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Dear TOJDE Readers,

Welcome to Volume 22 Issue 3 of TOJDE.

There are 18 articles in the July 2021 issue of TOJDE. 43 authors from 11 different countries contributed to the issue. These countries are Denmark, Indonesia, Iraq, Jordan, Malaysia, Mexico, Nepal, Saudi Arabia, Turkey, United Arab Emirates and Vietnam.

EFL TEACHER CANDIDATES' ENGAGEMENT IN MOBILE-ASSISTED FLIPPED CLASSROOM, authored by Truly Almendo PASARIBU and Mega WULANDARI is the first article. This case study investigates the roles of the teacher and the students in the implementation of a mobile-assisted flipped classroom. The data from online archives, observations, questionnaires, and focus group discussions show that a flipped course leads to different levels of emotional, behavioral, cognitive, social, and reflective engagements in various modes of learning and interactions.

The title of the 2nd article is DISTANCE EDUCATION EXPERIENCES OF SECONDARY SCHOOL MATH TEACHERS DURING THE PANDEMIC: A NARRATIVE STUDY. The authors are Seyma SENGIL AKAR and Meltem KURTOGLU ERDEN. This narrative study which analyzes the online teaching experiences of secondary school math teachers during Covid-19 pandemic yields five themes covering the general structure of the math course, hardware, Web 2.0, socio-cultural and psychological issues and teacher readiness.

The 3rd article, A SYSTEMATIC REVIEW OF THE TENDENCIES IN THE USE OF LEARNING MANAGEMENT SYSTEMS, is written by Hakan ALTINPULLUK and Mehmet KESIM. In this systematic review, 59 SSCI-indexed articles published between 2012 and 2017 in the Web of Science database were analyzed to determine the current situation and future trends in using LMSs. The study provides a snapshot of publication trends, LMS types, use patterns, methodological and theoretical trends in LMS research.

ANALYSIS OF THE WEB APPLICATION ON BAYES' THEOREM CONSIDERING DATA SCIENCE AND TECHNOLOGICAL ACCEPTANCE MODEL is the title of the 4th article, and the authors are Ricardo-Adán SALAS-RUEDA, Érika-Patricia SALAS-RUEDA and Rodrigo-David SALAS-RUEDA. This mixed research aims to design and implement the Web Application on Bayes' Theorem (WABT) in the Statistical Instrumentation for Business subject. The results of machine learning indicate that WABT positively influences motivation, autonomy, personalized learning and active role. In addition, WABT is found to be a pleasant, simple, useful and innovative web tool for the educational field.

Mustafa CANER and Sinan AYDIN are the authors of the 5th article titled SELF EFFICACY BELIEFS OF PRE-SERVICE TEACHERS ON TECHNOLOGY INTEGRATION. The non-experimental quantitative research study explores the self-efficacy beliefs of pre-service teachers enrolled in four different teacher education programs of a state university in Turkey. The results reveal that pre-service teachers have high self-efficacy in technology integration in general, and while technology integration self-efficacy of pre-service teachers show a significant difference in line with some majors and grade level variables, there is no difference in terms of the gender variable.

The title of the 6th article is ONLINE DISTANCE LEARNING FOR TRANSLATION SUBJECTS: TERTIARY LEVEL INSTRUCTORS' AND STUDENTS' PERCEPTIONS IN SAUDI ARABIA. Khaled ALDOSSARY is the author. The objective of this quantitative study is to explore university instructors' and students' perceptions of utilizing eLearning platforms for teaching and learning translation subjects during the Covid-19 period. The findings reveal no difference in both instructors' and students' perceptions of eLearning, and a number of benefits are reported.

STUDENT BARRIERS TO PROSPECTS OF ONLINE LEARNING IN VIETNAM IN THE CONTEXT OF COVID-19 PANDEMIC is the 7th article. Dao Thi Hong VAN and Ha Hoang Quoc THI are the authors. This mixed-method study investigates student barriers to online learning in Vietnam, in the context of Covid-19 pandemic. The findings reveal three obstacles from the qualitative data analysis

including geographical features, the economic status of Vietnamese people, and Vietnamese culture and traditions in addition to the six groups of barriers re-confirmed from Berge's framework.

The authors of the 8th article are Zeliha ERGUL AYDIN, Zehra KAMISLI OZTURK and Zeynep Idil ERZURUM CICEK. The title is TURKISH SENTIMENT ANALYSIS FOR OPEN AND DISTANCE EDUCATION SYSTEMS. The purpose of the study is to conduct a sentiment analysis (SA) on the collected Turkish tweets about an ODE system to monitor students' opinions and sentiments about the system. Through the SA results, the authors purport that students' dissatisfaction, appreciation, and concerns will be learned quickly by the university administration to develop strategies that will increase the quality of education and educational services.

Xuan-An NGUYEN, Duc-Hoa PHO, Dinh-Hai LUONG and Xuan-Thuc-Anh CAO are the authors of the 9th article. The title of this article is VIETNAMESE STUDENTS' ACCEPTANCE OF USING VIDEO CONFERENCING TOOLS IN DISTANCE LEARNING IN COVID-19 PANDEMIC. This study examines the external factors that affected students' acceptance of videoconferencing tools during the COVID pandemic using an extended Technology Acceptance Model (TAM) and Structural Equation Modeling (SEM). The results reveal that external factors such as subject norm and computer playfulness have a significant impact on most TAM constructs, and output quality is found to have a positive influence on students' perceived usefulness in the acceptance of VCTs in distance learning.

The 10th article which is authored by Berrin OZKANAL, Secil KAYA GULEN and E. Pinar UCA GUNES is titled ONLINE INFORMATION SEARCHING STRATEGIES OF OPEN AND DISTANCE LEARNERS: ANADOLU UNIVERSITY SAMPLE. This quantitative study aims to identify the online information searching strategies of open and distance learners. It is seen that there are significant differences between online information searching strategies and age, gender, enrollment type. The age and enrollment type are taken in the consideration within the scope of experience, and it is seen that the experience is more decisive than the gender for open and distance learners.

DEVELOPING MEASURES FOR THE EFFECTIVENESS OF DISTANCE EDUCATION AS REGARDS SUSTAINABILITY: THE MIXED METHOD APPROACH is the 11th article authored by Siti Haslina Md HARIZAN and Mohd Faiz HILMI. The objective of this mixed methods study is to develop the instrument that measures the effectiveness of distance education in inculcating sustainability among distance learners. The findings yield a comprehensive and contextually appropriate measurement tool applicable to a larger population of distance learners and provides an evaluation tool for practitioners in determining the effectiveness of distance education programs and courses that have led to the attainment of sustainability outcome among learners.

The 12th article EDUCATIONAL CRISIS MANAGEMENT REQUIREMENTS AND ITS RELATION TO USING DISTANCE LEARNING APPROACH: A CROSS-SECTIONAL SURVEY SECONDARY STAGE SCHOOLS IN AL-BALQA'A GOVERNORATE DURING COVID-19 OUTBREAK FROM THE PERSPECTIVES OF TEACHERS is authored by Fadi SAMAWI. The study investigates the educational crisis management and its relation to using distance learning approach in secondary stage schools in Al-Balqaa governorate during COVID-19 outbreak from the perspectives of teachers. The results highlight the positive and significant role of the requirements of educational crisis management in its five domains (planning, information, communications, leadership skills, team work) in raising the level of use of the distance learning method in its three domains (the importance of distance learning, the rationale for distance learning, and the obstacles to distance learning) among teachers of secondary schools in Al Balqaa governorate.

Hussein AL-BAZAR, Hussein ABDEL-JABER, Ebtisam LABIB and Mohammad AL-MADI are the authors of the 13th article titled IMPACTS OF BLENDED LEARNING SYSTEMS ON AOU STUDENTS' SATISFACTION: AN INVESTIGATIONAL ANALYSIS OF KSA'S BRANCH. This study examines a number of key factors that affect students' satisfaction within a blended learning environment in a private university in Saudi Arabia. The results reveal that students are mostly satisfied with blended learning,

particularly, with the convergence of the Face-to-Face and Videoconferencing classes and the role of their instructors. Those students are moderately satisfied with the SIS, the online forums, and their course materials and modules, and least satisfied with the LMS and the E-library.

The 14th article titled FACTORS INFLUENCING GRADUATE STUDENTS' PERCEPTION OF ONLINE AND DISTANCE LEARNING IN NEPAL is authored by Parshu Ram UPADHAYAYA, Bishnu SHARMA, Yagya Prasad GNAWALI and Shashidhar BELBASE. This study explores the perception of online and distance learning (ODL) experienced by postgraduate students in Nepal during the COVID-19 pandemic in 2020. The results show significant difference in the participants' views about Quality, Opportunity, Relevance, and Support depending on their place of residence.

The 15th article, DO TURKISH STUDENT TEACHERS FEEL READY FOR ONLINE LEARNING IN POST-COVID TIMES? A STUDY OF ONLINE LEARNING READINESS, is authored by Alev ATES-COBANOGLU and Ilker COBANOGLU. The purpose of this descriptive study is to investigate online learning readiness levels of student teachers according to several variables. The findings suggest that online learning readiness levels of student teachers is at good level. Moreover, online learning readiness levels of student teachers are significantly different according to their departments, Internet access, their perceived competency in information and communication technology use.

Ahmed ANTWI-BOAMPONG is the author of the 16th article titled AN INVESTIGATION INTO BARRIERS IMPACTING AGAINST FACULTY BLENDED LEARNING ADOPTION. This exploratory qualitative study investigates the barriers impacting faculty blended learning in Ghana the perceptions and experiences of faculty members. The results reveal that infrastructure, faculty concerns, institutional, technical support constitute barriers to faculty BL adoption.

The 17th article, ENHANCING VOCABULARY KNOWLEDGE AMONG SECONDARY SCHOOL EFL STUDENTS BY USING FACEBOOK, is authored by Majida Ibrahim MUKHLIF and Ala'a Ismael CHALLOB. This quasi-experimental study compares the effectiveness of employing Facebook and traditional instruction in improving Iraqi EFL secondary school students' vocabulary knowledge, and the factors that affect the EFL students' vocabulary learning. The results reveal that FOLP was more effective than traditional instruction in improving EFL students' vocabulary knowledge with effective group work, immediate feedback, and autonomous learning opportunities.

The last article DEVELOPMENT OF MEDICAL SCHOOL STUDENTS' ATTITUDES TOWARDS ONLINE LEARNING SCALE AND ITS RELATIONSHIP WITH E-LEARNING STYLES is authored by Mustafa Onur YURDAL, Erkan Melih SAHIN, Ayşen Melek AYTUG KOSAN and Cetin TORAMAN. This study aims at determining students' attitudes towards distance education/online learning through a scale developed by the authors and determine the relationship between these attitudes and e-learning styles. The results reveal that Presented Medical School Students' Attitudes Towards Online Learning Scale is a valid and reliable instrument to measure medical school students' attitudes towards distance/online learning. The regression modeling also show that the learning styles are significant predictors for attitudes towards online education, and the audio-visual learning style is reported to have the highest predictive strength for attitudes towards online education.

Hope to meet again in the next issue of TOJDE.

