies, ELT Programs in Turkiye, Materials Design in ELT, Syllabus Design in ELT, Integrated Language Skills, Critical Pedagogy and ELT, ESP and EAP, Program Evaluation in ELT, Language Policies and Planning. She has publications on topics relevant to language teaching and learning, teacher education, language program evaluation, and ESP/EAP with a specific focus on needs analysis.

Ece ZEHİR TOPKAYA,
Izmir Demokrasi University, Faculty of Education, Department of Foreign Language Education, Division of English Language Teaching.
Address: Izmir Demokrasi Universitesi Egitim Fakultesi Gursel Aksel Blv No: 14, 35140 Karabaglar/Izmir
Phone: +90232 260 1001
E-mail: ece.topkaya@idu.edu.tr

REFERENCES

- Al-Harbi, S., & Alshumaimeri, Y. (2016). The flipped classroom impact in Grammar class on EFL Saudi Secondary school students' performances and attitudes. *English Language Teaching*, 9(10), 60-80.
- Alnuhayt, S. S. (2018). Investigating the use of the flipped classroom method in an EFL vocabulary course. *Journal of Language Teaching and Research*, 9(2), 236-242.
- Alsowat, H. (2016). An EFL flipped classroom teaching model: effects on English language higher-order thinking skills. *Student Engagement and Satisfaction*, 7, 108-121.
- Altas, E.A., & Mede, E. (2021). The impact of flipped classroom approach on the writing achievement and self-regulated learning of pre-service English teachers. *Turkish Online Journal of Distance Education*, 22(1), 66-88.
- Al-Zahrani, A. M. (2015). From passive to active: The impact of the flipped classroom through social learning platforms on higher education students' creative thinking. *British Journal of Educational Technology*, 46(6), 1133- 1148.
- Balikci, H. S. (2015). Evaluation of the success of the lectures prepared with 'flipped classroom' model and students' opinion (Unpublished master's thesis). Afyon Kocatepe University, Afyon, Turkey.

- Basal, A. (2012). The use of flipped classroom in foreign language teaching. In *The 3rd Black Sea ELT Conference* "Technology: A Bridge to Language Learning" (pp. 8-12). Samsun, Turkey.
- Basal, A. (2015). The implementation of a flipped classroom in foreign language teaching. *Turkish Online Journal of Distance Education*, 16(4), 28-37.
- Bergmann, J., & Sams, A. (2012). *Flip your classroom: reach every student in every class every day*. Washington, DC: International Society for Technology in Education.
- Berrett, D. (2012). *How 'flipping' the classroom can improve the traditional lecture*. The Chronicle of Higher Education, 12. Rabidoux and Rottmann research [PDF document]. Retrieved from ASEE National Conference Proceedings: <http://www.studiesuccessho.nl/wp-content/uploads/2014/04/flippedclassroom-artikel.pdf>
- Bishop, J. L., & Verleger, M. A. (2013). The Flipped Classroom: A Survey of the Research. In 120th American Society for Engineering Education Annual Conference and Exposition (1-18). Atlanta, Georgia.
- Bolat, Y. (2016). The flipped classes and education information network (EIN) Tersyuz edilmiş sınıflar ve Eğitim Bilisim Ağı (EBA). *Journal of Human Sciences*, 13(12), 3373-3388.
- Boyras, S. (2014). Evaluation of flipped classroom/ education in English teaching (Unpublished master's thesis). Afyon Kocatepe University, Afyon, Turkey.
- Ceylaner, S. (2016). Effects of flipped classroom on students' self-directed learning readiness and attitudes towards English lesson in the 9th grade English language teaching (Unpublished master's thesis). Mersin University, Mersin, Turkey.
- Chen Hsieh, J. S., Wu, W. C. V., & Marek, M. W. (2016). Using the flipped classroom to enhance EFL learning. *Computer Assisted Language Learning*, 30(1-2), 1-21.
- Cohen, L. (2007). Experiments, quasi-experiments, single-case research and meta-analysis (Cohen, L., Manion, L., & Morrison, K. in Eds) *Research methods in education*. (6th eds.).
- Council of Europe. (2001). *Common European Framework of Reference for Languages: Learning, Teaching, Assessment*. Cambridge, UK: Press Syndicate of the University of Cambridge.
- Creswell, J. W. (2012). *Educational research: planning, conducting, and evaluating quantitative and qualitative research* (4th ed). Boston, MA: Pearson Publication.
- Caliskan, N. (2016). Examining the influence of flipped classroom on students' learning English as a foreign language. (Unpublished master's thesis). Cag University, Mersin, Turkey.
- Cibik, B. (2017). The effects of flipped classroom model on learner autonomy (Unpublished master's thesis). Mugla Sitki Kocman University, Mugla, Turkey.
- Day, J., & Foley, J. (2006). Evaluating web lectures: A case study from HCI. In *Extended Abstracts Proceedings of the 2006 Conference on Human Factors in Computing Systems* (pp.195-200). Montreal, Quebec, Canada.
- Demiralay, R. (2014). Evde ders okulda odev modelinin benimsenmesi sürecinin yenilgin yayilimi kurami cercevesinde incelenmesi (Unpublished doctoral dissertation). Gazi University Educational Sciences Institute, Ankara, Turkey.
- Edis, S. (2017). Flipped instruction for English language learners to enhance learner autonomy (Unpublished master's thesis). Gazi University Educational Sciences Institute, Ankara, Turkey.
- Ekmekci, E. (2014). Flipped writing class model with a focus on blended learning (Unpublished doctoral dissertation). Gazi University Educational Sciences Institute, Ankara, Turkey.
- Ekmekci, E. (2017). The flipped writing classroom in Turkish EFL context: A comparative study on a new model. *Turkish Online Journal of Distance Education*, 18(2). 151-167.
- Elmore T., & McPeak, A. (2019). *Generation Z Unfiltered: Facing Nine Hidden Challenges of the Most Anxious Population*. Atlanta, Georgia: Poet Gardener Publishing.

- Enfield, J. (2013). Looking at the impact of the flipped classroom model of instruction on undergraduate multimedia students at CSUN. *Tech Trends*, 57(6), 14-27.
- Engin, M. (2014). Extending the flipped classroom model: Developing second language writing skills through student-created digital videos. *Journal of the Scholarship of Teaching and Learning*, 14(5), 12-26.
- Fahandezh, F., & Mohammadi, A. (2021). The Effect of Gamified Flipped Classroom on the Improvement of Vocabulary Learning of Iranian Pre-Intermediate EFL Learners. *Vision: Journal for Language and Foreign Language Learning*, 10(2), 83–98. <https://doi.org/10.21580/VJV10I28577>
- Farah, M. (2014). The impact of using a flipped classroom instruction on the writing performance of twelfth grade female Emirati students in the applied technology high school (ATHS) (Unpublished master's thesis). The British University, Dubai.
- Flipped Learning Network. (2014, March 16). Flipped Learning Network. The Four Pillars of F-L-I-P: http://www.flippedlearning.org/cms/lib/07/VA/01923112/Centricity/Dormain/46/FLIP_handout_FNL_Web.pdf
- Filiz, O., & Kurt, A. A. (2015). Flipped learning: Misunderstandings and the truth. *Egitim Bilimleri Arastirmalari Dergisi*, 5(1), 215-229.
- Foust, T. (2012). A tip of the hat to the flip of the class. *Illinois Music Educator*, 73(2), 100.
- Fulton, K. (2012). Upside down and inside out: flip your classroom to improve student learning. *Learning & Leading with Technology*, 39(8), 12-17.
- Gencer, B.G. (2015). A case study towards the implementation of the flipped classroom model in the schools (Unpublished master's thesis). Bahcesehir University, Istanbul, Turkey.
- Groot, P. J. M. (2000). Computer assisted second language vocabulary acquisition. *Language Learning & Technology*, 4(1), 56-76.
- Gulevska, V. L. (2017). Teachers' Perceptions of Parental Involvement in Primary Education. *Teaching Innovations*, 31(1), 134–160.
- Guc, F. (2017). The effect of flipped classroom practice on the rational numbers and operations with rational numbers (Unpublished master's thesis). Amasya University, Amasya, Turkey.
- Han, Y. (2015). Successfully flipping the ESL classroom for learner autonomy. *NYS TESOL Journal*, 2(1), 98-109.
- Hao, Y. (2016). Middle school students' flipped learning readiness in foreign language classrooms: Exploring its relationship with personal characteristics and individual circumstances. *Computers in Human Behavior*, 59, 295-303.
- Harper, F., H. Green, & Fernandez-Toro, M. (2012). "Evaluating the integration of jing® screencasts in feedback on written assignments." Paper presented at the 15th annual conference on interactive collaborative learning (ICL), Villach, Austria. doi:10.1109/ICL.2012.6402092.
- Hazar, E. (2020). Use of Digital Games in Teaching Vocabulary to Young Learners. *Educatia 21 Journal*, 19, 99-104.
- Hermagustiana, I., & Rusmawaty, D. (2018). The Use of Technology for Vocabulary Instruction in EFL Classrooms: Support and Challenges. In *Proceedings of the 2017 International Conference on Education and Technology* (pp.137-143). Atlantis Press.
- Huang, Y. N., & Hong, Z. R. (2016). The effects of a flipped English classroom intervention on students' information and communication technology and English reading comprehension. *Educational Technology Research and Development*, 64(2), 175-193.
- Hung, H. (2015). Flipping the classroom for English language learners to foster active learning. *Computer Assisted Language Learning*, 28(1), 81-96.

- Ishikawa, Y., Akahane-Yamada, R., Smith, C., Kondo, M., Tsubota, Y., & Dantsuji, M. (2015). An EFL flipped learning course design: utilizing students' mobile online devices. In F. Helm, L. Bradley, M. Guarda, & S. Thou sny (Eds.), *Critical CALL—Proceedings of the 2015 EUROCALL Conference, Padova, Italy*.
- Iyitoglu, O. (2018). The impact of flipped classroom model on EFL learners' academic achievement, attitudes and self-efficacy beliefs: A mixed method study (Unpublished doctoral dissertation). Yildiz Technical University, Istanbul, Turkey.
- Jabali, M., & Walker, C. (2021). An exploratory cross-sectional study: FlipQuiz as a digital tool for learning English vocabulary in language classroom. *International Journal of Technology in Education (IJTE)*, 4(3), 516-526. <https://doi.org/10.46328/ijte.149>
- Jenkins, C. (2012). The Advantages and disadvantages of the flipped classroom.
<http://info.lecturetools.com/blog/bid/59158/The-Advantages-and-Disadvantages-of-the-Flipped-Classroom>
- Johnston, J., & Barker, L. (Eds.). (2002). *Assessing the Impact of Technology in Teaching and Learning*. University of Michigan: Institute for Social Research.
- Kang, N. (2015) The Comparison between Regular and Flipped Classrooms for EFL Korean Adult Learners. *Multimedia-Assisted Language Learning*, 18, 41-72.
- Karahan, M. (2001). Egitimde bilgi teknolojileri. Malatya: Inonu Universitesi Egitim Fakultesi, Bote ders notlari.
- Kaya, M. F. (2021). Implementing flipped classroom model in developing basic language arts of the fourth grade students. *Turkish Online Journal of Distance Education-TOJDE*. October 2021 ISSN 1302-6488 Volume: 22 Number: 4 Article 12
- Kirmizi, O., & Komec, F. (2019). The impact of the flipped classroom on receptive and productive vocabulary learning. *Dil ve Dilbilimi Calismalari Dergisi*, 15, 437-449.
- Kim, M.K., Kim, S.M., Khera, O., & Getman, J. (2014). The experience of three flipped classrooms in an urban university: an exploration of design principles. *Internet and Higher Education*, 22(1), 37-50.
- Kim, W. Y. (2018). Effects of flipped learning on the learning of English vocabulary. *Korean Journal of English Language and Linguistics*, 18(4), 470-485.
- Komec, F. (2018). EFL students' perceptions of the flipped classroom in terms of learner autonomy, language skills, technological attitudes, and motivation at secondary level (Unpublished master's thesis). Karabuk University, Karabuk, Turkey
- Koroglu, Z. C. (2015). The effects of flipped instruction on pre-service English language teachers' speaking skills development (Unpublished doctoral dissertation). Gazi University Graduate School of Educational Sciences, Ankara, Turkey.
- Koroglu, Z. C., & Cakir, A. (2017). Use of flipped instruction in language classrooms; an investigation about student teachers' perceptions. *European Journal of English Language Teaching*, 3(1), 17-38.
- Kong, S. C. (2014). Developing information literacy and critical thinking skills through domain knowledge learning in digital classrooms: An experience of practicing flipped classroom strategy. *Computers & Education*, 78, 160-173.
- Kvashnina, O., & Martynko, E. (2016). Analyzing the Potential of Flipped Classroom in ESL Teaching. *International Journal of Emerging Technologies in Learning*, 11(3). 71-73.
- Lage, M. J., Platt, G. J., & Treglia, M. (2000). Inverting the classroom: A gateway to creating an inclusive learning environment. *The Journal of Economic Education*, 31(1), 30-43.
- Leis, A., Tohei, A., & Cooke, S. (2015). The effects of flipped classrooms on English composition writing in an EFL environment. *International Journal of Computer-Assisted Language Learning and Teaching*, 5(4), 37-51.