Cordially,

Dr. T. Volkan YUZER

Editor in Chief

EFL TEACHER CANDIDATES' ENGAGEMENT IN MOBILE-ASSISTED FLIPPED CLASSROOM

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ABSTRACT

Many studies have explored the benefits of flipped classrooms in language learning, but a further investigation on the link between mobile-assisted flipped classrooms and EFL teacher candidates' engagement in learning in an Indonesian context is needed. This research aimed at elaborating on how the implementation of mobile-assisted flipped classroom engaged EFL teacher candidates. With this goal in mind, we employed a case study design aiming at giving a holistic description of the case. It included multiple sources of data from online archives, observations, questionnaires, and Focus Group Discussion (FGD). We investigated the roles of the teacher and the students in the implementation of a mobile-assisted flipped classroom. The data from online archives, observations, questionnaires, and FGD show that a flipped course leads to EFL engagement. The discussion reveals how EFL teacher candidates experience different levels of emotional, behavioral, cognitive, social, and reflective engagements in various modes of learning and interactions. The study elaborates on the positive impact of mobile-assisted flipped language learning on engaging teacher candidates. This study also offers some implications and recommendations for teaching practitioners and future research.

Keywords: MALL, flipped classroom, language teaching, EFL teacher candidates.

INTRODUCTION

Extensive literature has discussed the benefits of learning and teaching a language with technology. Technology is believed to have enhanced language teaching (Basal, 2015; Cakir, 2013; Franklin, 2011; Giron-Garcia, 2015; Lee & Wallace, 2018a; Yang, Chuang, Li, & Tseng, 2013). The use of technology in an Indonesian context fosters students' autonomy (Ardi, 2017; Wulandari, 2017), raises their writing engagement (Prasetyawati & Ardi, 2020), reduce anxiety (Pasaribu, 2016), and improves critical thinking skills (Pasaribu & Iswandari, 2019). Not only does it empower students' learning process, but technology facilitates teaching for developing materials, instructional testing, and assessment. Turan and Akdag-Cimen (2020) conducted a systematic review of the studies of flipped models and revealed that flipped models increased student engagement. However, the integration of technology in Indonesia remains low (Harendita, 2013) because in the process of implementing technology teachers face some challenges.

Despite the benefits of learning and teaching language using technology, some teachers are still resistant to using technical tools due to their teaching beliefs and limited resources. First, the teacher-centered approach has been considered "commonplace in Indonesian school culture" (Zulfikar, 2009, p. 19). In Indonesia, the word guru (teacher) stands for digugu lan ditiru or obeyed and imitated (Ardi, 2017; Herawati, 2010;

Pasaribu, 2020). Because teachers are culturally seen as the main source of information, both teachers and students may feel demotivated to find other sources using technology. Moreover, some teachers also felt anxious in using technology since they are categorized as digital immigrants teaching students who are born in the digital culture. Yunus et al. (2013) pointed out that some teachers also argued that technology can make the students lazy due to their reliance on technology. Another barrier is the lack of hardware, software, and Internet facilities in schools. Not all schools are equipped with adequate digital tools. A limited Internet connection can also demotivate teachers to use technology.

These constraints should be a major concern for educators in the Industrial Revolution 4.0. To meet current pedagogical objectives, teachers should be able to integrate technology into English classrooms (Cakir, 2013; Danker, 2015; Gilbert, 2013). Seeing this need, pre-service teachers must be equipped with technology, pedagogy, and content knowledge (TPACK). This concept has been introduced to describe an integrated conceptual framework for the knowledge base that teachers or preservice teachers must possess to effectively teach with technology in classroom settings (Harris, Koehler, Koehler, & Mishra, 2009; Koehler, 2006). Gonen (2019) scrutinized pre-service teachers' and students' reflections and discovered that technology-enhanced classes help improve language skills. He also mentioned that it enhanced motivation and active participation. Due to the benefits of technology in language learning, Indonesian preservice teachers or EFL teacher candidates should actively experience the classroom which implicitly exposes this knowledge in the teaching and learning process. To enable EFL teacher candidates to use, apply, and assess digital media for language learning, we investigated a study program which offers Computer Assisted Language Learning (CALL), an elective course offered to sophomore students in the English Language Education Study Program, Faculty of Teacher Training and Education, Sanata Dharma University, Indonesia.

Studies have discussed the link between technology in flipped classrooms and learning (Chen Hsieh, Wu, & Marek, 2017; Davies, Dean, & Ball, 2013; Hung, 2015; Jarvis, Halvorson, Sadeque, & Johnston, 2014; Lee & Wallace, 2018b; Steen-Utheim & Foldnes, 2018). Flipped classrooms place students in the center of learning implementation. A flipped classroom is a learning model where traditional teaching procedures are reversed (Hung, 2015). Hsieh, Wu, and Marek (2017) elaborated on how flipped models help students achieve the learning goals as the research participants improve their idiomatic acquisition significantly in the flipped learning context. Davies, Dean, and Ball (2013) explored how a flipped classroom motivates learning. Steen-Utheim and Njål Foldne (2018) showed how the affective dimension of student engagement is particularly prominent when students reflect upon learning in the flipped classroom when studying mathematics. Lee and Walace (2018) also highlighted the benefits of a flipped classroom for students' enjoyment and engagement.

A sizable number of studies have emphasized the benefits of flipped classrooms. However, there is little investigation on the link between mobile-assisted flipped classrooms and EFL teacher candidates' engagement in learning in an Indonesian context, so further studies are needed. This study fills the literature gap by exploring how web technology in a flipped classroom was implemented to lead to EFL teacher candidates' engagement in learning. The course utilized a Moodle 3.6 format responsive to mobile phones through the Moodle application (app) and browsers. Different digital tools and language skills are integrated in developing the materials for this class. EFL teacher candidates are required to create language learning lesson plans using different digital tools. This study also aimed at explaining how mobile-assisted flipped classrooms are linked to EFL teacher candidates' engagement. Fredricks et al. (2004) categorized engagement into three domains: behavioral engagement, cognitive engagement, and emotional engagement. Besides using this framework in analyzing the data, this study also analyzes different kinds of engagement in the class within the socio-cultural context of the university. Students' social engagement and reflective engagement, which are central in learning and teaching languages, are also scrutinized. The discussion has critical implications for educators to gain a deeper understanding of EFL teacher candidates' engagement. Suffice it to say that investigating how the implementation of a mobile-assisted flipped classroom fosters student engagement is crucial. The research aims at answering this research question: how did the implementation of a mobile-assisted flipped classroom engage EFL teacher candidates?

THEORETICAL FRAMEWORK

Language teaching practice helps students find the link between theory and practice gap. Students at the English Language Education Study Program will experience two kinds of teaching practice: campus-based practice teaching and school-based practice teaching. Campus-based teaching gives students more opportunities to observe and experience teaching with their lecturers. It is done before they face challenges in real schools. They can focus on giving an introduction, delivering lessons, and close the lessons. Secondly, they can learn from the feedback given by their peers who act as students. Students are also able to observe real schools, make lesson plans and teach in the real class.

Studies about Indonesian pre-service teachers' beliefs have been extensively documented. In Indonesian context, Kuswandono (2013) elaborated on pre-service teachers' beliefs from their reflections. He explored how teacher candidates negotiate meaning based on learning as well as teaching experience from reflective practice. He argued that teacher candidates are "…complex and multidimensional, stemming from their different motivations for studying teaching" (p. xiv). Astika (2014) investigated how pre-service teachers were concerned with the contextual aspect of their teaching. He explained how pre-service teachers consider the importance of contextual aspects in teaching. One contextual aspect which should be considered by EFL teacher candidates is that they are going to teach digital natives. It is important for EFL teacher candidates to experience different theories and practical experience in using the new technologies. Accordingly, this study is interested in investigating the implementation of flipped learning and how it affects their engagement in the classroom.

Computer Assisted Language Learning (CALL)

Computer-assisted language learning (CALL) is the area of language learning and computers. Computers have helped the process of teaching and learning language. Another name for this area is TELL or Technology Enhanced Language Learning which focuses on different kinds of technology including phones and mobile phones (Wulandari & Pasaribu, 2020). Technical tools are extensively believed to have strengthened language teaching. The process of teaching four language skills can be integrated with technology, for example the use of blogs to improve students' writing skills (Pasaribu, 2016), infographics to enhance students reading comprehension, podcasts to foster students listening skills, and vlogs to improve students' speaking skills (Wulandari, 2019).

The use of technology in an Indonesian context fosters learner autonomy, reduces anxiety, and improves critical thinking skills (Pasaribu, 2016; Pasaribu & Iswandari, 2019; Prasetyawati & Ardi, 2018; Wulandari, 2017). Seeing the advantages of using technology in the classroom, EFL teacher candidates in the English Language Education Study Program are strongly encouraged to take CALL, a course offered for the English Language Education Study Program. This program aims at providing students with the theoretical ground for using innovations in language teaching.

This study aimed at describing materials in a mobile-assisted flipped classroom for CALL. It is vital that EFL teacher candidates have rich exposure in using digital tools in the workshops throughout the semesters. Not only do students learn the theoretical grounds for integrating technology in the classroom, but students also integrate the technology in teaching practice.

Flipped Classroom

A flipped classroom model aims at encouraging students' preparation before the class and students' active engagement in the class. As the name suggests, it is a flipped version of the conventional classrooms. This learning model is defined as "the typical activities of classroom lectures followed by homework in traditional teaching procedures are reversed in order, and often supplemented or integrated with instructional videos." (Hung, 2015, p. 1) In traditional learning procedures, usually, students listen to the lectures and bring home their homework. On the other hand, in flipped learning classrooms, students are required to study supplementary materials, watch relevant educational videos, and do the homework. It is then followed by interactive discussion in the classroom.

On a practical basis, Cockrum (2013) explained some reasons to flip the classroom. Some of them are to improve classroom management and facilitate interactions among students with different abilities and learning preferences. Jarvis et al. (2014) proposed that this model can foster student engagement in learning. Students can study the materials individually and engage actively in class discussion. In a flipped learning environment, the teachers can provide more opportunities for students to participate in active engagement. In this digital era, language teachers can design and develop flipped classrooms using various technical media.

Using mobile phones in classrooms is not new in the teaching and learning process (Ardi, 2017; Kukulska-Hulme & Viberg, 2018; Reychav, Dunaway, & Kobayashi, 2015; Sung, Chang, & Yang, 2015). Sung, Chang, and Yang (2015) discussed that mobile-device-assisted learning has some properties beneficial for learners, namely mobility, interactivity, context-sensitivity, and individuality. Reychav, Dunaway, and Kobayashi (2015, p. 148) express how mobile learning affects "learning outside the classroom individually or collaboratively in both countries". Kukulska-Hulme and Viberg (2018) emphasized the affordances of using mobile in language learning, which promotes social constructivism. In an Indonesian context, Ardi (2017, p. 55) discussed how mobile-assisted language learning through Schoology helps students control their "learning management, cognitive process, and selection of learning materials". When they are integrated in mobile technology, students can learn language autonomously (Ardi, 2017). The mobile-assisted flipped classroom in this study utilized a Moodle 3.6 format which is responsive to mobile phones. Students can get the notification and easily log in to the course to join the discussions and online activities through their gadgets. It is then urgent to describe how a mobile-assisted flipped model is implemented in the classroom and how they foster EFL teacher candidate engagement.

Student Engagement

Student engagement can be generally classified into three dimensions: emotional or affective engagement, cognitive engagement, and behavioral engagement (Fredricks et al., 2004). However other literature suggests that social engagement and reflective engagement also play roles in the learning process. As the name suggests, emotional engagement involves students' reactions towards their classmates, teachers, academics, and schools (Fredricks et al., 2004). How students actively engage in the classroom influences their motivation in the learning process. Behavioral engagement involves students' participation such as asking questions and participating in the discussion. It is related to their habit in the class and outside the class. Social engagement deals with students' relationships with other students, such as group work or group discussion. Cognitive engagement talks about the students' scholastic success. It involves their grit in facing and solving problems (Fredricks et al., 2004). It also involves students' relationships with their teachers in the learning process. Reflective engagement is related to their reflection after engaging in a lesson. Reflective practice is considered an integral part of learning in the Ignatian Institution (Harendita, Kristiyani, Melissa, & Julie, 2019). Students are encouraged to associate their context, the learning experience, and how to apply the knowledge in real life. They are aware of their learning goals and the progress of achieving the goals.