- Liman-Kaban, A. (2022). The Effect of Gamified Flipped Classroom on Vocabulary Learning of Primary School Students in a Private School in Turkey: Students and Teachers' Experiences. In: Valjataga, T., Laanpere, M. (eds) *Shaping the Digital Transformation of the Education Ecosystem in Europe. EDEN 2022. Communications in Computer and Information Science, vol 1639*. Springer, Cham. https://doi.org/10.1007/978-3-031-20518-7_7
- Little, D. (1991). *Learner Autonomy: Definitions, Issues and Problems*. Dublin: Authentik.
- Mason, G.S., Shuman, T. R., & Cook, K. E. (2013). Comparing the effectiveness of an inverted classroom to a traditional classroom in an upper-division engineering course. *IEEE Transactions on Education*, 56(4), 430-435.
- McLaughlin, J. E., Griffin, L. M., Esserman, D. A., Davidson, C. A., Glatt, D. M., Roth, M. T., Gharkholonarehe, N., & Mumper, R. J. (2013). Pharmacy student engagement, performance, and perception in a flipped satellite classroom. *American Journal of Pharmaceutical Education*, 77(9), 1-8.
- McGivney-Burelle, J., & Xue, F. (2013). Flipping calculus. *PRIMUS: Problems, Resources, and Issues in Mathematics Undergraduate Studies*, 23(5), 447-486.
- Mehring, J. G. (2015). An exploratory study of the lived experiences of Japanese undergraduate EFL students in the flipped classroom (Unpublished doctoral dissertation). Pepperdine University, Malibu, CA, USA.
- Mehring, J.G. (2016). Present research on the flipped classroom and potential tools for the *EFL classroom*. *Computers in the Schools*, 33(1), 1-10.
- Milman, N. (2012). The flipped classroom strategy: What is it and how can it best be used. *Distance Learning*, 9(3), 85-87.
- MoNE. (2018). Ingilizce Dersi Ogretim Programi [English Language Teaching Programme- Primary and Lower Secondary Schools 2nd -8th Grades), Ankara, Turkey. Retrieved from: <http://mufredat.meb.gov.tr/ProgramDetay.aspx?PID=327>
- Moravec, M., Williams, A., Aguilar-Roca, N., & O'Dowd, D. (2010). Learn before lecture: a strategy that improves learning outcomes in a large introductory biology class. *CBE-Life Sciences Education*, 9(4), 473-481.
- Murphree, D. S. (2014). Writing wasn't really stressed, accurate historical analysis was stressed: Student perceptions of in-class writing in the inverted, general education, university history survey course. *History Teacher*, 47(2), 209-219.
- Nayci, O. (2017). The evaluation of implementation of flipped class model in the teaching of social studies (Unpublished master's thesis). Ankara University, Ankara, Turkey.
- Ollin, R. (2008) Silent pedagogy and rethinking classroom practice: structuring teaching through silence rather than talk. *Cambridge Journal of Education*, 38(2), 265-280.
- Orhan, A. (2019). The Effect of Flipped Learning on Students' Academic Achievement: A Meta-Analysis Study. *Cukurova University Faculty of Education Journal*, 48(1), 368-396.
- Ozcelik, A. (2021) The utilization of modelling and flipped video teaching in a combinatory manner for the development of young learners' spoken production. (Master thesis.) Gazi University, Ankara, Turkey.
- Ozdemir, M. C., Agirman Aydin, T., & Kucuk-Demir, B. (2020). Matematik Ogretmeni Adaylarinin Geometri Tutumlarini Gelistirmeye Yonelik Bir Calisma: Ters Yuz Edilmis Sinif Uygulamasi. *Eurasian Journal of Teacher Education*, 1(1), 37-58.
- Ozkal, C. (2019). Flipped vocabulary learning among Turkish learners of English as a foreign language: a sequential explanatory mixed method study (Unpublished master's thesis). Middle East Technical University, Ankara, Turkey.

- Pierce, R., & Fox, J. (2012). Vodcasts and active-learning exercises in a “flipped classroom” model of a renal pharmacotherapy module. *American Journal of Pharmaceutical Education*, 76(10), 1-5.
- Prefume, Y. (2015). Exploring a Flipped Classroom Approach in a Japanese Language Classroom: a Mixed Methods Study (Unpublished doctoral dissertation). Baylor University, Texas, USA.
- Prensky, M. (2001). Digital natives, digital immigrants. *On the Horizon*, 9(5), 1-5.
- Redmond, C. (2014). Flipping Primary Literacy Instruction. <http://carolredmond.efoliomn.com/Uploads/CarolMAED%20Capstone%20Flipped%20Literacy-1391089204570.pdf>
- Ringstaff, C., & Kelley, L. (2002). The learning return on our educational technology investment: a review of findings from research. *Office of Educational Research and Improvement, U.S. Department of Education*. Contract: R302A000021. WestED RTEC, San Francisco, CA.
- Roth, C., & Suppasetsee, S. (2016). Flipped classroom: Can it enhance English listening comprehension for pre-university students in Cambodia? *In Proceedings of Classic: Learning in and beyond the Classroom: Ubiquity in Foreign Language Education* (pp. 255-264).
- Rutkowski, J., & Moscinska, K. (2013, September). *Self-directed learning and flip teaching: electric circuit theory case study*. 41st SEFI Conference, Leuven, Belgium.
- Sage, M. & Sele, P. (2015). Reflective journaling as a flipped classroom technique to increase reading and participation with social work students. *Journal of Social Work Education*, 51(4), 668-681.
- Saglam, D. (2016). Ters-Yuz Sinif Modelinin Ingilizce Dersinde Ogrencilerin Akademik Basarilarina ve Tutumlarına Etkisi (Unpublished master's thesis). Bulent Ecevit Universitesi, Zonguldak, Turkey.
- Schmitt, N. (2010). *Researching vocabulary: a vocabulary research manual*. New York: Palgrave Macmillan.
- Seaman, G., & Gaines, N. (2013). Leveraging digital learning systems to flip classroom instruction. *Journal of Modern Teacher Quarterly*, 1, 25-27.
- Shaffer, S. (2016). One high school English teacher on his way to a flipped classroom. *Journal of Adolescent and Adult literacy*, 59(5) 563-573.
- Sirakaya, D. (2015). Tersyuz sinif modelinin akademik basari, oz-yonetimli ogrenme hazirbulunuslugu ve motivasyon uzerine etkisi (Unpublished doctoral dissertation). Gazi University Graduate School of Educational Sciences, Ankara, Turkey.
- Smith, J. P. (2015). The efficacy of a flipped learning classroom ((Unpublished doctoral dissertation). McKendree University, Illinois, USA.
- Stone, B. B. (2012). Flip your classroom to increase active learning and student engagement. *In 28th Annual Conference on Distance Teaching & Learning* (pp. 1-5). Madison, Wisconsin, USA.
- Strayer, J. F. (2012). How learning in an inverted classroom influences cooperation, innovation and task orientation. *Learning Environments Research*, 15(2), 171-193.
- Street, S. E., Gilliland, K. O., McNeil, C., & Royal, K. (2015). The flipped classroom improved medical student performance and satisfaction in a pre-clinical physiology course. *Medical Science Educator*, 25, 35-43.
- Sahin, S. (2022) The effect of flipped classroom model on the vocabulary learning and retention of young efl learners. Tersyuz edilmis sinif modelinin Ingilizceyi yabanci dil olarak ogrenen kucuk yastaki ogrencilerin kelime ogrenimi ve kaliciligi uzerine etkisi. (Master thesis.) Gazi University, Ankara, Turkey.
- Talbert, R. (2012). Inverted classroom. *The Internet and Higher Education*, 15, 89-95.
- Topalak, S. (2016). The effect of flipped classroom model on the beginner level piano teaching (Unpublished doctoral thesis). Inonu University, Malatya, Turkey.
- Turan, Z., & Goktas, Y. (2015). Yuksekogretimde yeni bir yaklasim: Ogrencilerin ters yuzsinif yontemine iliskin gorusleri. *Yuksekogretim ve Bilim Dergisi*, 5(2), 156-164.

- Umutlu, D. (2016). Effects of different video modalities in flipped English writing classes on students' writing scores (Unpublished master's thesis). Bogazici University, Istanbul, Turkey.
- Unal, Z., & Unal, A. (2017). Comparison of Student Performance, Student Perception, and Teacher Satisfaction with Traditional versus Flipped Classroom Models. *International Journal of Instruction*, 10(4), 145-164. <https://doi.org/10.12973/iji.2017.1049a>
- Utku, O., & Dolgunsoz, E. (2018). Teaching EFL vocabulary to young digital natives through Online Games: A study with Turkish 5th grade EFL learners. *International Online Journal of Education and Teaching (IOJET)*, 5(1), 115-130. <http://iojet.org/index.php/IOJET/article/view/228/223>
- Unsal, G. (2021) The effect of Flipped Classroom Model on students' learning English
- Ters Yuz Edilmis Sinif Modelinin ogrencilerin Ingilizce ogrenmelerine etkisi. (Master thesis.) Gazi University, Ankara, Turkey.
- Yavuz, M. (2016). An investigation into the effects of flipped classroom applications on the academic success and experiences of students a secondary school (Unpublished master's thesis). Ataturk University, Erzurum, Turkey.
- Yavuz, F., & Ozdemir, S. (2019). Flipped classroom approach in EFL context: Some associated factors. *World Journal on Educational Technology*, 11(4), 238-244.
- Wairimu, M.J., Macharia, S.M., & Muiro, A. (2016). Analysis of Parental Involvement and Self-Esteem on Secondary School Students in Kieni West Sub-County, Nyeri County, Kenya. *Journal of Education and Practice*, 7(27), 82-98.
- Wiginton, B. L. (2013). Flipped instruction: An investigation into the effect of learning environment on student self-efficacy, learning style, and academic achievement in an algebra I classroom (Unpublished doctoral dissertation). The University of Alabama, USA.
- Woodard, C. (1998). *Developing vocabulary skills*. ERIC Document Reproduction Service No. EDA426400.
- Wu, W. C. V., Hsieh, J. S. C., & Yang, J. C. (2017). Creating an online learning community in a flipped classroom to enhance EFL learners' oral proficiency. *Journal of Educational Technology & Society*, 20(2), 142-157.
- Sun, X.Q. (2016). Construction of Flipped Classroom Model for Vocabulary Teaching and Its Effectiveness. *In Proceedings of the 2nd Annual International Conference on Social Science and Contemporary Humanity Development* (291-293), Atlantis Press.
- Yang, C. C. R. (2017). An investigation of the use of the 'flipped classroom' pedagogy in secondary English language classrooms. *Journal of Information Technology Education: Innovations in Practice*, 16, 1–20.
- Yang, C. C. R., & Chen, Y. (2020). Implementing the flipped classroom approach in primary English classrooms in China. *Education and Information Technologies*, 25, 1217-1235. doi: 10.1007/s10639-019-10012-6
- Zainuddin, Z., & Halili, S. H. (2015). Flipping the classroom: what we know and what we don't. *The Online Journal of Distance Education and e-Learning*. 3(1), 15-22.
- Zappe, S., Leicht, R., Messner, J., Litzinger, T., & Lee, H. W. (2009). "flipping" the classroom to explore active learning in a large undergraduate course. *ASEE Annual Conference and Exposition, Conference Proceedings*.
- Zhang, H., Li, J., Jiao, L., Ma, W., & Guan, C. (2016). The Adjustment and Effects of Vocabulary Teaching Strategies in Flipped Classroom. *Creative Education*, 7(14), 1966-1973.

APPENDIX 1

Screening Sheet for Vocabulary Items













Aşağıdaki İngilizce kelimelerin Türkçe anlamlarını karşılarna yazınız.

- dress :
- coat :
- shoes :
- hat :
- skirt :
- trousers :
- jumper :
- scarf :
- tie :
- gloves :
- trainers :
- socks :
- waistcoat:
- slippers:
- trainers:
- belt:

APPENDIX 2

Measurement 1 Test, Measurement 2 Test and Delayed Test

Write the clothes under the pictures













			<p>belt</p> <p>trousers</p> <p>socks</p>
<p>1.....</p> 	<p>2.....</p> 	<p>3.....</p> 	<p>tie</p> <p>coat</p> <p>trainers</p> <p>slippers</p>
<p>4.....</p> 	<p>5.....</p> 	<p>6.....</p> 	<p>gloves</p> <p>shirt</p> <p>waistcoat</p>
<p>7.....</p> 	<p>8.....</p> 	<p>9.....</p> 	<p>jumper</p> <p>umbrella</p>
<p>10.....</p>	<p>11.....</p>	<p>12.....</p>	

Write the numbers of the clothes under the pictures

			<p>1. shirt</p> <p>2. coat</p> <p>3. slippers</p> <p>4. waistcoat</p> <p>5. belt</p> <p>6. trousers</p> <p>7. jumper</p> <p>8. umbrella</p> <p>9. tie</p> <p>10. gloves</p> <p>11. trainers</p> <p>12. socks</p>
			
			
			
			
			

Delayed-test

Write the clothes under the pictures

			<p>belt</p>
<p>1.....</p>	<p>2.....</p>	<p>3.....</p>	<p>trousers</p>
			<p>socks</p>
<p>4.....</p>	<p>5.....</p>	<p>6.....</p>	<p>tie</p>
			<p>coat</p>
<p>7.....</p>	<p>8.....</p>	<p>9.....</p>	<p>trainers</p>
			<p>slippers</p>
<p>10.....</p>	<p>11.....</p>	<p>12.....</p>	<p>gloves</p>
			<p>shirt</p>
			<p>waistcoat</p>
			<p>jumper</p>
			<p>umbrella</p>

APPENDIX 3

Interview Questions with Experimental Group of Students

Ters Yuz Sinif Modeli Ogrenci Gorusme Formu

Sinif Disi Surece Iliskin Gorusler

Genel Algilar:

Sizlerle Ters Yuz Sinif Modeli isimli bir uygulama yaptik. Evde ders videosunu seyrettin ve sinifta da etkinlikleri yaptik. Simdi calismanin en basini evdeki video dersini dusunerek cevaplamanı rica ediyorum.

1. Bu evde izledigin kiyafetler ile ilgili video ders hakkında genel olarak ne dusunuyorsun?
 - a. Olumlu/ guzel buldugun yonleri oldu mu? Evet, ise en cok hangi ozelliklerini begendiniz?
 - b. Zor/karmasik veya olumsuz buldugun yonleri oldu mu? Evet, ise en cok hangi ozelliklerini begenmedin?

Teknik Surec:

2. Evde bilgisayari acmak/ kapatmak, ders videosunu acmak, siteye erismek hususunda problem / zorluk yasadin mi? Yasadiysan ne yaptin? Nasil cozdun?

Evde Izleme Sureci:

3. Ders videosunu evde nasil yaptin? Dersi nasil calistin?

- a. Videoyu izlerken ne yaptiniz?
- b. Kelimeleri ogrenmek icin ne yaptin? Nasil bir yontem kullandin?
- c. Anlamadigin bir sey oldugunda baska kaynak kullandin mi?
- d. Evdekilerden yardim istedin mi? Evet ise. Ne siklikta ve ne icin istedin? Ne kadar yardim ettiler?

4. Video ders anlasilir miydi? (Zor oldu mu? Kolay miydi?)

- a. Evet ise. Nasil anlasilirdi? Anlasilir olan neydi?
- b. Hayir ise. Hangi kisimlari anlasilmadi? Neden?

5. Video icin neler dusunuyorsun?

- a. Kayit temiz miydi? Goruntu ses kalitesi iyi miydi? Resimleri acik miydi? Yazilar gorunur muydu? Uzun muydu? Sikici miydi? Egleneli miydi? Muzik nasildi?
- b. Video beni/baska bir ogretmen olsaydi olur muydu? Ne hissederdin?

Surec Degerlendirme:

6. Video ders ile Ingilizce kelimeleri evde ogrenmek nasildi?

- a. Olumlu/ guzel buldugunuz yonleri oldu mu? Evet, ne acidan olumlu?
- b. Zor/karmasik ve ya olumsuz buldugunuz yonleri oldu mu? Evet, ne acidan olumsuz?

Sinif Ici Uygulama ile Ilgili Gorusler

Ders Ici Surece Iliskin Algilar:

Simdi ders ici etkinlikleri dusunmeni istiyorum.

1. Ders videosunu ile dersi ogrendik, sinifa geldigimizde ogretmenimiz ile dogrudan etkinlikler ile derse basladik, bu yontemle ile ilgili ne dusunuyorsun?
 - a. Olumlu/ guzel buldugunuz yonleri oldu mu? Evet, ise en cok hangi ozelliklerini begendin?
 - b. Zor/karmasik ve ya olumsuz buldugunuz yonleri oldu mu? Evet, ise en cok hangi ozelilerini begenmedin?

Sinif Etkinlikleri:

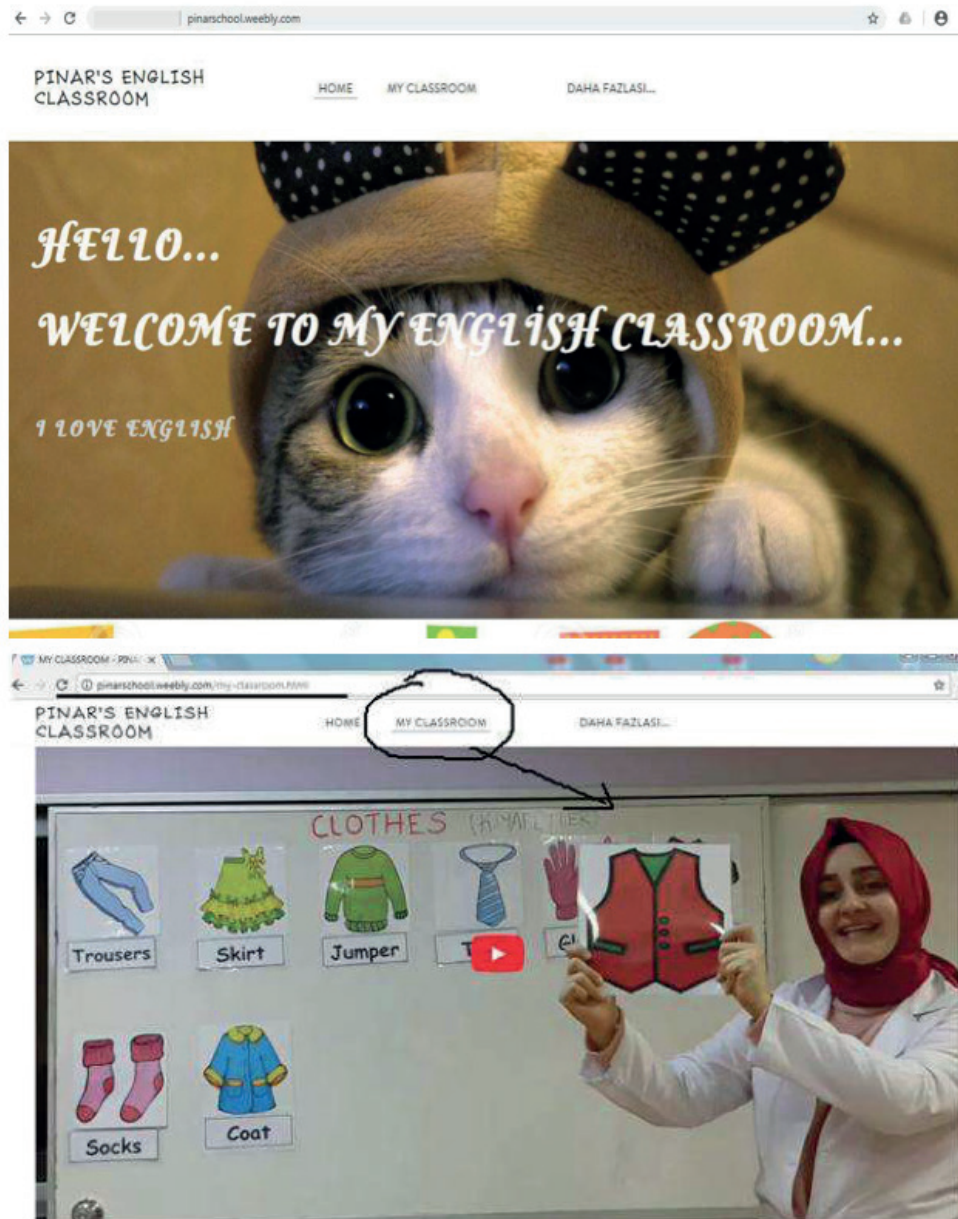
2. Ters yuz sinif modelinde sinif icinde yaptigimiz etkinliklere iliskin dusuncelerin nelerdir? (fayda, kolaylik, zorluk, istekli olma)
3. Etkinlikler sirasinda yasadigin problemler oldu mu? (gec kalma, anlayamama, takip edememe)

Genel Değerlendirme:

4. Geleneksel yöntemde okulda dersimizi, evde de ödev olarak etkinliklerimizi yapıyoruz. Fakat ters yuz sınıf uygulamasında evde dersi öğrendik, sınıfta etkinlikleri öğretmen rehberliğinde yaptık. Sence etkinlikleri sınıfta dersi evde yapmak mi daha verimli, eski yöntem mi daha verimli? Neden?
5. Ters yuz dersimizin sonunda tekrar eve öde verilmedi. Bu durumda ne düşünüyorsun? Verilmeli miydi? Neden?
6. İngilizce derslerinizde bu modelin kullanılmasına hakkında ne düşünüyorsun?
 - a. Olumlu/ güzel bulduğunuz yönleri oldu mu?
 - b. Zor/karışık ve ya olumsuz bulduğunuz yönleri oldu mu?
 - c. Bu yöntemi kullanmaya devam edelim mi? Neden?
7. Baska dersleri de bu şekilde öğrenmek nasıl olurdu ne dersin? Diğer derslerde de (din kültürü, matematik...) Sınıf öğretmeniniz de bu yöntemi kullanmasını ister misin? Neden?
8. Ters yuz sınıf yöntemi hakkında baska söylemek istediklerin ve bir daha ki sefer için önerilerin var mi?

APPENDIX 4

Flipped Classroom Web Site on Weebly



MALAYSIAN ELEMENTARY LEARNERS' SELF-REGULATION, MOTIVATIONAL BELIEFS AND LEARNER CONTROL MOTIVATION WHEN EXPERIENCING ONLINE TUTORIALS

Dr. Min Hui LEOW

ORCID: 0000-0003-4347-4663
Academy of Language Studies
Universiti Teknologi MARA
Penang, MALAYSIA

Dr. Rafiza ABDUL RAZAK

ORCID: 0000-0002-1604-7781
Faculty of Education
University of Malaya
Kuala Lumpur, MALAYSIA

Received: 09/03/2023 **Accepted:** 02/06/2023

ABSTRACT

Online learning is emphasised in the 21st century curricula as one of the efficient instructional practices that improves the learning ownership of contemporary learners. A key factor in ensuring success in learners' online learning environments is the implementation of learner control. Learner control motivation is influenced by multiple interconnected beliefs and learner-directed learning practices. This study focuses on self-regulation strategies and motivational beliefs in the context of post-pandemic online tutorials. The aim of this study was to discover the influence of self-regulation strategies on learners' motivational beliefs, and the impact of learners' motivational beliefs on their learner control motivation when experiencing online tutorials. This study comprises 14 learners (age 9) from a Malaysian elementary school. Qualitative case study methodology was employed, using interviews and observations. The results of this study revealed a significant relationship between self-regulation and motivational beliefs in order to comprehend learners' motivation for learner control when experiencing online tutorials. The results drew attention on self-regulation strategies to guide online instruction that underpins learners' motivational beliefs and enhances learner control motivation.

Keywords: Online tutorials, learner control, self-regulation, motivation, elementary education.

INTRODUCTION

The 21st century curriculum reflects a global shift in education. Learners become engaged individuals who are fully responsible for their knowledge acquisition; in addition, their self-realisation of potentialities is critical to the development of educational system. According to Fadli and Irwanto (2020), learner-directed learning is more salient than learner-centred learning in today's education, in which learners are expected to regulate their own behaviour by engaging in different learning activities that correspond to their personal learning preferences. Hence, learners have been given more control over the knowledge they desire to learn and master by taking the initiative to determine their learning needs, set learning goals, identify and make use of resources, select and apply suitable learning strategies, and evaluate learning outcomes (Knowles, 1975). This situation instils a sense of purpose into the learning process which eventually brace the "learner control" initiatives in the modern learning circumstances.

Learner control is an expression of self-direction and have similar idea to ownership in terms of the ability of individuals to make their own decisions regarding learning strategies, sequence, or pace based on their own interests and preferences (Buchem et al., 2011). Giving learners the freedom to take control of their learning means allowing them to participate in the process, which is essential for the learning process to be effective.

The dimensions of learner control include the control of learning objectives, activities, rules, materials, tools and resources, social environment, tasks, and evaluation criteria (Buchem et al., 2011; Valjataga & Laanpere, 2010).

Many methods of technology-based learning highlight learner control as a fundamental principle of effective learning; learner control becomes one of the main areas of research in the field of technology-based learning. For example, Buchem et al. (2020) emphasised the crucial integration of ownership, learner control, and self-regulated learning into technology-based learning with focus on e-portfolio practices; Schroeder et al. (2020) indicated that learner control can be beneficial in aiding learners to learn from instructional videos; Rajagopal et al. (2020) suggested the significance of learner control to be implemented in digital personalised learning; and so on.

Today's instructors favour bridging the gap between physical and virtual learning for increasing learners' self-direction in learning (Adinda & Marquet, 2018). The pandemic crisis has sped up the shift from physical classroom instruction to virtual learning. Technology has developed into a crucial instrument for solving crisis-related issues. Online tutorials that encourage learners' self-learning and interaction have been created as a result of the conventional learning concept's innovation (Chatpakkarattana et al., 2022). The online tutorials are frequently supported by the use of digital tools, materials, and resources. For example, Google Classroom is a practical tool that invites learners to participate actively in knowledge exploration, discussion, creative thinking, and problem solving (Izwan Nizal Mohd Shaharane et al., 2016); materials for gamification drive learners' engagement and motivation with personalised learning and providing constructive feedback based upon assessments or evaluations (Welbers et al., 2019); extensive resources and useful brainstorming tool encourage collaboration from distance (Panagiotis & Triantaphyllia, 2020); and so on. Online tutorials therefore boost learners' digital competency by allowing them to independently discover information, participate in digital learning activities, and share and discuss ideas with peers on digital learning platforms (Alkahtani, 2019). As a result of the education modernisation, the idea of learner control has been raised to examine how children's learning may be used to nurture this ability.