Some studies have linked the relationship between technology and student engagement. In flipped mathematical classrooms, Steen-Utheim and Njål Foldne (2018) showed how "affective dimension of student engagement is particularly prominent when students reflect upon learning in the flipped classroom". Lee and Walace (2018b) also highlighted the benefits of flipped classrooms for the students. They enjoy learning English and are more engaged in the learning process than the students in the non-flipped classroom. These studies indicate that flipped classrooms engage students' active learning.

However, more investigation should be reported on how flipped classrooms engage Indonesian EFL teacher candidates and prepare them to be tech-savvy when they teach in the classroom. Therefore, this study aimed at investigating the implementation of flipped learning in CALL and how it engages the EFL teacher candidates in learning and implementing digital tools in the workshop.

METHODS

This research aimed at elaborating on how the implementation of mobile-assisted flipped classroom engaged EFL teacher candidates. With this goal in mind, we employed a case study design aiming at giving a holistic description of a case (Ary, Jacobs, & Sorensen, 2010, p. 454). Further Hood (2009, p. 72) pointed out that a case study is "a bounded system consisting of an individual or entity and the context in which social action occurs". We employed a case study as we intended to elaborate on a holistic description of a class as a social community of learners who experienced flipped classrooms in the teacher preparation study program. Furthermore, Davies (2011) mentioned that a good case study uses different research tools to ensure validity. Accordingly, this study collected both quantitative and qualitative data to: (1) explore how web technology in a mobile-assisted flipped classroom was implemented to lead to EFL teacher candidates' engagement in learning, and (2) explain how mobile-assisted flipped classroom is linked to EFL teacher candidates' engagement. To get a holistic view of the study and ensure its validity, we used different data collection procedures, including questionnaires, interviews, and online archives.

Participants

The participants who are involved in this study are EFL teacher candidates who were students of Computer Assisted Language Learning course at Sanata Dharma University. CALL is a 16-week course with 14 meetings for content delivery and 2 meetings for a mid-term test and a final test. Upon completing this course, students are expected to be able to plan and implement quality lessons using technology to support curriculum objectives in the 21st century. It involved 34 participants, 15 male students and 19 female students, who are in the 5th and 6th semesters of their undergraduate education. As seen in Figure 1, the mobile-assisted classroom used Moodle 3.6 which is responsive to mobile phones through the Moodle app and browsers.

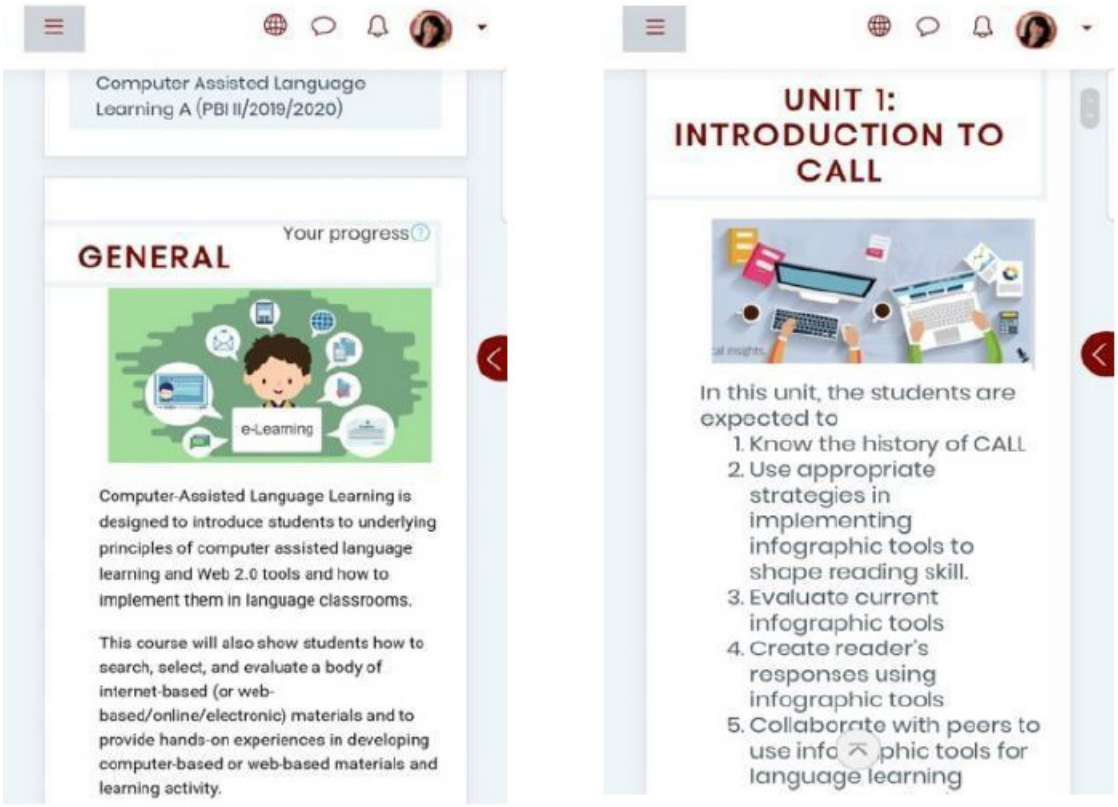

Figure 1. Screenshots of mobile-assisted CALL class

Before conducting the research, we obtained permission from the chair of the study program. We received 29 questionnaires and invited 4 students to join the Focus Group Discussion.

Data Collection and Analysis

This study includes different kinds of instruments to collect different kinds of data to increase the validity of this case study, namely online archives, observations, questionnaires, and Focus Group Discussion (FGD). First, to describe the implementation of flipped learning in CALL, the researchers explored the instructional goals by analyzing the online archives, students' reflections, and the researchers' observations. Secondly, to elaborate on the link between a mobile-assisted flipped classroom and EFL teacher candidates' engagement, the study distributed questionnaires which were developed from library study (Fredricks et al., 2004; Steen-Utheim & Foldnes, 2018) and reviewed by the board of reviewers of Research and Community Service at a private university.

Besides collecting data from questionnaires from 29 participants, we conducted an FGD on 13 June 2019 by inviting 4 students, two of whom with high levels of engagement and the other two with low levels of engagement. First, we describe the means of the survey data to see the dimensions of engagement. We scrutinized the recording of the FGD. As we examined the data carefully, we identified the themes that can be categorized within a comprehensive theory of engagement (Fredricks et al., 2004; Steen-Utheim & Foldnes, 2018). The data were, afterward, translated to English and deductively classified based on the categories of engagement (CE: Cognitive Engagement, BE: Behavioral engagement, EE: Emotional Engagement, SE: Social Engagement and RE: Reflective Engagement) and the source (R1: respondent 1; R2: respondent 2; R3: respondent 3; R4: respondent 4). Multiple sources of data were triangulated to improve the reliability of the study. In a case study, data from different sources are used to mitigate bias (Fusch, Fusch, and Ness, 2018). They further stated that, "Enhancing the validity of the study results through triangulation ensures that one's research is worthy of a contribution to the existing body of knowledge" (p. 29). The findings from the current study were also compared with those of relevant research to get a holistic view of the learners' engagement in a mobile-assisted flipped classroom.

FINDINGS AND DISCUSSION

To answer the first research question, the researcher observed the class and took notes on how a mobile-assisted flipped learning model is implemented in the class. This study described the instructional goals and the materials given in the class learning cycles.

Flipping the class

Flipped learning was conducted in two environments, namely outside and inside the classroom. There must be detailed planning to make sure that learning in both environments were perfectly integrated (Basal, 2015). This section discusses the teacher's role and students' activities in the implementation of a mobile-assisted flipped classroom.

Teacher's Roles

The teacher took the role of the material developer or curator. The teacher designed and developed the materials and activities using various technical media. Using technology in classrooms is not new in the teaching and learning process. Technical tools such as vlogs, videos, blogs, news websites help EFL students to acquire and master four language skills. The mobile-assisted flipped classroom utilized a Moodle 3.6 format which is responsive to mobile phones. Students can get a notification by logging in to the course to join the discussions and online activities.

Because a flipped classroom model requires students to study materials available on the website, watch relevant educational videos, and do the homework, the materials should be ready at the beginning of the semester. The teacher in this CALL class compiled the drafts of the materials before the cycle of the flipped

class. Each unit contains concepts of language learning and practical applications to teach a foreign language. Each unit was explored in two meetings. Table 1 elaborates on the outline of the materials and activities uploaded in mobile-based Moodle.

Table 1. Materials in mobile-assisted CALL class

UNIT	CONTEXT	EXPLORE	LINK		PRACTICE	APPLY
			WORKSHOP	TARGETED-SKILLS		
UNIT 1	History of TELL	History of CALL & criteria of a good app	Canva & Infographic	Reading	Creating an infographic	Making a lesson plan
UNIT 2	Digital Literacy	Digital Immigrant vs. Digital Natives	Youtube, EdPuzzle, and Discussion Forum	Listening	Creating video blog	Choosing the right video
UNIT 3	Gamification	Gamification	Quizizz, Kahoot	Grammar and Vocabulary	Creating an online quiz using Quizizz	Creating language game using Wordwall
UNIT 4	Collaborative activities	Collaborative activities	Google docs, form, and drive	Writing	Collecting data using google form	Designing collaborative activities using GAFE
UNIT 5	Mobile Learning	MALL	Skype and chatroom	Speaking	Having a video conference	Screencasting / Vlogging
UNIT 6	Learning Management System / Developing e-learning	Blended learning	Edmodo and Google Classroom	All skills	Exploring LMS	Planning a flipped learning

As seen in Table 1, the course is both theoretical and practical in nature. The materials in this mobile-based flipped classroom course are divided into 5 sections, namely 1) Context, 2) Explore, 3) Link, 4) Practice, and 5) Apply. The first section, Context, helps students activate their background knowledge related to the material. This section emphasizes how students use previous experiences to interpret and learn from the theory. Students' interpretation of the material can be derived through the context of their past knowledge, known as the "schema." Activating schema is essential to conduct an effective learning process. The second section is Explore which elaborates on pedagogical concepts applied in the area of Computer-Assisted Language Learning. Students are introduced to some relevant theories such as the history of CALL, digital literacy, gamification, mobile-assisted language learning and Learning Management System. The next section, Link, is practical in nature. This section presents information on how to implement the EdTech tool in the language classroom. Practice section is a project-based task where students can apply their knowledge to produce digital content for teaching English. Finally, the section Apply accommodates practice for planning their language classes. Due to their role as pre-service teachers, they need to be able to design lesson plans which integrate language learning and digital content/media.

Additionally, there are two extra sections to help the students reflect on their learning, namely Evaluate and Self-Assess. The section Evaluate guides students to explore some new digital tools which are not mentioned in the LMS and decide if the tool meets the requirements of good learning apps. Technology develops rapidly, and the only constant part is change. Accordingly, we need to prepare our students to encounter this constant change by guiding them in choosing new apps appropriate for EFL learning. Lastly, the section Self-Assess helps them reflect independently on their understanding and check their understanding of the materials learned.

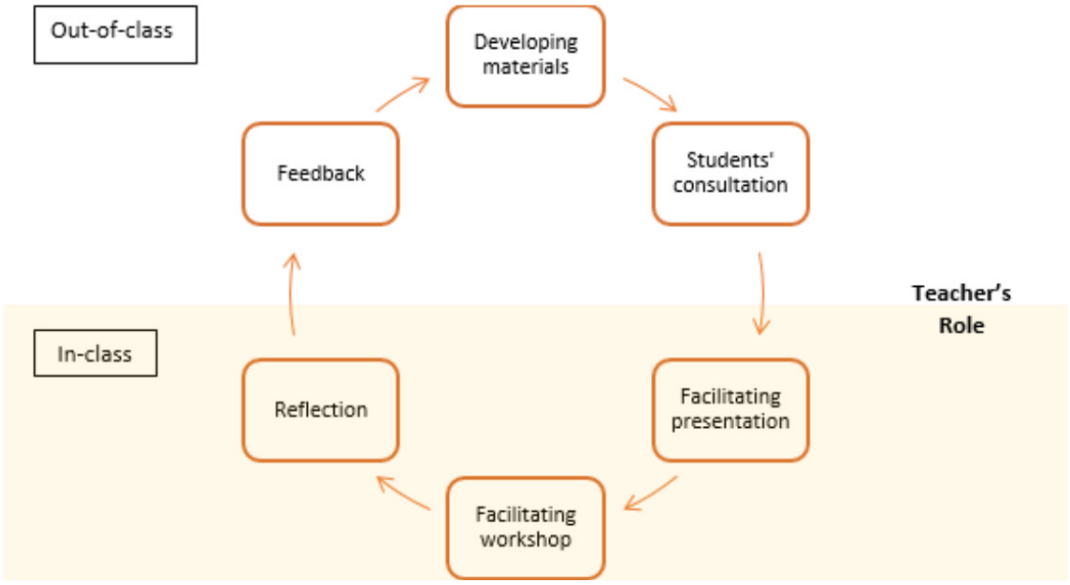

Figure 2. Teacher's role in the mobile-assisted flipped classroom

As seen in Figure 2, besides developing the material in the mobile-based flipped classroom, the teacher provided consultation sessions to avoid misconceptions during the presentations and workshops. This consultation time was essential to ensure that the groups were well prepared in presenting the material to their peers. The teacher's role, therefore, was shifted from "sage on the stage" to "guide on the side" (Gillies, 2006). Teachers are not seen as the main source of knowledge in the class. Students are empowered through this allotted consultation time.

In a mobile-assisted flipped classroom, the teacher also took a role as a facilitator in students' presentations, workshops, and reflection. As a facilitator, first, she gave responsibilities to the students to do the tasks individually and in groups. Secondly, the teacher offers support and advice when the students face challenges in doing the tasks in the workshops. The teacher also helps students evaluate and monitor their learning in the class through reflection. She helps the students achieve the learning goals by being a facilitator.

The teacher helps students monitor their progress by giving feedback and also encouraging peer feedback. Teachers need to ensure that both learnings (outside and inside the classroom) are integrated effectively. Therefore, thorough feedback was needed to check whether the expected goals of learning were achieved by students. Feedbacks were given to both the presentations and projects.

Students' Activities in A Mobile-Assisted Flipped Classroom

With the materials ready in Moodle, the students were expected to read or review the materials before the class. However, difficulties may occur when the students do not do their responsibilities by accessing the materials prior to class activities (Bristol, 2014; Kordyban & Kinash, 2013). Therefore, we allotted consultation time before the group presentation. Students worked in a group of three students to create digital teaching media and deliver presentations. The class activities are group presentations, quizzes, discussions, and digital tools for teaching workshops. Finally, after-class activities are tasks/project submissions, reflections, and evaluations.

The students are grouped into 12 groups with random topics for the semester. This presentation is collaborative in nature, so the students work in groups. A great deal of literature suggests the benefits of collaboration. Coates (2006) highlighted the importance of collaborative learning for classroom engagement. The students worked together with their peers in preparing the presentations. They shared different responsibilities. In the classroom, students also felt less tense when listening to their peer presentations and asking questions to the presenters.

In the pre-study stage, the students consulted their presentation draft to the teacher before their presentation. They revised the drafts by adding or deleting some information and rearranging the order of the presentations. The teacher advised the students to interact with the audience as seen in Figure 3.

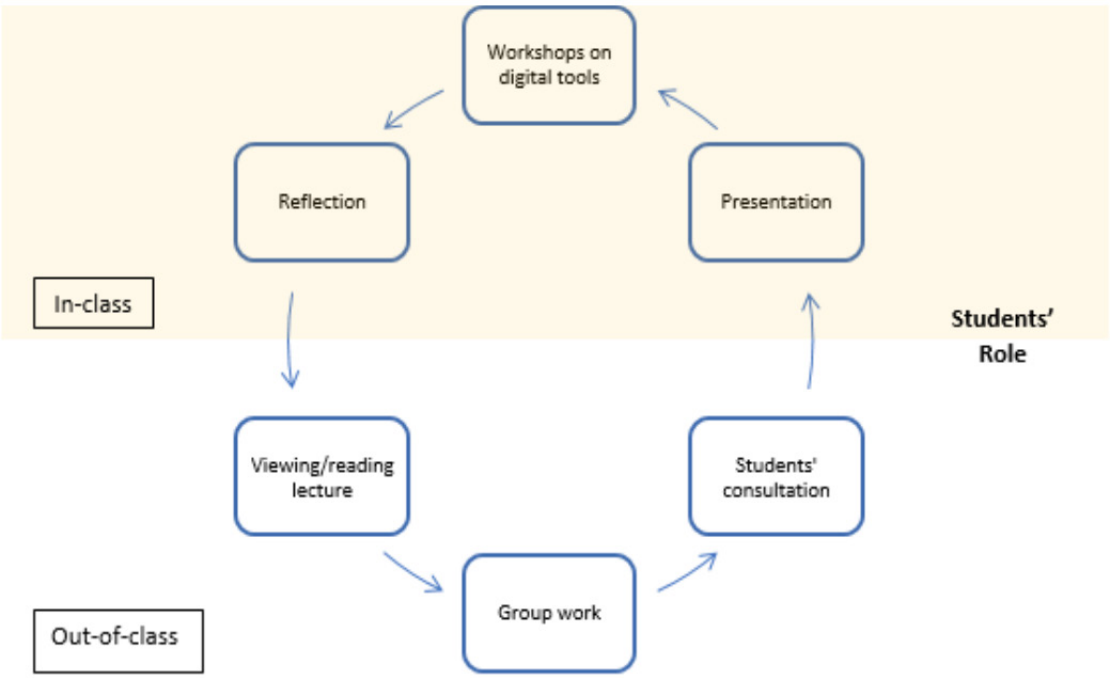

Figure 3. Students' role in the mobile-assisted flipped classroom

In the class, the students presented the theories and digital tools' implementation. Both the lecturer and students participated actively. As seen in Figure 3, after the presentations, the students executed the tasks where the students practice and apply the knowledge gained in groups. The class is ended by reflecting and evaluating the presenters' performance. Students are also encouraged to write reflections to gain an in-depth understanding of the materials and connect them with their context as seen in these students' reflections as EFL teacher candidates:

> I agree that the games can motivate students in learning something. It is because students need the variation of learning. They prefer to learn while playing games rather than just reading the books and doing the exercises. The materials will be accepted easily if students like the things they do.
>
> (Reflection 1)
>
> A part that I want to know more is Gamification Apps for Enhancing and Motivating ESL Learning. As a future teacher I want to know what games that can be used as the media in my teaching activity in the classroom. I have to be aware about the straights and weaknesses of some games in order to prevent some negative effects on my future students.
>
> (Reflection 2)

Students' reflections 1 and 2 demonstrate that the students were aware of the benefits of gamification and learning (Reflection 1) and eager to know more on the topic (Reflection 2). Additionally, they also monitored their friends' performance by completing an evaluation survey administered by using Google Form. They were asked to give their responses on the texts uploaded in the mobile-assisted flipped classroom.

The students were asked to develop various digital media in the presentations or workshops for different language skills (reading, writing, listening, and speaking) and language components (vocabulary and grammar). They developed language learning media by using Canva (for reading), eDpuzzle (for listening), GAFE (for writing), Instagram Vlog or screencast for speaking and Quizizz for vocabulary and grammar. They also made a Google site where they combined their portfolio. One sample of the students' portfolio can be seen in Figure 4 (URL: https://sites.google.com/view/lourdesworkshop/beranda).

Figure 4. An example of a student portfolio

Figure 4 is a portfolio of different kinds of digital tools for language teaching compiled by the student. In this portfolio, they presented various digital media in the presentations or workshops for different language skills (reading, writing, listening, and speaking) and language components (vocabulary and grammar).

Flipping the Class

To answer the question of the research, the researcher developed questionnaires based on different domains of engagement (Fredricks et al., 2004; Steen-Utheim & Foldnes, 2018). Furthermore, the researcher conducted an FGD with four students, who were selected based on their observed engagement in the class. In the FGD, the participants revealed the possible connections between a flipped learning model and their engagement as well as how it prepares them to use technology in teaching.

The data from the questionnaire show that the students have positive engagement in the flipped classroom (M=3.98). Their engagement in the class can be broken down into several types of engagement as seen in Table 2.

Table 2. Types of EFL teachers' engagement

Types of Engagement	Means
Emotional engagement	4.1
Behavioral engagement	3.9
Cognitive engagement	4.2
Reflective engagement	4.0
Social engagement	3.5

The data show that the students experience five aspects of engagement. Table 2 shows that students are engaged cognitively (M=4.3). The possible interpretation is that students are able to achieve the learning goals by being able to integrate technology in teaching practice. The next one was emotional engagement (M=4.1). Students were motivated to use technology in the classroom. The reflective engagement is also positive (M=4.0) as students were aware of the importance of using technology. Students also show positive social engagement and behavioral engagement.

Emotional engagement involves students' reactions towards their classmates, teachers, academics, and schools (Fredricks et al., 2004). How students actively engage in the classroom influences their motivation in the learning process. Table 3 summarizes students' emotional engagement through the following statements:

Table 3. Emotional engagement

No	Statements (S)	Means
1	I enjoy using technology for teaching and learning English in the classroom.	4.5
2	I am confident to use technology for teaching and learning in the class.	4.1
3	I avoid using technology for teaching and learning English.	3.9*
4	I am excited to discover digital tools for teaching and learning English.	4.4
5	I am anxious (afraid) to use technology for my projects after the class.	3.6*

Table 3 shows that students tend to engage emotionally (average mean=4.1). They enjoy (S1), feel confident (S2), and excited (S3) to use technology. The inverted statements (S2 and S5) show inverted scores. From the mean score, students did not avoid and were not anxious about using technology. Academic engagement empowers students to develop greater students' well-being (Pietarinen, Soini, & Pyhalto, 2014). Having engagement, the students were motivated in participating in the class as seen in the FGD. The data from the FGD demonstrate that students are positive in experiencing mobile-assisted flipped classroom, as seen in F1 (FGD Data 1) to F6.

1. [The CALL class is] … exciting because the teacher asked us to read [the materials], but I did that some minutes before. (FGD_R3)
2. I like the presentation variation. When we have a presentation we talk about the class' materials. But when we have workshop, we make something new that can be applied [in class] (FGD_R4)
3. I feel comfortable because I must prepare the presentation. (FGD_R4)
4. I felt anxious when presenting the materials. But after presenting, I felt glad. I felt ready, because I have understood. (FGD_R1)
5. I enjoy using the browser, because I am used to using the old version of Moodle. (FGD_R2)
6. I enjoy that this week is presentation [of the theory] and next week is the workshop. After learning the knowledge, we applied it in workshop. We learnt to link the language skills and the tools. (FGD_R4)

The adjectives in the data, namely *exciting, like, comfortable, glad, and enjoy* in the data demonstrate positive feelings toward the class, the activities, and the tools. Students' statements show that the emotional dimension of engagement leads to enjoyment (Daniels, Adams, & Mccaffrey, 2016) and motivation (Fredricks et al., 2004). Flipping the class enabled them to be more prepared in the class since they knew what they would learn in the lesson.