However, it can be challenging for learners to assume their learning responsibilities if they lack the maturity, self-awareness, self-reflection abilities, and sufficient cognitive resources required for demonstrating learner control. In the Malaysian context, during the "panicgogy" application throughout the COVID-19 pandemic, the young learners significantly underperformed in controlling and directing their own learning when experiencing online tutorials, in which elementary level learners need a lot of hands-on coaching and constant supervision (Kanyakumari, 2020), and they hardly manage their works independently (Wan, 2020). Since maturity is a trait that distinguishes adults from children, young learners' levels of learner control are expected to be lower than those of adults (Hauk & Groschner, 2022), regardless of the pandemic crisis's impact. Prior to the epidemic, studies had already shown that young learners habitually relying on teachers' guidance and ritual learning schedule during technology-based learning (Mohd Fadzly Wasriep & Lajium, 2019). Moreover, young learners often lack self-motivation and self-discipline to learn actively and independently in the technology-enhanced learning environment (Lee, 2019). In short, the motivation of young learners to demonstrate learner control in a technological learning environment is depending on their abilities for self-regulation, since self-regulation is a process by which an individual tries to consciously manage his/her behaviour or reaction tendency in order to achieve a specific goal (Baumeister et al., 1994).

Undeniably, learners have practiced self-learning and ownership initiatives in a multitude way during the pandemic, and the new educational system is compelled to conform to post-pandemic teaching and learning environment. Considering what we have learnt from the pandemic, the significance of abilities for self-regulated learning became more apparent (Berger et al., 2021). It is essential to recognise self-regulation as an important educational ability for learners' learner control performance and motivation. In light of this, Werner and Milyavskaya (2018) proposed that future research should consider the strong relationship between motivation and self-regulation. In addition, according to Code (2020), learners' ability to control and monitor their own learning depends heavily on motivation and self-regulation. In another case, self-regulation can be predicted by learners' motivational beliefs (Bai & Wang, 2021). Previous research mostly discussed about the impact of motivational beliefs on self-regulation (e.g., Adel & Hussain, 2020; Teng, 2021); however, this study discussed on the inverse relationship between motivational beliefs on self-regulation. It seems that no research has so far investigated the relationship between learner control

motivation, self-regulation, and motivational beliefs in the context of online tutorials. Furthermore, this study focused on investigating the post-pandemic modulation in Malaysian elementary school online learning concerning elementary learners' learner control motivation when experiencing online tutorials, which is still understudied at present.

PURPOSE OF THE STUDY

This study aimed to discover the influence of Malaysian elementary learners' self-regulation strategies to their motivational beliefs, and the impact of learners' motivational beliefs to their learner control motivation when experiencing online tutorials. In short, this study sought answers to the following research questions:

- a. How do elementary learners implement self-regulation strategies when experiencing online tutorials?
- b. Which motivational beliefs are being underpinned by self-regulation strategies?
- c. How do motivational beliefs significantly impact learner control motivation when experiencing online tutorials?

THEORETICAL BACKGROUND

Motivation

Online learning research emphasises the importance of motivation in accomplishing educational goals (Hartnett, 2016); same goes to online tutorials research, which views motivation as a crucial aspect that determines learners' quality of learning (Sugilar, 2021). Motivation gives people the desire to act and fulfil their needs or pursue a specific goal. In other words, motivation is described as the process that initiates, drives, and sustains goal-oriented behaviours (Brophy & Wentzel, 2014). From theoretical aspect, motivation is a theoretical concept that used to explain human behaviour. There are a variety of motivational theories that are pertinent to learning, such as intrinsic and extrinsic motivation theory, social cognitive theory, self-determination theory (Deci & Ryan, 2010), ARCS model (Keller, 1983), and expectancy theory (Vroom, 1964).

In relation to this study's focus on learner control, motivation concept pertains to intrinsic and extrinsic motivation theory, social cognitive theory, and self-determination theory. Learner control demonstration in technology-enhanced learning environments typically rely on intrinsic motivation, associate with self-efficacy and self-regulation (Siddiqui et al., 2020). However, there is a substantial positive association between intrinsic and extrinsic motivation, but not an opposition (Takahashi, 2018). According to Bandura's (1986, p. 18) social cognitive theory, "people are neither driven by internal motives nor automatically controlled by external stimuli; rather, human functioning is operated in which behaviour, person, and environment factors interrelating among each other". Hence, learning motivation needs affiliation of both internal force and external stimuli. Ryan and Deci (2000) defined that intrinsic motivation refers to engaging in an activity for the intrinsic satisfaction of the activity itself; extrinsic motivation refers to engaging in an activity in order to achieve a distinct goal. Both intrinsic and extrinsic motivation have the capacity to enhance learning outcomes (Zhou et al., 2021). Evolve from intrinsic and extrinsic motivation, self-determination is defined as acting with a sense of choice, volition, and commitment (Deci & Ryan, 2010); whereas learner control is associated to self-determination (Ryan & Deci, 2000).

Motivational Beliefs

Although motivational beliefs are considered as predictors of self-regulation (Bai & Wang, 2021; Teng, 2021), this study believes that there is an inversed relationship between motivational beliefs on self-regulation. Among the variety of motivational beliefs, self-efficacy, instrumental value beliefs, and goal orientation were specifically examined in relation to self-regulation (Pintrich, 1999). The social cognitive theory put out by Bandura (1997) emphasises the significance of perceived efficacy. Self-efficacy has been described as an individual's perception of his/her capacity to organise and execute actions that result in the accomplishment of a particular goal (Bandura, 1986). Learners' methods for controlling their cognition are referred to as self-

regulated learning. Therefore, using cognitive and metacognitive strategies to achieve a goal can be attributed to high levels of self-efficacy. For example, when learners make regulation on their decisions and judgements while learning, they see progress from trial and error, which eventually affects learners' self-efficacy regarding their capability and motivation to keep learning.

Instrumental value beliefs refer to how learners value various learning instruments, such as tasks, materials, or resources. Instrumental value beliefs impact cognition and motivational controls, in which learners may be motivated to learn when given an instrument that he/she finds important, engaging, and valuable (Pintrich, 1999). Conversely, learners see progress towards their goals when regulating or managing the use of resources; if they discover that there is a slow or ineffective progress from what they are controlling, it affects learners' beliefs about the instrument and reduces their motivation to learn. Goal orientation defines how learners perceived the reasons for participating in a learning task (Pintrich, 1999). This study lays focus on performance goal orientation (demonstration of learning ability), learning goal orientation (perseverance of learning), and performance-avoidance orientation (avoid failure) proposed by Yokoyama and Miwa (2018), based on intrinsic and extrinsic learning initiatives. Goal orientation is a key aspect in determining how learners regulate their learning, and goal orientation in turn is influenced by self-regulation. For instance, learners are internally motivated to achieve their goals, which motivates them to regulate or control their cognition and motivation; however, the manner in which they regulate their learning may influence their tendency for different kinds of goal orientation.

Self-Regulation

Self-regulation refers to the methods that learners employ to control their cognition processes, including their use of cognitive (e.g., selecting, managing/organising, executing) and metacognitive strategies (e.g., planning, monitoring, evaluating) (Pintrich, 1999). Moreover, when exhibiting learner control, volitional strategies can also be used to regulate important aspects of the learning process, such as control of selective attention, encoding, affection, motivation, environment, and information processing (Kuhl, 1985). Hence, volitional control is required to support and maintain one's intention until the goal has been accomplished; it is one of the key strategies for regulating learners' learning motivation, especially when learners are learning from distance (Keller et al., 2021). Therefore, in this study, along with cognitive and metacognitive strategies, volitional strategies are included as one of the components of the self-regulation strategies to be discovered in elementary learners' learner control demonstration. However, this study only looks into learners' volitional regulation of affection (emotions or feelings) because affection is frequently correlated with learners' beliefs of their control over the learning and positive affection may have favourable impacts on learning motivation (Pekrun, 2000).

This study adopts the stance that self-regulated learning, motivation, and motivational beliefs should all be investigated as components of a cohesive whole. Self-regulation guides learners to be active participants in their own learning processes so that they take the initiative and control their own learning motivation. It is critical to discover the relationship between self-regulation and motivational beliefs in order to comprehend learners' motivation for learner control when experiencing online tutorials.

METHOD

Research Design and Setting

Apart from implementing learner-controlled instruction under classroom setting, online tutorials are implemented concurrently in Malaysia education system to adopt technology usage in conventional learning situations in form of flipped learning or blended learning. This study deliberately discovered learners' learning situation regarding their learner control demonstration only in the online setting. For further information on the study's setting, the online learning platform was equipped with a variety of learning materials and resources that braced online tutorials. The materials and resources distribution were sequentially arranged from simple to complex, some of the items even had a self-evaluation feature. It allowed learners to take responsibility for their own choices and decisions in order to meet the learning goals.

The purpose of this study was to investigate the relationship of learners' self-regulation, motivational beliefs, and motivation from their learner control experiences in the context of online tutorials. Hence, this study needs method that would allow for discovery. Merriam's (2009) qualitative case study methodology was employed because it is a particularly appealing research design for education to obtain holistic and in-depth description of an experience.

Participants

A school that undergoes the School Transformation Program 2025 (TS25) with support from the Malaysian Collective Impact Initiative (MCII) for 21st century and active learning training was purposefully chosen. 14 Year 3 learners with performance levels ranging from 3 to 5 (with a maximum performance level of 6) were selected to take part in the study. Only learners within the performance levels range were chosen because they represented the average group of learners; learners who scored below 3 may experience learning difficulties, while learners who scored over 5 may lead to difficulty in generalising the study results. According to the demographic information about participants in Table 1, distribution of male and female learners was balanced to encourage generalisability. Inclusion criteria were they undergone educational transformation, received 21st century and active learning training program initiated by school, and expressed a willingness to participate. These participants were expected to embrace learner control skills and inevitably contribute rich data to this study. The required number of participants were depending on when saturation was reached.

Table 1. Participants' demographic information

Participants	Gender	Performance level	Age
Yik	Female	3	9
Cloe	Female	3	9
Jiang	Male	3	9
Jing	Female	3	9
Min	Male	3	9
Kang	Male	4	9
Sen	Male	4	9
Jerry	Male	4	9
Annie	Female	4	9
Eli	Male	4	9
Matt	Male	5	9
Mad	Female	5	9
Chris	Female	5	9
Yin	Female	5	9

Data Collection and Analysis

Merriam (1998) offered comprehensive instructions for qualitative case study data collection procedure by suggesting the necessity of conducting attentive observation, effective interviews, and detail mining of documents. This study conducted observation and semi-structured interviews for data collection.

The observation procedure in this study did not use checklist or formatting, but “free writing” to record any meaningful event that were likely to answer research questions over the period of the three-month investigation, such as participants’ verbal and nonverbal expressions, actions and reactions, interactions, and contextual influences. The researchers recorded as much data as possible, free from pre-determined time until saturation of information was reached (Merriam, 2009). To avoid the arisen of sensitivities of participants being watched, the researchers informed the participants that observations will be carried out during the study but did not inform participants when and how long will it takes.

Semi-structured interviews were conducted with the participants after observations to cross-check the data collected from subjective aspects; follow-up questions were addressed, if necessary, to get additional information from the participants. Participants were asked to attend audio-visual interviews scheduled for approximately 45 minutes (duration depends on time-paced, semi-structured interview questions, and syllabus) and were conducted in participants’ native languages. Interviews were recorded with interviewees’ permission for later transcription and analysis. In short, the interview procedure followed Merriam’s (1998) case study interview protocol: ask insightful questions, use probes, create an interview guide, interact effectively with the respondents, record the interview, and analyse the data.

A thematic analysis was used to interpret codes, generate categories, and construct themes. It was designed to ensure triangulation and interpretative validity. Initial coding was done in parallel with continual reflection, with a focus on making sure the data could answer the research questions. This study used the code mapping technique (Saldana, 2015) to generalise code patterns and categories in order to clearly demonstrate each code’s connection. As a result, the most common or significant codes that generate the most important categories were displayed. By rigorously examining the meaning of units within the holistic context, central themes were determined. The researchers analysed the themes, and it came up with a general description of the case. Eventually, the researchers interpreted the meaning of data and advanced themes description into a qualitative narrative.

The Scale

Ethical consideration was taken into account during the course of the investigation. This study obtained formal approval from the Educational Planning and Research Division (EPDR), Ministry of Education (MOE), and District Education Department. Informed consent was obtained from the school principal, participants, and participants’ parent(s)/guardian(s) prior to the study. To strengthen the credibility and transferability of the results, the researchers also provided a detailed explanation about the method of participant selection and the procedure of data collection and analysis.