Daniels, Adams, and McCaffrey (Daniels et al., 2016) also suggest that engagement leads to more effort, which is considered in the behavioral domain of engagement. Behavioral engagement includes students' participation such as asking questions and participating in the discussion (Fredricks et al., 2004). It is related to their habit in the class and outside the class. Research also included persistence and focus on academic tasks (Cooper, 2014; Yazzie-Mintz & McCormick, 2012). The following values from the questionnaire show EFL teacher candidates' behavioral engagement.

Table 4. Behavioral engagement

No	Statements (S)	Means
6	I preview the materials before the class.	3.2
7	I discuss the materials with my friends and lecturer.	3.8
8	I am attentive to my teachers' instructions.	4.1
9	I do the projects by applying the knowledge obtained in the class.	4.0
10	I access the materials although it costs me my phone Internet data.	4.4

Although the overall score in the data is positive (mean=3.9), the findings show that some students were not accustomed to preparing the materials before the class (S10, mean=3.2). However, Table 4 shows that students

tend to engage by discussing the materials, being attentive to the instructions, doing the projects, and accessing the online materials for the class. The data confirmed that students participate in class activities (Cooper, 2014; Yazzie-Mintz & McCormick, 2012). The FGD shows how they participated in and outside the class.

7. Engaging and new because I think flipped [classroom] is ideal. Since High School we were taught without a textbook, so we learnt without preparation. In this course, we have the materials, so we can read. If we were absent we could read the materials by ourselves. (FGD_R4)
8. I accessed the site 30 minutes before the class. (FGD_R3)
9. [the materials] are varied because we can read and listen to the presentations. (FGD_R4)
10. I read [the materials] the night before so I can make some connections with the presentation. I am sure that the information is more complete in the reading materials. (FGD_R4)

From the text in bold, it was revealed that the students show behavioral engagement in terms of reading the materials outside the class in advance of class meetings (Basal, 2015; Webb, Doman, & Pusey, 2014; Wulandari, 2017). F7 suggests that the students think being able to prepare for the materials before the class is ideal. She also added that students can still follow the materials when they were not able to attend the class on a particular day. From F8 and F9, it was found that students exhibited behavioral engagement by both reading the materials and listening to their friends' presentations. Although some students did not preview the materials, they engaged with the lessons by listening to their friends' presentations.

Cognitive engagement talks about the students' scholastic success as it involves their grit in facing and solving problems (Fredricks et al., 2004). It shows how students invest their time and energy to gain certain skills and knowledge. The participants show their cognitive engagement through the following statements:

Table 5. Cognitive engagement

No	Statements (S)	Means
11	I can integrate digital tools in the lesson plan.	4.1
12	I can assess the use of digital media for learning.	4.3
13	I understand how to utilize technology in teaching practice.	4.0
14	I realize that the knowledge of technology and teaching language skills will be useful for my teaching career in the future.	4.7
15	I am aware of my learning goals in this class.	4.1

The students experienced cognitive engagement as seen from the average means of this variable (mean=4.2). They gained the knowledge to integrate digital tools in lesson plans (S11), the skills to assess digital tools for learning (S12), and skills to integrate digital media in the lesson plan (S13). This cognitive ability is required by the teacher to teach digital natives (Wulandari & Pasaribu, 2020). They are also aware of these skills and knowledge in the class (S14 and S15). The FGD confirmed these statements.

11. I'm so familiar with the techs to help us teach. I wrote a final paper about technology. (FGD_R1)
12. I use technology in my tutor class. They are excited. (FGD_R3)
13. After CALL class, I could make a quiz. (FGD_R3)
14. The class helps me evaluate the learning materials, like the use of the application with statistics to know the development of our students. (FGD_R1)

Daniels et al. (2016) mentioned that cognitive engagement includes the "investment put into thinking about their tasks". The data from the discussion confirmed that the students understood how technology helped them in teaching (F11), implemented digital tools when teaching (F12 and F13), and evaluated the online materials (F15). The students exercise their thinking skills by understanding, applying, and evaluating the tools learned in class.

Furthermore, students also reflect their reflective engagement as it is an integral part of learning in an Ignatian institution. We collected the data from an Ignatian university which put a high value on reflections. Harendita et al. (2019) highlighted that "reflection is an attempt to understand more deeply what has been

learned. Educators lay the foundations for learning how to learn through involving students in reflection skills and techniques. Students are encouraged to associate their context, the learning experience, and how to apply the knowledge in real life". The data in the study show that the students were aware of their learning goals and the progress of achieving the goals. The participants show their reflective engagement through the following statements. The following values from the questionnaire show their behavioral engagement.

Table 6. Reflective engagement

No	Statements (S)	Means
16	I monitor my own progress through feedback and grades from the lecturer.	3.8
17	I am aware that I have to prepare the materials before the class.	3.8
18	I am aware that my engagement in the class will support learning effectiveness.	4.1
19	I am aware of the difficulties I face in the class.	3.9
20	I am aware that the project will help me understand the materials in the future.	4.3

This study agrees with Spalding and Wilson (2002) who proposed that writing reflections engage students with the learning activities. The data from the questionnaire in Table 6 present the students' evaluation (S16) and awareness (S17, S18, S19, S20). The mobile-assisted flipped classroom is designed to enable students to reflect on the topics, materials, and activities designed.

15. I reviewed my previous projects. I reviewed them before making the portfolio. (FGD_R3)
16. I am aware of what would be discussed in CALL, I should have been more prepared to understand better. (FGD_R3)
17. I become more aware. Before I blamed my teacher when I didn't understand the materials. After all, we have the obligation to exercise independent learning. (FGD_R4)
18. The LMS has personalized feedback because we all got feedback. (FGD_R4)

This kind of engagement also emerged from the FGD. The students demonstrated reflective engagement by reviewing previous projects (F15), acknowledging the importance of preparation, being more aware of one's responsibilities (F16 and F17). This experience is possible because they get personalized feedback from the mobile-assisted platform (F18). Students were able to get feedback in the form of comments and grades on their digital media and presentation from their peers and teachers through their mobile devices.

Finally, the students also show social engagement by doing group work or group discussion. Pasaribu (2020) mentions that students show online and offline engagement which might be influenced by their belief in *gotong royong* or mutual cooperation. Table 7 shows that students scored the lowest in giving comments to friends' posts because they tend to go offline to ask questions and discuss the projects.

Table 7. Social engagement

No	Statements (S)	Means
21	I give comments to my friends' posts.	2.7
22	I ask questions to my friends and teachers when I face problems.	4.0
23	I participate actively in the classroom discussion.	3.4
24	I appreciate my friends' and my teachers' comments.	4.5
25	I read my friends posts outside the class.	3.4
26	I ask questions to my lecturer outside the class	3.1

Digital tools enable students to engage both offline and online through technology. However, they tend not to give comments to their friends' posts (S21) in an online environment because they prefer to have direct discussion with their friends. We can also see in the questionnaire that the students valued both their teacher

and peers' comments (S24). The flipped classroom enables students not only to participate in the class discussion but also to read students' posts and ask teachers outside the class.

19. Learning in groups helps us to improve collaboration skills. It is useful for our future at school or the company. (FGD_R1)
20. The online group work is usually done through WA, but we discuss it directly after the class. (FGD_R4)
21. Sometimes we want to be practical, so we distribute the materials, but we only learn about our own part. Usually, there is a leader who understands the whole picture. (FGD_R4)
22. When we had our presentation for the first time, we read Moodle. Al understood the materials better, so he explained them to us. When I understand the materials better, I will explain them. So, we complete each other. (FGD_R3)

The FGD also shows how students exercise their collaboration skills (F19) through *Whatsapp* and offline discussion (F20). However, some also experienced social problems since not everyone is well-prepared for projects or group work (F21). But one student highlights their social engagement by saying that they help each other after reading the materials from Moodle (F22). The data confirm that flipped classrooms facilitate different kinds of media to engage socially. It aligns with an argument highlighted by Rennie (2008) that eLearning should engage learners socially. However, in this flipped classroom there is a gap between the act of giving online comments and the appreciation of receiving online comments. The act of giving online comments seems to be rated lower than the appreciation of receiving comments. This gap emerges as students tend to have direct discussion since they can receive instant responses.

This study has discussed the implementation of a mobile-assisted flipped classroom that leads to EFL teacher candidates' engagement. From the above-mentioned elaboration, we noticed that as the teacher provided different modes of learning and interactions in the mobile-assisted platform, the students demonstrated all dimensions of engagement. The discussion highlights that the implementation of the mobile-assisted flipped classroom for EFL teacher candidates in the CALL class helps them gain technological knowledge and skills then apply them in the learning environment as they choose, integrate and evaluate tools for language learning. It agrees with Gonen (2019) who found qualitatively that pre-service teachers experience the benefits of using digital tools in improving IT skills and classroom atmosphere. Teacher candidates enjoyed the contents in the mobile-assisted flipped learning as they were presented in different formats, which accommodated their learning styles and strategies. Besides, the students were able to participate actively as they applied their knowledge in different kinds of digital projects. The students were familiar with the benefits of reflective practices in the university and through the implementation of a flipped model, the students were more able to reflect on the learning materials. The teacher can also follow students' reflection directly from the online platform. Furthermore, the students can always access the materials, their progress, and the evaluation which makes them abler to monitor their progress.

However, it is important to note that not all students came to the class prepared. Some had not read or viewed the materials before the class. Reading without direct supervision from the teacher might be difficult for students who were dependent on constant direct supervision. Due to the long-established prevalence of teacher-centeredness in the Indonesian context (Masduqi, 2014), it is a challenge to make students well-prepared before the class. One way to deal with this is that the teachers need to provide a consultation time/reminder outside the class to check whether the learners were well-prepared. Teachers must encourage learners to fully maximize the available resources in flipped classrooms. Another noteworthy finding was that although the students did not rate the social engagement in the online platform as high as the emotional, behavioral, cognitive, and reflective engagement, the results of the FGD demonstrate how they valued the importance of collaborative work. They did not comment or discuss the task in the Moodle since they preferred face to face discussion or discussion through Whatsapp after the class. The learners tend to have direct meetings with the lecturer at the consultation time and discuss the tasks directly with their friends prior to the class.

CONCLUSION

Although this study is limited in size, some findings should be highlighted. First, the mobile-assisted flipped classroom in CALL class is both theoretical and practical in nature. The teacher was responsible for providing content materials, activities, offering consultation time before the class, facilitating in-class activities, and giving feedback. The contents or theories in the form of videos, infographics, and documents materials were uploaded before the class for the students to access. The class activities and practical instructions were designed and developed using various technical media. The students were required to read the materials before the class, work in groups to complete the tasks, consulting their works, and reflecting their learning. The data from observations, questionnaires, and focus group discussion show that the flipped course leads to emotional, behavioral, cognitive, social, and emotional engagement in learning. EFL teacher candidates were given opportunities to discuss theories on educational technology and integrate digital tools in learning throughout the study. Throughout the class, they enjoyed experiencing the integration of technology in teaching and learning, which is relevant and applicable for their teaching practices. Moreover, the participants of the study underlined their cognitive engagement in understanding, applying, and evaluating the digital tools for language learning and teaching. Through the implementation of the flipped model, they were more able to exercise behavioral engagement by participating actively in the class, although the data required teachers to investigate more ways to encourage students to be more well-prepared by reading the materials before the class. They also showed reflective engagement throughout the study by monitoring their learning through feedback given personally by the lecturer. It is also evident from the data that students have the spirit of gotong royong or mutual collaboration in doing the tasks, although they prefer to communicate face to face, right after the class, rather than to communicate virtually.