The qualitative construct validation of the observation and interview protocols was done by a team of experts (experts in the subject matter and experts in measurement). Since the “free writing” observation protocol is a data-gathering method that heavily relies on subjectivity, observation experts advised the researchers to undertake long-term repeated observations to establish a fixed trend. Instead of relying solely on observations, more than one data source should be employed, such as interviews. For the interview protocol’s validation, experts in the subject matter reviewed the interview questions pertaining to its language, wording, and relevance. Validity was established due to the short, hints-filled questions that lack academic jargon and are basic enough for children to understand. Besides, a close reading of an interview protocol was done by experts in measurement, examining the protocol for structure, length, writing style, and comprehension. Such a penal evaluated the interview protocol to check for proper substance, questions that connect to the study’s focus, questions that are missing, and questions that are inappropriate. The experts evaluated and provided confirmation on the appropriateness of the procedures in terms of encouraging positive engagement, maintaining the flow of conversation, and stimulating the subjects to share their experiences and thoughts. Respondent validation was used to make sure that interview data was reliable. Participants were provided with a copy of final version of study reports and asked to verify correctness, clarify discrepancies, and further remark on the inquiry.

On the other hand, a pilot study was conducted as an assessment of transferability (reliability) in order to make sure that the information gathered from the questions asked was consistent and repeatable. The pilot study did not enrol the same participants as the main study in order to prevent participants from losing

interest or might influencing the results of the main study. Two participants who met the same selection criteria as the participants in the main study were selected. After conducting a pilot study, it was determined that the research approach and protocols were found to be feasible for application in a larger scale study (main study).

RESULTS AND DISCUSSIONS

Self-regulation Strategies

Cognitive Control

The intentional selection of ideas and behaviours based on task requirements, goals, and learning or social context is known as cognitive control (Miller & Cohen, 2001). Piaget asserted that young learners have a fundamental mental structure on which all subsequent learning and methods of knowledge acquisition are based (McLeod, 2018). Therefore, elementary learners' learner control was facilitated by explicit instruction which was dynamically assigned from top to down (Zhu et al., 2019). Consider the following situation:

I always follow the instruction and start to learn from the first one...I will be confused if I do number two, then go to number three, and go back to number one. (Kang/Interview/219)

Learners regulated their learning based on sequential instruction that served as fixed and directive scaffold that provide learners procedural and conceptual assistance as they pursue their learning goals. Learners believe that explicit directions or distinct cue ensure them to “stay on task”.

Certainly, when learners managing their learning materials, resources, or tasks, they usually progress from simple to complex in that order, then move on to more advanced exercises. In certain cases, the learners' sequential learning arrangement was based on the measurement of task value rather than in sequential level order. Consider the following situations:

I will start with the main task first since it is the compulsory task to be accomplished in the lesson...I then move on to other work, which is additional work for the lesson. (Sen/Interview/251-255)

Sometimes, learners' regulation of works was based on their action-in-context. For example:

If there are only three learning materials to refer to, I will work on the task and the learning materials simultaneously. If there are many learning materials that need to be referred to, I will finish referring to all of them before starting a task (Sen/Interview/337-338)

Although learners occasionally showed difficulty in making selection among a variety of materials such as “my brain doesn't know which one to choose” (Annie/Interview/211), the ability to control, master, or reschedule learning activities was fully demonstrated by learners throughout online tutorials. The results showed that learners have diverse regulatory strategies depending on the situation, as well as having personal orientation to control and organise their own behaviours or actions.

Froiland (2021) suggested that learning goals aid in boosting learners' motivation for ownership. To attain the learning goals, learners chose and evaluated the worthiness of various activities that would ensure them to achieve learning goals, which is quite similar to the “best-worst scaling” decision-making method proposed by Rogers et al. (2021). For example:

I won't make reference to the learning materials that I haven't gone through because I have already finished my task...I am aware that referring additional resources will help me learn more, but I still have a lot of works to do...Maybe I will refer to some of them later. (Mad/Interview/127-140)

Consequently, during self-regulation, learners paid less attention to the extraneous content but focused more on germane content.

Online instruction gives learners the freedom to learn at their own pace without having to follow static sequencing lessons. Thereby, learners comprehend the concepts by adjusting the information's flow to their cognitive needs as well as regulating the rate of incoming information. Studies presented that the control of learning time is closely connected with normative item difficulty, in which learners devoting more time to difficult items than easy items (Hoffman-Biencourt et al., 2010; Tullis & Benjamin, 2011). Consequently, in this study, some learners deliberately extended their learning time in order to complete the tasks and catch up with others; some learners, who were typically learning in a faster pace or advanced learners completed their learning in a shorter period of time.

Besides, learners' control over the learning environment demonstrates their social rights within the context (Makuch et al., 2020). Consider the following situation:

When something is a little unclear to me or is too challenging for me, I will do it with my friend. But if I learn on my own, that means I know how to do it properly and more effectively by myself. (Matt/Interview 02/48-50)

Online learning environment lack of distinguishing space which would naturally encourages collaboration (Clinton & Wilson, 2019). Therefore, learners self-regulated their learning behaviours to accommodate the online learning social environment. As highlighted in Stengelin et al.'s (2020) study, if a task does not necessarily require involvement of others, they prefer to learn alone. In short, learners committed to self-regulation and demonstrated their learner control abilities by being exposure to a variety of "opportunities" (Chacon-Diaz, 2020) when experiencing online tutorials.

Metacognitive Control

If learning is a cognitive process, whereas metacognition is the technique of observing or monitoring how a learner learns and applying the feedback loop for the regulation of his/her cognitive process (Jia et al., 2019). John Flavell (1979) proposed two categories of metacognition: metacognitive experience and metacognitive knowledge. Metacognitive experience allows a learner to monitor and evaluate while controlling cognitive processes; metacognitive knowledge relates to a learner's awareness of his/her capabilities, nature of the task, and the method that needs to be used to perform a task.

From the perspective of metacognitive experience, self-evaluation appears to be useful to improve learners' learning behaviour when learners make a critical judgement on their learning process, motivation, beliefs, plans, and outcomes (Van Loon, 2018). For example:

The quiz will reveal how many questions I answered incorrectly...I will try it again if I have got some answers wrong. (Min/Interview 01/502)

Research have shown that digital games give learners the chance to experience and actively or critically reflect on their learning (Altanis & Retalis, 2019; Felix et al., 2019; Luu et al., 2020). In this study, it was discovered that learners were actively participating in game-based quizzes for self-checking and self-correction. Since self-evaluation is a process by which learners understand the occurrences so that they learn from mistakes and failures (Andrade, 2019). Learners in this study re-adjusted their learning in response to the quizzes scores that indicated their mastery level of specific knowledge. In fact, cognitivism and constructivism are the two main theoretical foundation used in play or game-based learning (Bhagat et al., 2018); the game-based quizzes encourage learning by exposing learners to new experiences of mental activity in terms of play (Vygotsky, 1978).

From the perspective of metacognitive knowledge, learners' behaviour can change the instructional environment with different forms, outcomes, and efficiencies, which consequently leads to differentiated learning. It is a fact that information can be acquired both actively and passively (Wasik et al., 2006). Learners' initiatives of "active" and "passive" were regulated according to personal learning needs in order to properly utilise the learning resources. For example, the entire social environment appears passive, as if learners only read, listen, see, look, or watch at the learning materials and gain information solely; when comes to another

stage of learning, learners switch passive mode to active thinking, doing, and even communicating. The uniqueness of learner control when experiencing online tutorials was completely demonstrated by learners' self-regulation in carrying out "active" and "passive" initiatives.

Volitional Control

The ability of an individual to initiate actions according to internal decision and motivation rather than external stimuli is known as volition (Haggard & Lau, 2013). In this study, learners performed volitional control of emotions and feelings triggered by a heavy workload or environmental stress. It was a cognitive process which helped learners to develop positive learning habits that allowed them to sustain or increase their enthusiasm in learning. The findings of this study were supported by Takahashi (2018) who indicated that elementary learners' learning motivation is highly affected by anxiety-based, unwillingness-based (fulfil other peoples' needs), and rewards or praise-oriented influences. For instance, learners occasionally experienced anxiety when given freedom to make choices as though they felt insecure in the absence of clear guidelines or rules. One of the participants regulated anxiety by controlling learning in ordinal sequence, as shown as follows:

Negative emotions/feelings (anxiety):

I worry because I am not sure of which material should I refer to. (Matt/Interview 02/123-125) →

Volitional control (ordinal sequence):

As I take each step one at a time, I feel secure. I feel secure carrying out my work as directed. Therefore, I follow the flow setup by teacher and begin with the first item. (Matt/Interview 02/112-122)

Elaborate further on how learners regulate their anxiety, learners in this study frequently placed a high value on fulfilling teachers' expectations in order to receive rewards or praise and avoid punishment because they believe that doing so would lead to an emotionally satisfying outcome. For example:

Negative emotions/feelings (anxiety):

Some teachers are fierce. I am a little bit scared of the teacher. (Jerry/Interview/141-156) →

I am scared if I answer wrongly... I am scared if I don't know how to do... Won't teacher punish you if you do it wrongly?" (Min/Interview 01/195-200)

Volitional control (avoid punishment):

I complete the work assigned by teacher and adhere to teacher's instruction so that I can do it correctly. "I might learn something if I follow teacher's instruction," is the first thought that comes to my mind. Regardless of whether I like or dislike the work, I will complete it. (Jerry/Interview/141-156)

Negative emotions/feelings (anxiety):

I have already worked so hard, but teacher doesn't praise me. Does it mean that I am not doing well enough? Why doesn't teacher give me compliments? (Sen/Interview/523-535) →

Volitional control (rewards or praise):

I would like to approach teacher as the teacher would probably say '[Sen], you are awesome'". (Sen/Interview/118)

Positive self-talk, on the other hand, was another volitional control strategy that learners applied to regulate their negative emotions or feelings, particularly when they fell into the pitfall of their negative self-judgment. One of the participants expressed that:

Negative emotions/feelings (negative self-judgement):
I don't think I am awesome... I give up easily and I need other people to give me compliments so that I can move on. This makes me feel like I am annoying...I wish I could change my attitude, as if I could still be joyful even in the absence of other people's compliments. (Yik/Interview/485-490)

→ Volitional control (positive self-talk):
Sometimes, I talk to myself that "I am not bad. I am a strong kid. I will never give up". I makes me feel happier if I think in this way. Just saying to myself that "I won't quit and I am giving myself a full mark"... It seems like I am encouraging myself. (Yik/Interview/491-495)

Besides, instead of coping with distressing emotions or feelings on their own, learners occasionally approached teachers or peers when they were feeling lost or distressed. Hence, help-seeking is the social component of volitional control to regulate their emotions or feelings. For example:

Negative emotions/feelings (afraid of challenge):
I make an effort to take on the challenging task. If the task is too challenging and the teacher does not supply the solutions, I give up. (Yik/Interview/611)

→ Volitional control (help-seeking):
I have a unique method for resolving problems. It is to ask for help from someone. (Yik/Interview/141)

According to Mogavi et al. (2021), learners are easily being distracted by their surroundings because they are not used to incorporate material supportive learning, particularly during online learning. Based on the results of observation, it was discovered that learners were easily distracted by things that were more interesting or appealing around them, such as games and television, which led to a loss of concentration during a specific learning session; noises from the surroundings interfere with learners' concentration while learning in front of a computer (Story2/Observation/0:00:39CVT4 - 0:07:15CVT4). Nonetheless, it was discovered that learners could control themselves from distraction and retain their attention on learning, such as:

Matt stops learning. He keeps staring at something that appears to be distracting him from his learning. After a while, he shakes his head and turns his attention back to the computer screen where he is working. He also writes occasionally. (Story2/Observation/0:01:21CVT4 - 0:02:00CVT4)

Motivational Beliefs that Underpinned by Self-Regulation Strategies

According to this study, learners' motivational beliefs about demonstrating learner control when experiencing online tutorials were underpinned by the employment of self-regulation strategies. Self-efficacy, instrumental value beliefs, and goal orientation were three motivational belief dimensions that this study found to be significantly correlated with self-regulation strategies (Pintrich, 1999). This indicates that learners' use of self-regulation strategies is more likely to have increased motivational beliefs; or conversely, self-regulatory failure is more likely to have decreased motivational beliefs (Molden et al., 2016). Details are shown in Table 2.

Table 2. Relationship between self-regulation strategies and motivational beliefs

Self-regulation strategies		Correlated motivational beliefs	Motivational beliefs resulted from successful self-regulation	Motivational beliefs resulted from self-regulatory failure
Cognitive control	Sequential learning	Goal orientation (performance-avoidance orientation)	Belief in achieving learning goal	Confusion in achieving learning goal
	Action-in-context	Self-efficacy	Belief in taking control over learning	Belief in a lack of one's regulatory abilities
	Best-worst scaling	Goal orientation (performance goal orientation)	Belief in demonstrating learning ability	Slight awareness for learning goal orientation
	Comparing task level and value	Instrumental value beliefs	Belief in one's capacity to acquire knowledge	Low capacity belief to acquire knowledge
	Balancing pace and time	Self-efficacy	Belief in taking control over learning pace and time	Belief in a lack of one's pace and time regulatory abilities
	Regulating social/learning environment	Instrumental value beliefs	Belief in the sensible application of learning tasks	Belief in a lack of social/environmental regulatory abilities
Metacognitive control	Self-evaluation	Self-efficacy	Belief in one's learning capability	Poor self-understanding and self-expectation
	Regulating active and passive initiatives	Goal orientation (learning goal orientation)	Belief in one's preferences in achieving learning goal	Low credence to regulate one's preferences in accordance to learning goal
Volitional control	Regulating negative emotions/feelings	Self-efficacy	Increase self-confidence and enthusiasm for learning	Decrease self-confidence and enthusiasm for learning

Relationship between Motivational Beliefs and Learner Control Motivation when Experiencing Online Tutorials

Intrinsic Motivation: Self-determination Perspective

It was found that elementary learners are more likely to possess a high level of self-determination to take control over their online learning. Self-determination relates to human nature that promotes intrinsic motivation (Martela, 2020). In response to the third research question, motivational beliefs significantly impact learners' self-determination. Consequently, learners' intrinsic motivation for learner control when experiencing online tutorials may increase or decrease depending on their motivational beliefs. To further elaborate Table 2, Table 3 shows excerpts from research findings that indicate the impact of motivational beliefs on learners' intrinsic motivation.

Table 3. The impact of motivational beliefs on intrinsic motivation

Self-regulation strategies	Motivational beliefs resulted from successful self-regulation	Increase intrinsic motivation (Samples of excerpts)	Motivational beliefs resulted from self-regulatory failure	Decrease intrinsic motivation (Samples of excerpts)
Sequential learning & anxiety control (ordinal sequence)	Belief in achieving learning goal Increase self-confidence and enthusiasm for learning	Increase motivation to learn from simple to complex information in order to achieve learning goal: <i>I refer the materials from one until ten before doing the task...so that I can learn more things from every learning material, from the beginning to the end. (Matt/Interview 01/155-162; Annie/Interview/182-186)</i>	Confusion in achieving learning goal Decrease self-confidence and enthusiasm for learning	Decrease the motivation to rationally measure the probability of achieving learning goal: <i>I was like, "I choose this one lah!" I don't care if it helps my learning or not. I just simply choose one. (Yin/Interview 01/334)</i>
Action-in-context & balancing pace and time	Belief in taking control over learning [pace and time]	Increase the motivation for self-directed learning: <i>Free to choose means I can select between A and B. I will look at both to see what the differences are...I like to choose by myself... I dislike when teachers instruct me that I must complete this task first, this task second, and this task third...Teacher's suggestion is reasonable, but I just don't like being ordered around...I won't lose my temper and I will be happy if nobody is controlling me. (Yik/Interview/282-300)</i> <i>Increase the motivation to learn and go beyond pace and time constraints:</i> <i>I will go back to look at other learning materials after finished the task... because I want to see if there is anything further I can learn. (Eli/Interview 01/168-171)</i>	Belief in a lack of one's [pace and time] regulatory abilities	Decrease the motivation for self-directed learning: <i>I don't like it because I have to figure out by myself what should I do with this task and what should I do with that task. (Min/Interview 01/75-76)</i> <i>Decrease the motivation to adjust learning actions in accordance to suit individual learning pace and time:</i> <i>I don't really enjoy it. I have finished my work. I have nothing to do. So, I do nothing and just sit there. (Eli/Interview 02/60)</i>
Best-worst scaling & comparing task level and value	Belief in demonstrating learning ability	<i>Increase the commitment to performance goal orientation:</i> <i>I will keep working on the compulsory task even surpass the timeframe if I haven't completed it... I might access to additional learning materials after I have completed the compulsory task...but only within the one-hour timeframe. (Jerry/Interview/165-172)</i>	Slight awareness for learning goal orientation	<i>Decrease the commitment to learning goal orientation:</i> <i>Sometimes, I get too lazy to access further learning materials or to refer back to the ones that I have already learnt because I have finished my works... regardless of whether I have time or not. (Min/Interview 02/240-261)</i>

Self-regulation strategies	Motivational beliefs resulted from successful self-regulation	Increase intrinsic motivation (Samples of excerpts)	Motivational beliefs resulted from self-regulatory failure	Decrease intrinsic motivation (Samples of excerpts)
	Belief in one's capacity to acquire knowledge	Increase the motivation to acquire new knowledge: I can learn more efficiently and successfully if the task is at a normal level...I choose to learn with the normal level task because the one that is too simple is the one that I have already mastered...I consider it as a revision. There is something that I never learnt before in the normal level task and I can gain new knowledge from it. (Jerry/Interview/295-317)	Low capacity belief to acquire knowledge	<i>regardless of whether I have time or not. (Min/Interview 02/240-261)</i> Decrease the motivation to acquire knowledge from challenging task: <i>The task that I am unable to solve...I decide to give up due to the difficulty. I would rather quit. (Jerry/Interview/352-368)</i>
Regulating social/ learning environment & regulating active and passive initiatives & anxiety (help-seeking) and distraction control	Belief in the sensible application of learning tasks Belief in one's preferences in achieving learning goal Increase self-confidence and enthusiasm for learning	Increase the motivation to manage the independent and collaborative learning: <i>Sen has completed the first task on his own. Sen requests Matt to pair up with him so that they can help each other to complete another task. Along with Matt, Sen completes his task successfully. After that, they both continue their independent learning. (House 3/ Observation/0:23:14VT-0:36:30VT/June 4, 2020)</i>	Belief in a lack of social/ environmental regulatory abilities Low credence to regulate one's preferences in accordance to learning goal Decrease self-confidence and enthusiasm for learning	Decrease the motivation to manage the interpersonal or intrapersonal initiatives: <i>It is different from in-class learning. When I conduct the online tutorials, I learn by myself...I look at other people's discussion... but there is no such moment that I feel like want to talk to others although the discussion is rather necessary. I am shy. I am already used to learning on my own. (Jiang/Interview/265-349/June 25, 2020)</i>
Self-evaluation & self-judgement control (self-talk)	Belief in one's learning capability Increase self-confidence and enthusiasm for learning	Increase the motivation for self-success: <i>I am happy because I have done it all correctly... It is not necessary to receive praises as long as I can do the work by myself correctly... Self-success is more important than praise. (Jerry/Interview/404-414)</i>	Poor self-understanding and self-expectation Decrease self-confidence and enthusiasm for learning	Decrease the motivation to confront challenges: <i>I thought I am able to learn something tougher. However, when I confront with a difficult task, I feel compelled to return to something simpler. (Chris/Interview/577-583)</i>

Extrinsic Motivation: Social Cognition Perspective

According to social cognitive theory, learners' learning motivation is influenced by their experiences, other people's behaviour, and their surroundings (Bandura, 1986). According to the findings in Table 3, sometimes, learners' motivational beliefs do not fully reinforce their intrinsic motivation. Therefore, learners are more likely to seek assistance from external stimuli. Despite the fact that some learners showed strong motivational beliefs while implementing learner control when experiencing online tutorials, these beliefs would inevitably be reinforced by external stimuli, which ultimately increased their motivation to study. For example:

I feel happy to my learning even if I receive no praise, but I would be even pleased if the teacher compliments me. I will study harder and strive to perform better next time. (Eli/Interview 01/343)

There is a link between praise-oriented and intrinsic motivation in terms of strengthening or encouraging learners' learner control motivation when experiencing online tutorials (Takahashi, 2018).

Besides, when learners have low motivational beliefs, they become cautious or timid in their learning decisions. Most of the time, they would seek help from peers or teachers in order to retain their learning motivation. However, it might cause a fall back of intrinsic motivation if learners decide to rely on other people's assistance instead of completing the learning task on their own. Consider the following situation:

When I am unable to comprehend a question or when I am unsure of how to answer...I simply do a little and wait... I am waiting for the teacher's or friends' response to that question...Later, I can just write it down because I am not sure how to do it. (Min/Interview 01/402-428)

CONCLUSION AND IMPLICATION

This study highlighted the significance of learners being able to self-regulate through cognitive, metacognitive, and volitional control in order to shape desirable motivational beliefs that help learners' fully manifest learner control when experiencing online tutorials. Results revealed that self-regulation inevitably affects learners' learning flexibility and learner control motivation in online learning, in line with studies showing that effective self-regulation ensures desired attainment in online learning (Albelbisi & Yusop, 2019; Magen-Nagar & Cohen, 2016; Brittany, 2020). Additionally, this study revealed and validated the facts of the close connection between self-regulation and motivational beliefs in relation to learners' learning performance and motivation, which is consistent with previous studies (Adel & Hussain, 2020; Bai & Wang, 2021; Cho et al., 2020; Teng, 2021). Inversely, the present study's findings lend further support for previous studies which proposed that self-regulation are the underlying tenets that often predicted by motivational beliefs (Bai & Wang, 2021). This study underlined that the inverse relationship between self-regulation and motivational beliefs should not be taken for granted. The strong relationship between self-regulated learning and motivational beliefs has significantly influenced learners' learner control motivation when experiencing online tutorials, showing that it is the most notable contribution of the present study to the related research field.

This study showed that successful self-regulation contributes positively to motivational beliefs in terms of self-efficacy, instrumental value beliefs, and goal orientation; otherwise, vice versa. This suggests that learners who are able to well correlate self-regulation strategies with motivational beliefs are intrinsically motivated to take ownership of their learning, have confidence in their capability to accomplish goals, have better self-understanding and self-control, have distinct objectives to pursue, and perceive the learning tasks as valuable. This can be attributed to the fact that positive self-regulation behaviours and strong motivational beliefs may indicate successful online learning performance and strong intrinsic motivation (Bradley et al., 2017). Despite the fact that intrinsic motivation persists when learners feel self-determined (Martela, 2020; Ryan & Deci, 2000), however, evidence demonstrated that exerting external control would have an impact on intrinsic motivation (Deci & Ryan, 1985; Deci et al., 1999). This study argues that the intrinsic and extrinsic motivation, which enhance learners' learner control, are not mutually incompatible. Both intrinsic and extrinsic motivation must be rationally implied by instructors in accordance with necessities (Takahashi, 2018).

According to the present study's findings, learners' motivation to regulate and direct their own learning has been found to be improved in the context of post-pandemic modulation in Malaysian elementary school online learning, as compared to the online learning application before pandemic (Lee, 2019; Mohd Fadzly Wasriep & Lajium, 2019) and during pandemic (Kanyakumari, 2020; Wan, 2020). Nonetheless, there is still room for improvement in the learners' existing motivation for learner control. One aspect that should be considered is to enhance elementary learners' capacity for self-regulation, which in turn determines their motivational beliefs, and eventually impacts their learning motivation.

In brief, the findings of this study have implications for post-pandemic online instructional design. This study promotes the significance of self-regulation strategies that encourage learner control behaviour. Hence, instructors are advised to design instruction that support, drill, and enhance learners' use of self-regulation strategies. In addition, this study did reveal that learners' self-regulation and motivational beliefs played a causal role in their learner control motivation. When designing online learning for elementary learners, instructors should take into consideration to support learners' development of motivational beliefs through efficient self-regulation initiatives.

This study highlights the potential to enhance elementary learner's learner control motivation in the context of online tutorials, by promoting self-regulation strategies through cognitive, metacognitive, and volitional control. Future studies should be conducted to determine the circumstances as such which regulation strategies could efficiently boost learners' motivation to exhibit learner control in a wider range of situations during online learning. Future works should seek to identify the motivational level of today's elementary learner's learner control in online learning context, by expanding the investigation into their motivational beliefs level. Furthermore, longitudinal studies that enable learner control motivational research over a longer time span are required. It would also be useful to take into account other socio-demographic factors, such as age, school type, learning context, country, and so on.

BIODATA and CONTACT ADDRESSES of AUTHORS



Dr. Min Hui LEOW is a senior lecturer in Universiti Teknologi MARA, Penang, Malaysia. She pursued her PhD in Curriculum and Instructional Technology at the University of Malaya, Kuala Lumpur. She is proficient in developing teaching and learning that meets learners' learning needs and actively adapting student-centered experiential learning. Her research interests lie in the systematic design of instruction, fundamentals of teaching and learning development, and contemporary patterns in teaching and learning. Her works have been published in international conference proceedings and international indexes journals.

Min Hui LEOW

Department of Asian & European Language, Academy of Language Studies
Universiti Teknologi MARA

Address: Kampus Permatang Pauh, 13500, Pulau Pinang, Malaysia

Phone: +60 122008059

E-mail: leowminhui@uitm.edu.my



Dr. Rafiza Abdul Razak is an associate professor at the Department of Curriculum and Instructional Technology, Faculty of Education, University of Malaya, Kuala Lumpur. She is an innovative leader who creatively rebrands the department to uplift and boost the departments' wellbeing. She actively organizes international and national seminars. She also initiated several MoAs at the national and international levels. Her innovations were awarded in patents, copyrights, and trademarks accumulated to more than 81 registered products. She published her works in high impact journals.