Based on the above-mentioned discussion, we put forward some recommendations for teacher preparation programs. First, the programs should provide opportunities for teacher candidates to have hands-on experience in integrating technology in learning and teaching. Secondly, mobile-assisted flipped instructions are effective for teacher preparation programs as it fosters different dimensions of engagement. Thirdly, the lecturers should facilitate mobile-assisted flipped learning by providing content materials, activities, offering consultation time before the class, facilitating in-class activities, and giving personalized feedback. We also recommend that teachers develop more interactive online discussions to support their social engagement in learning. The findings of this study should be viewed within its limitations in scope. This study involved 29 EFL teacher candidates who were equipped with digital facilities, including computers and Internet access in a computer laboratory. Other research with a more diverse population could be conducted in the future to increase validity. Investigations on engagement in full online instructions in Indonesia should also be investigated further.

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DISTANCE EDUCATION EXPERIENCES OF SECONDARY SCHOOL MATH TEACHERS DURING THE PANDEMIC: A NARRATIVE STUDY

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ABSTRACT

All schools in Turkey have quickly entered into the process of distance education because of the Covid-19 outbreak. In this process, mathematics teachers have become an associate of this process to teach math lessons at a distance. The subject of the current study is the experiences of teachers in this process of distance teaching of math, which is a compulsory subject in all secondary schools. The participants of the current study designed as a narrative study are 15 math teachers experienced on the subject. As a result of the study, a total of five super-themes emerged. The first super-theme includes codes related to the general structure of the math course. The second super-theme is theme of hardware and Web 2.0 tools. This sub-theme includes codes related to their experiences of EBA TV, EBA Internet and other alternative tools of distance education. The third sub-theme is the Socio Cultural super theme. This theme is consisted of sub-codes including political issues, state of the student, state of the parent and socio-economic situations. The fourth sub-theme includes the codes related to psychological states arising from the extraordinary situation emerging in the pandemic (period of pandemic, cyber bullying, emotional links). The fifth sub-theme is related to the readiness of teachers.

Keywords: Pandemic, Covid 19, math teachers, narrative study.

INTRODUCTION

In the history of the world, humanity has faced many pandemics. Some of these pandemics are plague known as Black Death, smallpox, cholera, SARS, MERS and Ebola. Besides losses on a national and international level, pandemics affect countries in many ways. The new type of Coronavirus pandemic, which is thought to have emerged as of December 2019 and named as COVID-19, has spread across the world and affected almost all countries in many ways from health to economy, education to transportation. COVID-19 is a new type of infectious disease caused by severe acute respiratory syndrome coronavirus (Setiawan, 2020). With the rapid spread of the highly contagious COVID-19, countries have applied social isolation and quarantine measures to reduce the spread of the virus. Although it is known that the age group 65 and over is the age group most vulnerable to the COVID-19 pandemic, it is considered important to apply social isolation to children and adolescents, as the disease is also seen in children and adolescents and they are considered to be a carrier of the disease (Ustun &Ozciftci, 2020). Thus, school environments where hundreds of children and young students come together have become dangerous places where the disease can spread rapidly (Sintema, 2020). For this reason, because of the COVID-19 pandemic, schools in all levels from pre-school to higher

education have been closed in 191 countries worldwide and more than 1.5 billion students have been away from the school. However, in order for the education of students not to be hindered, countries started to search for solutions and found distance education as the easiest and most feasible solution to ensure the sustainability of education (Ustun &Ozciftci, 2020; Telli Yamamoto & Altun, 2020). Telli Yamamoto and Altun (2020) define distance education as a modern and effective form of learning that can be offered regardless of location and time, allowing individuals to structure educational materials electronically and integrate different technologies into the learning process. Zhou, Wu, Zhou and Li (2020) state that distance education refers to the method of content dissemination and rapid learning through the application of information and internet technologies.

Distance learning, which is independent of time and place, has gained great importance with the closing of schools and introduction of various restrictions during the COVID-19 pandemic. In this sense, it is thought that the best way to deal with COVID-19 and even the only solution is distance education for many countries worldwide (Moreno and Gortazar, 2020; Telli Yamamoto & Altun, 2020). With the closing of schools, UNESCO recommended the use of open educational practices and platforms for education of students not to be hindered (Setiawan, 2020). In addition, they shared 10 suggestions to ensure the continuity of education: (1) Examine the state of readiness and select the most appropriate tools, (2) Be sure of the comprehensiveness of distance education programs. (3) Pay attention to confidentiality and security of data. (4) Give priority to solutions for psycho-social difficulties before teaching. (5) Plan the schedule of distance education programs. (7) Provide support for teachers and families with the use of digital tools. (8) Blend the suitable approaches and limit the number of applications and platforms. (9) Develop rules of distance learning and monitor the learning process of students. (10) Set the time for the units of distance education according to students' self-regulation skills. (11) Create groups and develop connections (UNESCO, 2020).

When all these suggestions are considered, it is seen that the main emphasis is put on the planning of technology use according to the digital skills of the teacher and students and the internet infrastructure and ensuring students' access to distance education programs. In this connection, it can be suggested that tools in computer laboratories can be temporarily shared with families. Another point emphasized is the protection of the confidentiality of the data. Then, it is emphasized that when students are isolated, groups can be formed to help them cope with psycho-social difficulties they encounter. Determination of the time and goal of distance education programs is also emphasized. It is also stated that determination of the rules of distance education together with parents and children is important. Finally, the necessity of allocating time suitable for the level of students to live broadcast lessons is pointed out and it is recommended to devote 20 minutes at most to a lesson for primary school students and 40 minutes at most to a lesson for middle school students (UNESCO, 2020).

In the relevant literature produced during the pandemic, Setiawan (2020) aimed to design and apply scientific literacy worksheets to primary school students during the period of COVID-19. It was stated that these worksheets, which are not very different from the activities in the school, were prepared to guide distance learning. The study group of the research is comprised of 35 primary school students receiving distance education due to COVID-19. When the research on distance education in the period of Covid-19 is reviewed, it is seen that most research has been done on education in health sciences. Chick, Clifton, Peace, Propper, Hale, Alseidi & Vreeland (2020) investigated the distance education applications in the training of surgery assistants during the COVID-19 pandemic. The study focused on flipped classrooms. Conferences were given to the surgery assistants in flipped classrooms. In another study conducted on education in health sciences, Ng and Peggy (2020) focused on the visual classroom education approach to be used in clinical nursing training. The study suggests a 3-step virtual classroom training approach to support nursing educators in enhancing online theoretical hand hygiene. Murphy (2020) evaluated distance education applications in the context of the Copenhagen School and the Securitization Theory during the COVID-19 pandemic. According to Murphy (2020), while public health officials are struggling with pandemics within the scope of social isolation measures, e-learning applications will not cause a change, but will limit only face-to-face classroom interactions.

Arguing that the closure of schools and the transition to distance education have socio-cultural effects, Van Lanker and Parolin (2020) stated that the closure of schools during the pandemic affects the education of

80% of the children. They said that long-term closure of schools and transition to distance education may have harmful social and health consequences for poor children. First of all, it is suggested that for many students living in poverty, schools are not only a place for learning, but also for a healthy diet. With the closure of schools, many students are thought to have lost their healthy diet. The "food insecurity" that occurs as a result poses a risk for the mental and physical health of children. On the other hand, in Europe where online learning environments generally require a computer and a secure internet connection, a significant number of children live in homes that do not have the appropriate place to do homework (5%) or do not have internet access (6.9%). In another study with similar results, Alpago and Alpago (2020) investigated the socio-economic outcomes of the coronavirus epidemic, and stated that the use of digital education options differs by regions and individuals with different economic conditions. While it is emphasized that digital platforms such as Facebook, WhatsApp and Google have the potential to open online education schools, rural schools in rural areas and families living in houses with a lack of technical infrastructure may be negatively affected by this situation. Zhou et al. (2020) focused on the "School's Out, But Class' On" project launched by the Chinese government. The focus of this project is an online teaching path aimed at broad-based learning. According to Zhou et al. (2020), broad-based online educational activities need to be guaranteed by a well-established Internet infrastructure, and without this strong infrastructure, large-scale online educational activities cannot be carried out. And it is stated that China has guaranteed large-scale online educational applications as a result of thirty years of work to establish the necessary internet infrastructure.

Along with the compulsorily initiated distance education process, many courses are carried out in online learning environments and using various teaching management systems. Many students and teachers have faced such a situation for the first time. Although the increase in online learning opportunities makes it possible for students to access online courses, this rapid growth also brings quality problems (Ferguson, 2020; Patterson & McFadden, 2009). This holds true for mathematics education. Xu and Jaggars (2014) stated that for students it is more difficult to be successful in online math lessons than face-to-face lessons. When the existing research is examined, it is seen that online learning environments are at least as effective as face-to-face learning environments and although there are many benefits for both students and teachers, this seems not the same for mathematics lessons (Ferguson, 2020). In their qualitative study on math teaching, Ferguson and Smith (2005) stated that teaching mathematics in e-learning environments does not work very effectively. The results of their study revealed that there are real difficulties in online math classes.

There are two extreme views regarding the conduct of all mathematics courses online. One view argues that it will be effective to have the lessons completely online while the other states that it is not possible to conduct an effective mathematics teaching completely online (Trenholm, Peschke & Chinnappan, 2019). Trenholm et al. (2019) emphasized that although in the studies comparing face-to-face and online mathematics lessons, it is claimed that there is no difference in terms of teaching and learning, this claim is incomplete because in these studies, the success criteria consisted of the results produced by tests. In addition, in these studies the success is not clearly defined and whether the tools used are reliable or valid is not clearly stated. This is not effective and sufficient to interpret the nature of learning (Parker & Gemino 2001; Micari, Light, Calkins, & Streitwieser. 2007). Based on this, Trenholm et al. (2019) stated that online learning is still very new and should only be used to support face-to-face learning.

Given the delineations above, it can be said that teachers and students are the people most affected in the distance education process, which was mandatorily initiated because of the pandemic. The studies in the relevant literature seem to be largely focused on students, learning process and the determination of the existing state. Thus, how this process works in terms of mathematics education is one of the subjects that should be investigated. As the most important element of the process, teachers' experiences and observations in this process are also important. Therefore, a study aiming to reveal what the teachers have experienced as a result of the pandemic can help fill the void in the literature. In addition, with the current study, it is aimed to take a detailed picture of the distance education process in this extraordinary period from the perspective of mathematics teachers. In this regard, the purpose of the current study is to investigate math teachers' experiences.

The review of the literature should be up-to-date, comprehensive and address the need for the manuscript. should be up-to-date, comprehensive and address the need for the manuscript.

Paragraphs should be neither too long nor too short; each paragraph should be longer than a single sentence but no longer than one manuscript page. The manuscript should be prepared according to the Publication Rules of the journal. The style of the text should be 11 Point Adobe Garamond Pro, Black and Regular**.**

All figures should be numbered using Arabic numerals. Figures should always be cited in text in consecutive numerical order. Figure parts should be denoted by lowercase letters. Each figure should have a concise caption describing accurately what the figure depicts. Captions should begin with the term Figure and continue with a figure number. No punctuation should be placed at the end of the caption. The authors should identify previously published material by giving the original source in the form of a reference citation at the end of the figure caption. Figure size should fit the column width of the journal..