Rafiza ABDUL RAZAK

Department of Curriculum and Instructional Technology, Faculty of Education
University of Malaya

Address: Jalan Prof Diraja Ungku Aziz, 50603, Kuala Lumpur, Malaysia

Phone: +60 126523893,

E-mail: rafiza@um.edu.my

REFERENCES

- Adel, E., & Hussain, A. (2020). Relationships between self-regulated learning strategies, learning motivation and mathematics achievement. *Cypriot Journal of Educational Sciences*, 15(1), 104-111.
- Adinda, D., & Marquet, P. (2018). *Effects of blended learning teaching strategies on students' self-direction*. Proceedings of the International Conference on E-Learning (pp.1-9). Cape Town, South Africa.
- Albelbisi, N. A., & Yusop, F. D. (2019). Factors influencing learners' self-regulated learning skills in a Massive Open Learning Online Course (MOOC) environment. *Turkish Online Journal of Distance Education*, 20(3), 1-16.
- Alkahtani, A. S. (2019). Effectiveness of electronic learning environment that uses active learning in developing producing digital stories skills among female students at Princess Nourah University. *University of Tabuk Journal for Humanities and Social Sciences*, 3, 211-229.
- Altanis, I, & Retalis, S. (2019). A multifaceted students' performance assessment framework for motion-based game-making projects with Scratch. *Educational Media International*, 56(3), 201-217.
- Andrade, H. L. (2019). A critical review of research on student self-assessment. *Systematic Review*, 4(87), 1-13.
- Bai, B., & Wang, J. (2021). Hong Kong secondary students' self-regulated learning strategy use and English writing: Influences of motivational beliefs. *System*, 96, 102404.
- Bandura, A. (1986). *Social foundation of thought and action: A social cognitive theory*. New Jersey: Prentice-Hall.
- Bandura A. (1997). *Self-Efficacy: The Exercise of Control*. New York: Freeman and Co.
- Baumeister, R. F., Heatherton, T. F., & Tice, D. M. (1994). *Losing control: How and why people fall at self-regulation*. United States: Academic Press.
- Berger, F., Schreiner, C., Hagleitner, W., Jesacher-Roßle, L., Roßnagl, S., & Kraler, C. (2021). Predicting coping with self-regulated distance learning in times of COVID-19: Evidence from a longitudinal study. *Frontiers in Psychology*, 12, 1-12.
- Bhagat, V., Haque, M., & Jaalam, K. (2018). Enrich schematization in children: Play as the tool for cognitive development. *Journal of Applied Pharmaceutical Science*, 8(07), 128-131.
- Bradley, R. L., Browne, B. L., & Kelley, H. M. (2017). Examining the influence of self-efficacy and self-regulation in online learning. *College Student Journal*, 51(4), 518-530.
- Brittany, L. (2020). Examining students' confidence to learn online, self-regulation skills and perceptions of satisfaction and usefulness of online class. *Online Learning*, 24(3), 128-146.
- Brophy, J., & Wentzel, K. (2014). *Motivating students to learn* (4th ed.). New York: Taylor and Francis.
- Buchem, I., Attwell, G., & Torres, R. (2011, July 10-12). *Understanding personal learning environments: Literature review and synthesis through the activity theory lens*. Paper presented at the PLE Conference, Southampton, UK.
- Buchem, I., Tur, G., & Hoelterhof, T. (2020). The role of learner control and psychological ownership for self-regulated learning in technology-enhanced learning designs. Differences in e-portfolio use in higher education study programs in Germany and Spain. *Interaction Design and Architecture(s) Journal*, 45, 112-132.
- Chacon-Diaz, L. B. (2020). An explanatory case study of behaviors, interactions, and engagement in an introductory Science active learning classroom (ALC). *Journal of Classroom Interaction*, 55(1), 26-40.
- Chatpakkarattana, T., Puttapitakporn, S., & Jiwalak, K. (2022). Development of online tutorials with an active learning concept to enhance interaction and collaborative learning: New and next normal in distance education. *Special Education*, 2(43), 1992-1997.

- Cho, H. J., Levesque-Bristol, C., & Yough, M. (2020). International students' self-determined motivation, beliefs about classroom assessment, learning strategies, and academic adjustment in higher education. *Higher Education, 81*, 1215-1235.
- Code, J. (2020). Agency for learning: Intention, motivation, self-efficacy and self-regulation. *Frontiers in Education, 5*, 1-15.
- Deci, E. L., Koestner, R., & Ryan, R. M. (1999). A meta-analytic review of experiments examining the effects of extrinsic rewards on intrinsic motivation. *Psychological Bulletin, 125*(6), 627-668.
- Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. New York: Plenum
- Deci, E. L., & Ryan, R. M. (2010). *Self-Determination*. New York, NY: John Wiley & Sons, Inc.
- Fadli, A., & Irwanto. (2020). The effect of local wisdom-based ELSII learning model on the problem solving and communication skills of pre-service Islamic teachers. *International Journal of Instruction, 13*(1), 731-746.
- Felix, K., Pia, S., Linda, K., & Susanne, N. (2019). Investigating changes in self-evaluation of technical competences in the serious game Serena Supergreen: Findings, challenges and lessons learned. *Metacognition & Learning, 14*(3), 387-411.
- Flavell, J. H. (1979). Metacognition and cognitive monitoring: A new area of cognitive-developmental inquiry. *American Psychologist, 34*(10), 906-911.
- Froiland, J. M. (2021). The intrinsic learning goals of elementary school students, in their own words. *Journal of Humanistic Psychology, 61*(4), 629-649.
- Haggard, P., & Lau, H. (2013). What is volition? *Experimental Brain Research, 229*, 285-287.
- Hartnett, M. (2016). The importance of motivation in online learning. In M. Hartnett (Ed.), *Motivation in Online Education* (pp. 5-32). Singapore: Springer.
- Hauk, D., & Groschner, A. (2022). How effective is learner-controlled instruction under classroom conditions? A systematic review. *Learning and Motivation, 80*, 1-12.
- Hoffman-Biencourt, A., Lockl, K., Schneider, W., Ackerman, R., & Koriat, A. (2010). Self-paced study time as a cue for recall predictions across school age. *British Journal of Developmental Psychology, 28*(4), 767-784.
- Izwan Nizal Mohd Shahrane, Jastini Mohd Jamil, & Sarah Syamimi Mohamad Rodzi (2016). *Google Classroom as a tool for active learning*. Proceedings of the International Conference on Applied Science and Technology (pp.020069-1 – 020069-6). Kedah, Malaysia.
- Jia, X., Li, W., & Cao, L. (2019). The role of metacognitive components in creative thinking. *Frontiers Psychology, 10*, 1-11.
- Kanyakumari, D. (2020, May 20). Home-based learning: Odds stacked against teachers in Malaysia's public primary schools, while private counterparts are more prepared. *Channel News Asia*. Retrieved February 20, 2023 from <https://www.channelnewsasia.com/news/asia/malaysia-covid-19-home-based-learning-primary-school-teachers-12735306>
- Keller, J. M. (1983). Motivational design of instruction. In C. M. Reigeluth (Ed.), *Instructional design theories and models: an overview of their current status*. New York: Routledge.
- Keller, J. M., Ucar, H., & Kumtepe, A. T. (2021). Foundations of motivational research and design in online distance learning. In H, Ucar & A. T. Kumtepe (Eds.), *Motivation, volition, and engagement in online distance learning* (pp. 68-76). Hershey, Pennsylvania: IGI Global.
- Knowles M. (1975). *Self-directed learning: A guide for learners and teachers*. Chicago, IL: Association Press.
- Kuhl, J. (1985). Volitional mediators of cognitive-behavior-consistency: Self-regulatory processes and action versus state orientation. In J. Kuhl & J. Beckmann (Eds.), *Action control: From cognition to behavior* (pp. 101-128). Heidelberg, Berlin, New York: Springer.

- Lee, S. Y. (2019). Promoting active learning and independent learning among primary school student using Flipped Classroom. *International Journal of Education, Psychology and Counselling*, 4(30), 324-341.
- Luu, C., Talbot, T. B., Fung, C. C., Ben-Isaac, E., Espinoza, J., Fischer, S., Cho, C. S., Sargsyan, M., Korand, S., & Chang, T. P. (2020). Development and performance assessment of a digital serious game to assess multi-patient care skills in a simulated pediatric emergency department. *Simulation & Gaming*, 51(4), 550-570.
- Magen-Nagar, N., & Cohen, L. (2016). Learning strategies as a mediator for motivation and a sense of achievement among students who study in MOOCs. *Education and Information Technologies*, 22, 1271–1290.
- Makuch, K. E., Aczel, M. R., & Zaman, S. (2020). Do children want environmental rights? Ask the children! *Electronic Green Journal*, 1(43), 1-21.
- Martela, F. (2020). Self-determination theory. In B. J. Carducci, C. S. Nave, J. S. Mio, & R. E. Riggio (Eds.), *The Wiley encyclopaedia of personality and individual differences: Models and theories* (pp. 369-373). Hoboken, NJ: Wiley-Blackwell.
- McLeod, S. (2018). *Jean Piaget's theory of cognitive development*. Developmental Psychology. Simply Psychology. Retrieved February 28, 2023 from <https://www.simplypsychology.org/simplypsychology.org-Jean-Piaget.pdf>
- Merriam, S. B. (1998). *Qualitative research and case study applications in education*. San Francisco: Jossey-Bass Publishers, Inc.
- Merriam, S. B. (2009). *Qualitative Research: A Guide to Design and Implement*. San Francisco: Jossey-Bass Publishers, Inc.
- Miller, E. K., Cohen, J. D. (2001). An integrative theory of prefrontal cortex function. *Annual Review of Neuroscience*, 24, 167-202.
- Mogavi, R. H., Zhao, Y., Haq, E. U., Hui, P., & Ma, X. (2021). *Student barriers to active learning in synchronous online classes: Characterization, reflections, and suggestions*. Proceedings of the 8th ACM Conference on Learning (pp.101-115). New York, United States.
- Mohd Fadzly Wasriep, & Lajium, D. A. D. (2019). 21st century learning in primary Science subject via flipped classroom method – A teacher's perspective. *International Journal of Recent Technology and Engineering*, 8(2S9), 952-959.
- Molden, D. C., Hui, C. M., & Scholer, A. A. (2016). Chapter 20 – Understanding self-regulation failure: A motivated effort-allocation account. In E. R. Hirt, J. J. Clarkson, & L. Jia (Eds.), *Self-regulation and ego control* (pp. 425-459). London, UK: Elsevier, Inc.
- Panagiotis, A., & Triantaphyllia, K. (2020). Students are brainstorming from distance via internet and Stormboard. *Journal of Modern Education Review*, 10(12), 1116-1121.
- Pekrun, R. (2000). A social-cognitive, control-value theory of achievement emotions. In J. Heckhausen (Ed.), *Motivational psychology of human development* (pp. 143–163). Amsterdam, Netherlands: Elsevier.
- Pintrich, P.R. (1999). The role of motivation in promoting and sustaining self-regulated learning. *International Journal of Educational Research*, 31(6), 459-470.
- Rajagopal, K., Schoors, R. V., Vanbecelaere, S., de Bie, L., & Depaep, F. (2020). Designing personalised learning support for K12 education: learner control, motivation and psychological ownership. *Interaction Design and Architecture(s) Journal*, 45, 155-176.
- Rogers, H. J., Marshman, Z., Rodd, H., & Rowen, D. (2021). Discrete choice experiments or best-worst scaling? A qualitative study to determine the suitability of preference elicitation tasks in research with children and young people. *Journal of Patient-Reported Outcomes*, 5(26), 1-11.
- Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, 55(1), 68–78.

- Saldana, J. (2015). *The coding manual for qualitative researchers* (3rd ed.). London, California, New Delhi, Singapore: Sage Publications.
- Schroeder, N. L., Chin, J., & Craig, S. D. (2020). Learner control aids learning from instructional videos with a virtual human. *Technology, Knowledge and Learning*, 25(4), 733-751.
- Siddiqui, S., Thomas, M., & Soomro, N. N. (2020). Technology integration in education: Source of intrinsic motivation, self-efficacy and performance. *Journal of E-learning and Knowledge Society*, 16(1), 11-22.
- Stengelin, R., Hepach, R., & Haun, D. B. M. (2020). Cultural variation in young children's social motivation for peer collaboration and its relation to the ontogeny of Theory of Mind. *PLoS ONE*, 15(11), e0242071.
- Sugilar (2021). Students' barriers to online tutorial. *Turkish Online Journal of Distance Education*, 22(1), 170-178.
- Takahashi, T. (2018). Motivation of students for learning English in Rwandan schools. *Issues in Educational Research*, 28(1), 168-186.
- Teng, L. S. (2021). Individual differences in self-regulated learning: Exploring the nexus of motivational beliefs, self-efficacy, and SRL strategies in EFL writing. *Language Teaching Research*, 1-23.
- Tullis, J. G., & Benjamin, A. S. (2011). On the effectiveness of self-paced learning. *Journal of Memory and Language*, 64(2), 109-118.
- Valjataga, T., & Laanpere, M. (2010). Learner control and personal learning environment: A challenge for instructional design. *Interactive Learning Environments*, 18(3), 277-291.
- Van Loon, M. H., de Bruin, A. B. H., van Gog, T., van Merriënboer, J. J. G., and Dunlosky, J. (2014). Can students evaluate their understanding of cause-and-effect relations? The effects of diagram completion on monitoring accuracy. *Acta Psychologica*, 151(C), 143–154.
- Vroom, V. (1964). *Work and motivation*. New York: Wiley and Sons.
- Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological process*. Cambridge, MA: Harvard University Press.
- Wan, C. D. (2020). *Malaysia: An unexpected disruption to teaching and learning*. The Head Foundation. Retrieved February 27, 2023 from <https://headfoundation.org/2020/06/16/malaysia-an-unexpected-disruption-to-teaching-and-learning/>
- Wasik, B. A., Bond, M. A., & Hindman, A. H. (2006). The effects of a language and literacy intervention on Head Start children and teachers. *Journal of Educational Psychology*, 98(1), 63–74.
- Welbers, K., Konijn, E. A., Burgers, C., de Vaate, A. B., Eden, A., & Brugman, B. C. (2019). Gamification as a tool for engaging student learning: A field experiment with a gamified app. *E-Learning and Digital Media*, 16(2), 92-109.
- Werner, K. M., & Milyavskaya, M. (2018). Motivation and self-regulation: The role of what-to motivation in the process underlying self-regulation and self-control. *Social and Personality Psychology Compass*, 13(1), e12425.
- Yokoyama, M., & Miwa, K. (2018). *Relationship between goal orientation, conception of learning and learning behavior*. Proceedings of the IADIS International Conference on Cognition & Exploratory Learning in Digital Age (pp.233-240). Budapest, Hungary.
- Zhou, R., Ren, F., & Tan, Y. (2021). Stimulating intrinsic and extrinsic motivation in online learning: The role of incentive design. *SSRN Electronic Journal*, 1-38.
- Zhu, Q., Yuan, N., & Guan, D. (2019). Cognitive driven multilayer self-paced learning with misclassified samples. *Complexity*, 2019(6), 1-10.