METHOD

The purpose of this narrative study is to explore the experiences and difficulties of teachers who had to be suddenly involved in a distance education process in line with the measures taken during the period of the epidemic in Turkey. In this context, the study was designed according to the narrative research model, one of the qualitative research models. Narrative studies are specialized studies including the analysis process of life stories (Clandinin and Connolly, 2000). According to Creswell (2013), narrative studies focus on the stories narrated by individuals and the experiences they have lived.

The current study aims to understand the story of teachers involved in the process of distance education without having much experience about it and to investigate their experiences on the basis of their stories. Therefore, the current study was constructed as a narrative study.

The Situation in Turkey and Participants

The first Covid case was announced in Turkey on March 11, 2020. Then as in the rest of the world, formal education was suspended until 30 April 2020 with the announcement made on Thursday, March 12, 2020 within the scope of the health measures taken in the country. As of March 23, 2020 all students in Turkey have been involved in distance education primarily through EBA TV and EBA Web. Then, with the increase in the number of cases, the process of suspension of the formal education at schools was gradually postponed to 15 May, and then it was announced that schools would not be opened in this term (MEB, 2020).
As summarized above, it is seen that all teachers and students entered this process without any preparation as a result of the measures taken during the epidemic. After the statement made on Thursday, students and teachers who went to their schools for the last time on Friday left the schools think that they would return to school soon. In Turkey, 3.2 million students and hundreds of teachers experienced a sudden and huge change in their lives and accordingly in their education lives. All teachers and students tried to adapt to the distance education process that started firstly via EBA TV and EBA Web within a week they spent at home. EBA TV is a television broadcast with short lectures at different times. In these video broadcasts, teachers often deliver the 20-minute lesson in the form of lecture. EBA Web, on the other hand, is a website which is designed for computer-assisted teaching and where each student can have access to content over the internet. Teachers and students access the website with their own passwords and usernames. Teachers can allow students to have access to any course content on the system. These contents include video-based animations, game-based activities and worksheets with math problems. Teachers can monitor students' progress by following their individual studies on the web.
Chain sampling was used in the current study. Chain sampling is one of the purposive sampling methods. In this sampling method, it is started with a person who meets the criteria determined and other people who are recommended by this person and meet the criteria are added to the sample (Patton, 2018, p. 237). A total of 15 teachers participated in the current study. All the participating teachers are the graduates of secondary education math teaching departments in education faculties of good universities of Turkey. The professional experience of the teachers vary between 1 year and 15 years; that is, all the participating teachers graduated from their faculties after 2005, which means that all of them were introduced to the computer and technology at early ages. All the teachers are working in the state schools of the Ministry of National Education. All the teachers took at least one computer-assisted mathematics education course during their undergraduate education. All the teachers participating in the current study define themselves as prone to

technology and voluntarily involved in the study on the recommendation of another teacher friend. All of the teachers are known as positive and hardworking teachers who try to reach their students in the distance education process. Therefore, the criteria used in chain sampling are; years of teaching experience (1-15 years of teaching experience), being prone to technology, positive opinions and recommendations of other teachers, volunteering, mastery on EBA TV and EBA Web contents, and being a stakeholder in the distance education process.

Data Collection, Analysis and Coding

The data of the current study were collected by telephone in April 2020. In the data collection process of the current study, a semi-structured interview form was developed and an approximately 25 min. ongoing interview was conducted with each participant. In the interview form, there are items to elicit the participants' experiences of distance education in the period of the epidemic. The interviews were recorded with a voice recorder. While conducting the interview, the researcher tried to follow a systematic way. At the end of each interview, a preliminary analysis was conducted and researcher notes were taken. When needed, the interviewees were re-contacted. The data obtained from the interviews were transcribed simultaneously with the data collection process. These transcripts were coded by using Maxqda program and analyzed by using the content analysis method.

Credibility, Transferability and Dependability

In order to ensure the dependability of the study, the researchers analyzed all the data in two different time periods individually and then compared their analyses. After all the codes were established, the sub-codes were determined and then the codes were revised. In order to ensure the credibility of the study, while developing the interview form, a conceptual framework was created by examining the relevant literature. While these interviews were going on, the data obtained from the interviews were confirmed by the participant confirmation method by asking questions such as "is it like this?", "have I understood correctly?" After the interviews, the participants' statements were analyzed and these analyses were confirmed by the participants and finally, all the data were first analyzed by the two researchers together and then individually. In order to ensure the transferability of the study, the findings obtained in the data analysis are given in detail by the direct quotation method without any comment. What has been done in the process is explained in detail. In order to ensure the dependability of the study, the raw data and analyses obtained are stored by the researchers so that they can be examined by others for a possible confirmation in the future.

In terms of ethical dimension, the most important priority of the researchers is the confidentiality of the participants. The content of the study and the research questions were shared with the participants by e-mail before the interview. The participants were verbally re-informed about the study's framework and ethical codes before the study and their consents were gained through voice recording. After the completion of the reporting process, the full text was shown to the participants and the publishing process was initiated after their approval was received. All the participants are coded as T1, T2, T3 and no data is given within the study to reveal the identity of the participants.

FINDINGS

As a result of the analysis of the interviews conducted with the participants, "five super themes" emerged. Super-themes contain different codes in themselves. Related codes come together to form super-themes.

The first super-theme includes codes related to the general structure of the math course. The second super-theme is theme of hardware and Web 2.0 tools. This sub-theme includes codes related to the teachers' experiences of EBA TV, EBA Internet and other alternative tools of distance education. The third sub-theme is the Socio-cultural (Inequality of opportunities) super theme. This theme is consisted of sub-codes including political issues, state of the student, state of the parent and socio-economic situations. The fourth sub-theme includes the codes related to psychological states arising from the extraordinary situation emerging in the pandemic. The fifth sub-theme is related to the preparedness of teachers. Opinions of each participant can be included in more than one code and super-theme. After the findings of the current study were analyzed as a whole, they were separated into themes and reported.

First Super-theme- Delivery of Math Class

In this super-theme, opinions from 15 participant teachers are given. In this context, the teachers' opinions about live lesson content in their distance education experiences were collected. These opinions were gathered under the codes such as problem solving, classroom discourse, using materials and different teaching methods. These codes are explained in the order specified above.

The Problem Solving

The problem solving process is undoubtedly one of the most important components of mathematics teaching. Teachers emphasized that students' problem solving experiences were restricted especially during the distance education process. The teachers stated that in all the lessons delivered over EBA TV and EBA Web, students were put into a passive position.

> *The greatest harm has been given to mathematics in this process. In mathematics, the child should write the question and think over it. He/she should solve it step by step, try to solve it. He/she should think about it. He/she should discuss the problem with others, should listen to others' opinions. If it is necessary, we need to explain it step by step. It does not happen so in this process. There are videos in the internet and on TV. They watch the video like watching a film. He/she should be personally involved, solve the problem, think about it. He/she can watch videos to see his/her shortcomings but only after he/she has solved the problem; in my opinion, mathematics cannot be learned from TV or videos. It does not happen without thinking and using pencil. Mathematics is a mental process not a film. The student just watches it. (T1)*

> *Mathematics requires students to make efforts. They need to solve problems. In this process, particularly in the parts involving learning from TV, they just listen from TV. They are passive. Even if I teach on TV, the same will happen; they will just listen. Lessons are visualized but there is no mental process involved. The student needs to spend time with mathematics; in the application stage; in the problem solving stage. Thus, some time needs to be given to students; the teacher needs to be with them. But here we cannot give time. Does the child solve the problem by pausing the videos? What will the child do? In distance education, it is also difficult to manage time. Time is more limited in distance education. (T9)*

> *Mathematics is not verbal. It does not occur in the form of lecture and show. In this process, the only technique used is presentation. We use free applications. There, limited time is given. I solve the problem on the screen and students watch me solving the problem. Therefore, we feel really restricted. I think I cannot give enough time. Live lesson environment is not like face-to-face teaching at school. I am lecturing and students watch the video; this is not mathematics. The student should solve the problem and I need to watch him/her solving the problem and I need to intervene when needed. In Zoom, students respond altogether. For example, one student says I have done it by writing on Chat but I cannot see what he/she has done. In this process, I am not next to the student, I cannot see what he/she is doing, whether he/she is doing true or false and where he/she has a difficulty. Otherwise, he/she would easily progress easily with my help. Here, as students are in a group and I cannot see them as I see in the class, I cannot intervene with individual students. If I ask many questions to a student, he/she may feel worried. (T5)*

Classroom Discourse

In the interviews conducted with the teachers, the teachers stated that they had difficulty in establishing mathematical communication with students especially in the live lesson process in distance education. The teachers emphasized that classroom discussions are not sufficient and productive.

> *Mathematics is a subject against which students are already prejudiced. You need to establish an emotional contact with the student. When it is face-to-face, you can talk their language and you catch them. You get feedbacks from students and you can involve them in the process. In a face-to-face lesson, there occurs classroom discussion and communication. This is the most important thing. In this way, they are only listening in the synchronous lesson; if you allow them to speak, then it leads to confusion. We cannot turn on the voice for all students. There are very creative children; children offering different solutions and ideas. Even I get very surprised sometimes as they find a different solution from a different perspective. Thus, there is no interaction in a live lesson because they are just listening. (T4)*

When you say "you understand?" in the classroom, sometimes there is no sound, but we can understand whether they understand even from their facial expressions. You see everyone on these kinds of screens, but you can't notice everyone, you can't focus. They are also hesitant; there is no reaction. They do not respond when I ask a question. There is no communication. Only when one of them dare to speak is there some communication; some reaction. Even when they want to talk, as there are many students, you cannot understand who is saying what. To prevent this, their microphones are usually off. In this way, in my opinion, math teaching is not efficient. If we were able to teach one-to-one, then it might be more successful. (T6)

Using Materials

Only one of the teachers stated that he/she was doing activities using an interactive material during the lesson, but had problems in this process. The experience of the teacher regarding the use of concrete manipulative materials is given below.

There are also restrictions on material. In geometry for example. There is the subject of bisector, something like median line. There is the paper folding activity. I would have liked to do this activity as it is relatively simple. I was able to show it in a video but I need to see the child folding it. I show the paper on the screen and tell students "Put the two concerns on the top of each other. But they hold the wrong corner. I say "Put them on each other". Yet, some ask "Which one?", "It does not happen". I describe it but I cannot correct it with my hand. If I were next to him/her, it would just take 30 seconds; but, here it takes minutes. For example, if we construct an object. The same problem. I would like them to have concrete materials in their hands. I would like them to construct but it is not possible from distance. (T5)

Different Teaching Methods

Most of the teachers stated that they had difficulties in using different methods with students in mathematics during the distance education process. They emphasized that many methods (e.g. Drama, Gamification) they use in the classroom cannot be used in the distance education process.

At the first level, you can provide information at the level of understanding. How do you solve new generation questions (teacher means Timss, Pisa questions). For example, you are teaching whole numbers. You move two steps forward, one step backward. Sometimes you are joking, playing roles (Drama method). How can you do these? You cannot. (T2)

I normally use concrete materials and games in my classroom. I actually play a lot of games. I like mathematics games and many of them are games that should be played in pairs. I cannot figure out how to do these here. I cannot use any different methods in this distance education. I am the only active person. It is just lecturing. (T7)

Second Super-Theme – Tools of Distance Education

Under the second super-theme, the experiences of the teachers with the distance education tools they use are described. A total of 4 different codes were obtained under this theme. The first of these codes is EBA TV, the second is EBA Web, the third is Web2 tools, and the fourth is WhatsApp. One of the interesting findings related to these codes is that the application that teachers use most in the distance education process is WhatsApp. Thus, a separate code was created for WhatsApp and this code is given below.