BOOK REVIEW

RE-ENVISIONING AND RESTRUCTURING BLENDED LEARNING FOR UNDERPRIVILEGED COMMUNITIES

**Edited by Chantelle BOSCH, Dorothy LAUBSCHER and
Lydia KYEI-BLANKSON**

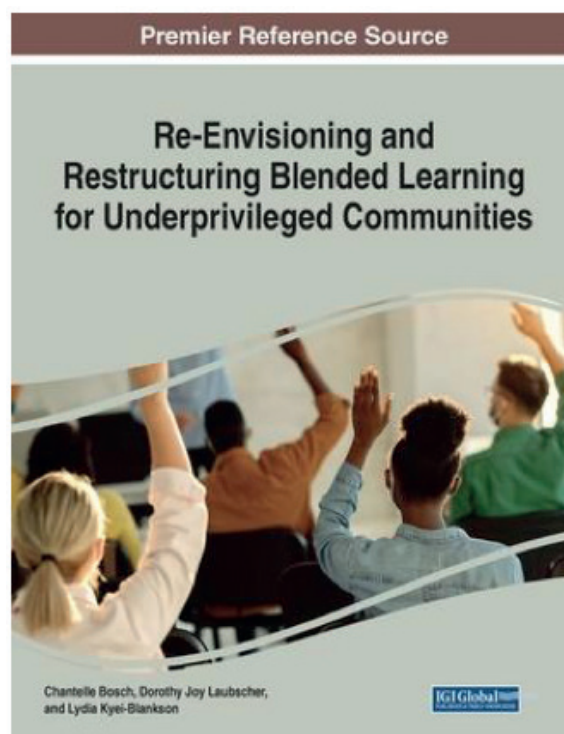
Dr. Nur HIDAYAT

ORCID: 0000-0002-1023-4877
Faculty of Teacher Training and Education
Universitas Muhammadiyah Surakarta
Surakarta, INDONESIA

ISBN	9781799869412
Publication Date	2021
Publication Formats	Ebook (PDF) and Hardcover
Publisher	IGI Global

INTRODUCTION

“Re-Envisioning and Restructuring Blended Learning for Underprivileged Communities” discusses how institutions in developing countries and less privileged societies have improved and transformed the implementation of blended learning to enhance teaching and learning for their constituents. This book aims to provide blended learning solutions that can be applied across various levels of institutions, programs, courses, and activities. Each chapter in this book will explore diverse learning environments, ranging from rural areas to developing countries, and delve into programs and courses designed to enhance student success and improve accessibility for students from diverse backgrounds. The book is highly relevant for teachers, administrators, educators, practitioners, stakeholders, researchers, academics, and students who are interested in blended learning opportunities within disadvantaged environments and often overlooked populations.



REVIEW OF THE BOOK

Chapter 1 provides the contextual foundation by offering a blended learning theoretical overview. In this section, different interpretations of blended learning are examined, and the advantages and difficulties of incorporating blended learning in different settings are explored. A broad range of blended learning models are outlined to establish a theoretical foundation for creating blended learning environments.

Chapter 2 focuses on the significance of ensuring high standards in blended learning within educational institutions, with a specific emphasis on underprivileged communities. The chapter highlights the importance of quality assurance measures in these contexts. In this chapter, the author emphasizes the need for policy implementation at the institutional level to ensure the quality of blended learning. The chapter sheds light

on the context of higher education institutions situated in both privileged and underprivileged communities, emphasizing the complexities associated with ensuring quality assurance. Additionally, the chapter showcases instances of effective quality assurance initiatives implemented in underprivileged communities.

Chapter 3 provides a depiction of research on the utilization of Information and Communication Technology (ICT) in primary schools. The authors report on the current usage of ICT and the ICT tools effectiveness. They also delve into the concept of “e-schooling” within underprivileged communities and identifies obstacles that impede the efficient utilization of information and communication technology (ICT) at the primary school level. Moreover, the research examines the potential for primary schools to incorporate ICT usage and instructional approaches from secondary schools and higher education institutions for the benefit of their students.

Chapter 4 presents empirical findings that conclude various types of technologies, such as laptops, interactive whiteboards, projectors, mobile phones, desktop computers, printers, and iPads, are effectively utilized as educational tools. In conclusion, the chapter establishes that incorporating ICT devices into classroom routines facilitates the clarification and comprehension of intricate concepts, while also adding depth and significance to the teaching and learning process.

Chapter 5 reports on an empirical study conducted where a mobile application is designed to help prospective mathematics teachers in presenting mathematical content. This chapter centers around the creation of an application rooted in the principles of Realistic Mathematics Education at the conceptual level. On the technical front, a variety of design frameworks were utilized to offer guidance to the design team. The experiences of users who utilized the application were recorded, and practical design principles for mobile application design are presented as a result.

Chapter 6 highlights the domain of science education with a particular focus on integrating blended learning to enhance multilingualism in science classrooms, specifically for students who are learning science in English as a Foreign Language (EFL). The author explores various strategies such as incorporating multilingual instructional videos, presentation slides with narration in multiple languages, leveraging social media platforms like WhatsApp and Facebook for educational purposes, and utilizing Open Educational Resources (OER). The chapter also underscores the significance of embracing linguistic diversity in science classrooms.

Chapter 7 explores the significant role of content developers as key stakeholders in delivering high-quality curriculum content through digital platforms, particularly addressing the dearth of quality digital content in underprivileged communities. It specifically focuses on the challenges faced by teachers who instruct in Afrikaans, one of South Africa’s official languages, spoken by approximately 13.5% of the population as their mother tongue. The chapter highlights the efforts of the Virtual Institute for Afrikaans (VivA) in providing valuable linguistic materials for Afrikaans language learning within the context of blended learning.

Chapter 8 comprises two sections. The first section examines the context of COVID-19 and explores the potential application of blended learning in complex and unforeseen social situations. The second section emphasizes the utilization of Universal Design for Learning (UDL) as a guiding framework to support teachers and school communities in addressing social justice issues associated with blended learning initiatives. The author draws upon two sources of data: personal phenomenological experiences as a graduate instructor and discussions observed in educational media during the COVID-19 crisis. The chapter discusses the concept of ensuring equitable and inclusive access to blended learning instruction through the lens of UDL. These findings underscore the necessity for proactive measures within the K-12 education sector to ensure equal opportunities and inclusivity for all learners in the implementation of blended learning.

Chapter 9 discusses practical solutions offered by blended learning in addressing challenges that arise due to the COVID-19 pandemic, particularly regarding formal paper-based portfolio assessments that are difficult for teacher-students to complete in their assignments. The study adopts a participatory learning and action research (PLAR) methodology to examine and document the lecturers and in-service teachers’ collaboration. Their collective effort involves designing a novel plan aimed at assisting elementary-level students in rural areas who encounter obstacles in their learning process. This plan integrates content knowledge with technology-based teaching and learning approaches to provide comprehensive support. Challenges related to teacher-student assessment are also discussed in this chapter.

Chapter 10 presents the research findings conducted with distance education students. Blended learning, as applied in various parts of the world, both in the northern and southern regions, becomes the focus of discussion, along with the importance of self-directed learning. The author presents findings from a case study conducted in Ghana involving adult learners. In this study, a blended learning approach is implemented, with a particular emphasis on utilizing a learning management system (LMS) as the central tool for delivering instruction. The author argues that the effective use of information and communication technology (ICT), such as mobile phones, is crucial for adult learners in reducing the sense of isolation in their learning process. Moreover, the author draws attention to the obstacles encountered in the Ghanaian context that impede the advancement of self-directed learning and the effective implementation of blended learning. The chapter concludes by offering potential solutions and recommendations to tackle the challenges faced in higher education within Ghana. The author posits that adult learners in developing nations, including Ghana, possess untapped potential that can be nurtured through appropriate practices in blended learning and self-directed learning. Furthermore, the author advocates for the implementation of pertinent policies by governments in developing countries, such as Ghana, to support adult education initiatives.

Chapter 11 investigates the role of a learning management system (LMS) in facilitating self-directed learning among adult learners. The authors present the outcomes of an empirical case study conducted in Eswatini, focusing on adult learners who are enrolled in higher education institutions. This chapter describes the flexibility and autonomy that can be provided by LMS in facilitating self-directed learning. Through a qualitative approach, the study investigates the mastery and perceptions of adult learners towards the LMS in enhancing their autonomy in learning. In conclusion, the chapter offers a compilation of actionable suggestions for instructors, content developers, and instructional designers to improve student independence and self-directed learning within the LMS platform. These recommendations provide practical guidance for enhancing the student experience in utilizing the LMS.

Chapter 12 reflects on the transition from a hybrid delivery mode to a fully online mode in a higher education institution. The chapter discusses the planning process for the online mode, including virtual training for tutors. It also addresses key aspects such as launching online courses and providing counseling support for students. The chapter highlights the value of the learning management system (LMS) in monitoring teaching and learning activities through the collection and analysis of learning analytics data. It concludes by suggesting the exploration of additional tools to enhance online delivery and monitoring, ultimately improving the quality of online learning experiences.

Chapter 13 applies Knowles' theory of adult learning to evaluate the preparedness of both staff and students at Great Zimbabwe University in transitioning from traditional face-to-face learning to blended learning during the COVID-19 pandemic. It examines their ability to adapt and adjust to the new mode of instruction, which combines online and in-person elements. It explores blended learning, its didactics, and pedagogy, and concludes that financial limitations and a lack of technological competence present challenges to implementing blended learning effectively in Zimbabwe.

Chapter 14 introduces principles and guidelines for forming Communities of Inquiry (CoI) in blended learning environments. Using the CoI framework, the chapter evaluates the online learning quality and emphasizes the importance of engaging students through CoI principles. This theoretical study utilizes exploratory desktop research to analyze published information and address research questions. The chapter concludes by providing guidelines, principles, and practical recommendations for fostering social and cognitive presence, with a focus on the instructor's role in the virtual learning environment.

CONCLUSION

Education has been confronted with significant challenges due to the COVID-19 pandemic and its widespread impact worldwide. Educators, including teachers, academics, researchers, and managers, have had to adapt, innovate, and improvise in the face of an uncertain situation. The most affected group within society is those who are less privileged, struggling to adjust to the "new normal" brought about by the pandemic. Therefore, primary attention is focused on blended learning implemented in various contexts for these less privileged communities. This publication centers its focus on this matter, transforming and restructuring blended learning for such communities. The topic is explored across various levels of education, ranging from early

childhood to adult education. The book combines theory and empirical research with contributions from authors representing diverse fields and educational contexts. The importance of developing and enhancing sustainable blended learning for less privileged communities is emphasized in this publication. This book will serve as a source of inspiration for your educational journey while providing support and assistance to learners at all levels in achieving greater success.

BIODATA and CONTACT ADDRESSES of AUTHOR



Dr. Nur Hidayat is a lecturer at Faculty of Teacher Training and Education, Universitas Muhammadiyah Surakarta. Dr. Nur Hidayat gained his Ph.D. in Language and Literature Education at Universitas Negeri Surabaya. His academic interest areas are computer assisted language learning (CALL), English language teaching (ELT), applied linguistics and Education. He has over than 18 book reviews published in reputable international journal. He also serves as the Vice President of I-Read (Indonesian Researchers in English Language and Education). His publication can be found at <https://orcid.org/0000-0002-1023-4877>

Nur Hidayat

English Education, Faculty of Teacher Training and Education

Address: Universitas Muhammadiyah Surakarta, 57169, Surakarta, Indonesia

Phone: +62 271-717417

E-mail: saujiruseta@gmail.com

REFERENCE

Bosch, C., Laubscher, D. J., & Kyei-Blankson, L. (Eds.). (2021). *Re-envisioning and restructuring blended learning for underprivileged communities*. IGI Global. <https://doi.org/10.4018/978-1-7998-6940-5>