EBA TV

In this process, teachers need to follow the lessons on TV, construct the lesson in accordance with the course contents and create assignments and activities via EBA Web. Teachers stated the following views regarding the contents of the TV video watched by students in this process.

I thought that they would not understand at all if they watched Ebatv. The teacher was reading mathematical problems by opening the slide on TV. It was completely incomprehensible. Then it was improved. It became a lesson in which the teacher was writing and teaching gradually. Now, we are watching these lessons. We are expected to present a content parallel to these lessons. But I thought. We are normally solving many problems like this in the class and teach them many times. In this way, students seem to not understand anything. The teacher only teaches once; this is not enough. On TV, it is not possible to rewind it. There is no chance to watch it again and when you watch it, it lasts just five minutes and there is no other way of teaching. Thus, TV seems to be problematic. On the other hand, there is teaching in the form of simple lecturing. (T4)

There are videos in the internet and on TV. Students watch the video like watching a film. He/she should be personally involved, solve the problem, think about it. He/she can watch videos to see his/her shortcomings but only after he/she has solved the problem; in my opinion, mathematics cannot be learned from TV or videos. It does not happen without thinking and using pencil. Mathematics is a mental process not a film. The student just watches. Videos particularly the ones presented on TV last just 20 minutes. The objective I normally spend 5 class hours in the class to teach is tried to be taught within just 20 minutes. In this process, the child can only see the solution of one problem and he/she will not have any support next to him/her. This is also problematic. If I were able to teach one-to-one in this process, it might be effective but in its current form, it is not. (T1)

EBA Web

The teachers' experiences in this process are gathered under two sub-codes. One of them is the problem of access to EBA Web. The other sub-code is the content of EBA Web. Most of the teachers reported many positive opinions about the content of EBA Web. However, the content of EBA Web could not be reached by all the students in Turkey at the same time as the capacity of the server was not enough for this; thus, many of the students could not have access to the contents. Related experiences of teachers are given below.

EBA Web Content

Most of the teachers reported many positive opinions about the content of EBAweb:

I have been using EBA Web for a long time. It is an interactive environment and I think that it is not appreciated as much as it deserves. If EBA were used properly, it would be a platform suitable for creating a lesson plan. I am developing my lesson plan as follows: First I look at videos, activities, tests and then I select them and order them. I put them in order of priority. I order them in my lesson plan. When I start my lesson, I use my plan. Children can see my lesson plan. We can give tests to students; there are game-based activities and we can also give them. After teaching the subject, we can use the activities. We can also see how much of the homework assigned to students has been done, how they have done it and how successful they are. We can add files ourselves if we want. We can create our own exams. We can monitor their work. I personally like it very much. I normally use it. I wish students could reach, but they can't. (T13)

First, I wanted to run it over EBA. Actually I think their ready content is very nice. There were activities I used in my normal class. There are very nice contents for students to comprehend the subject. I think it appeals to all children at the level of understanding. There are good contents to make students comprehend the logic. (T1)

I wanted to use EBA and to teach a lesson over it… I even thought I would upload videos to EBA, but there are many limits for video contents to be uploaded. Therefore, I gave up. Also, the children could not log in even if they were allocated certain hours to enter EBA. They continuously logged out the system. They could not enter at all. The internet connection was also problematic. In my village, there is also the problem of electricity. There occur some power-cuts when there is a storm. And when the system was overloaded, the server could not manage it. Children could not enter at all. So we had to find alternative ways.(T7)

Although most of the teachers stated positive opinions about the contents of the EBA Web platform, some teachers stated that some of the EBA contents were below the level, that they did not suit all students and that some of the contents did not serve the purpose.

> *There are activities that can create misconceptions in eba. I cannot exactly remember right now. I even wrote a report about them. Unsuitable contents. I am actually using but in a selective manner. They are not always suitable. Some activities are inadequate. Some activities do not serve their purposes. For example, there is a video about the running speed of dinosaurs. Video is actually very interesting content. There's a dinosaur called Gallamouus. Students are asked to create an algebraic expression about the running speed of this dinosaur. When I saw it, I thought this content was very nice. But there the child focuses on the dinosaur and his name and shape etc. What is its name and how is it running etc.? It is a remarkable content, but it did not have the desired effect on children. Children could not focus on the algebraic expression. Rather, they entirely focused on the dinosaur, yielding reactions from students such as "The word is very long. Was it really like this .." etc. The content of EBA; content that we will give to children needs to address the reality of children. Of course, this is not true. There is another situation as follows: There is a video about percentage calculations. There is a reduction by 20%+30%. One character in the video says there is a 50% discount in the store. With another character, they discuss how it should be calculated if it really is 50% discount. They calculate. Then they tell the percent of the discount. Actually, that content seemed dull to me. But it appealed to the real world of children. Although not all the contents are suitable, there are some suitable ones. And through this video, the children realized that they should not sum the percentages directly. They won't forget. I mean, activities should be used selectively. (T4)*

> *EBA content is bad. It only appeals to some of my students. Videos can be used to teach the basic meaning of a concept at the level of a simple introduction activity. Simple contents in videos; they do not appeal to good students. They are below the level. For example, there are no new types of questions (similar to TIMSS, PISA contents). (T6)*

EBA Web Access

All the teachers we interviewed stated that there is a problem accessing the EBA web site. The teachers who stated that there was a problem in their own access stated that almost all of the students had access problems.

> *We tried to follow the students over EBA but frankly it did not work. As the server was overloaded, it could not manage it. Students cannot connect the internet in the hours they wish. As there was also time limitation, they could not do it. They are always complaining. (T3)*

> *I wanted to use EBA and to teach a lesson over it… I even thought I would upload videos to EBA, but there are many limits for video contents to be uploaded. Therefore, I gave up. Also, the children could not log in even if they were allocated certain hours to enter EBA. They continuously logged out the system. They could not enter at all. The internet connection was also problematic. In my village, there is also some problems with electricity. There occur some power-cuts when there is a storm. And when the system was overloaded, the server could not manage it. Children could not enter at all. So we had to find alternative ways. (T7)*

> *I have students from 6th and 7th grades and there are 20-25 students in each class and only 7-8 of them could have access to EBA. We can see the students who can access the system; they can do something there and make some progress. But they had some great difficulties. They are always complaining. Most of the students could not access. The system always makes them logged out. Although it is a bit better now, still there are serious problems. (T12)*

WEB 2.0 Tools

As students and teachers could not access EBA, which is seen as the most important tool and resource in the distance education process, they turned to alternative Web tools or communication tools. Some of the teachers use programs such as "derslik", classjodo. Besides, almost all of the teachers try to use live lesson tools.

We looked for an alternative when we had a problem with EBA. I 'm using classjodo. I recorded all the classes. It gives feedback to children such as how many students participated, did their homework, etc. All the students can see what others did or did not. Parents can also see them and thus there is a good competition among students. Even I assign homework via eba I also announce it from here. But in any case, although I have 225 students, only 30-35 of them participate. In fact, I am using different sources. I am using the activities in the internet sites of NLMV. There is also another webpage called "Derslik". I share sources there. There are Youtube channels. There are many channels in English. I am sharing activities from there but only 2 students complete them. They do not want to do them as they are in English but in fact everything is quite understandable. I wish there were such sites in Turkish. (T4)

I have also checked; there are problems of access. I searched for 15 days to find out what I could do. Then I decided to use Zoom. It allows you write on the screen. It does not want anything extra juts an Ip. Screen interaction is better in Zoom. It allows writing on the screen via a tablet or telephone. I made a search on the internet to find out how to write on the screen. I have learned a pen could be made by covering an ear stick with aluminium foil. I made all the children do this. Now they can also write on the screen. They can do this on the phone. They can better interact. You cannot see the children; my screen is active. I solve problems and revise the subjects. As they have limited internet access, I do not make them turn on their screen. They have just their voice. I sometimes ask; sometimes they themselves tell something. (T13)

When I realized that EBA is not effective, I looked for another program. Then I started to use Zoom. I do not have a graph tablet; I share the screen and try to write by using the pen of the program. It is not much efficient in fact. I am preparing in advance or using ready-to-use materials. It can be difficult for children to take notes at the exact moment because we cannot wait for long because there is a time limit in free programs. I revise it once more then I send the materials to them (T8)

WhatsApp, as a Tool of Distance Education

When teachers could not communicate with their students via EBA Web, and as a result of the difficulties experienced by students in having access to EBA Web, all of the teachers stated that they used WhatsApp as an alternative communication channel. In Turkey, middle school 8th graders have to take a central exam and according to the result of this exam, they are accepted to high schools. Teachers use this software as a distance learning tool, especially in order to respond to the problems of 8th grade students quickly and to respond quickly to the needs of students.

I am using WhatsApp. We founded a group with the students who would take the exam. There are just 10 students. They send their problems to me. I solve them, take the photos of solutions and then send them to students. If it's a multi-step question, I'm shooting a video. They generally clearly understand them. (T11)

We have class groups on WhatsApp. I assign homework daily. I spare time for my students individually in the evening. They say "I could not do, could not understand". We are making video calls. I solve it by writing and then send its video. I spend 4-5 hours in this way every day. During the video call, I show the student what I have written for him/her. I am always in short lessons but this requires personal effort of the students yet not all students are willing to do this. For example, there are just 6-7 students from my eight graders. Others are silent. I cannot force them in the distance education. Students who take the exam seriously are more willing. (T6)

Teachers state that using WhatsApp as a distance learning tool creates some technical difficulties and application difficulties.

We send works that are tiring for me and students and announcements on a single channel via WhatsApp. There are at least 100 messages per day in a single message group. I have at least five groups. It is also difficult for students to follow these messages. While I am doing something, a message comes. It is good to be in contact but there is no time limit. Even at night, students can send messages to ask questions. We are always checking our telephone, day and night, to see whether there is any question from students, there is any announcement. (T5)

As we could not work via EBA and some students do not have computers we are using WhatsApp. In fact, this is also a problem because the child must check it from his/her telephone. This is also problematic. He/she does not have a telephone and there is no printer at home. Even we do not have a printer at home. Although my husband and I are teachers, we do not have a printer at home. I do not know how a student can handle this. (T12)

The child asks a question in the morning. I can respond only in the afternoon or evening. Then the child can see the answer next morning. Thus, there is a time problem. You can't answer instantly. You can't always go directly into a fast communication process. The child may have even forgotten the question. (T14)

Third Super-Theme- Socio-Cultural Factors

Under the third super-theme, the teachers' experiences arising from the socio-cultural situations of the students are included. All the codes in this theme reveal the differences and inequality of opportunity among students and disadvantages some students experience. Sub-codes under this theme are socio-economic status, parent profile, student success in the classroom, student readiness, distance education policies.

Socio-Economic Status

First of all, all the teachers stated that they could only reach a limited number of students. The ratio of the students who could continue their education in the distance education process remained between 20% and 65%. According to the teachers, the main reason for this is socio-economic.

Everyone was on the internet during this period. Internet infrastructure could not bear. Infrastructure is not strong enough. And not everyone has equal conditions. Students access the internet on the phone. The child has an 8 GB internet package but when he/she downloads 1 video, most of it has been used. There are some houses where there is one telephone but three children. There is 8 gigabyte (GB) internet in this one telephone; naturally, these children stay outside the system. We cannot reach these children. (T7)

The child does not have a computer. He/she does not have a tablet, either. They only have their parents' telephones. They do not have unlimited internet packages. I heard a parent complaining about the telephone bill, which was 300 TL last month. How can they pay such bills? They cannot have internet connection at home. There are 3-4 children at home, so how can they manage the process with just one phone?(T9)

I have already delivered several lessons and 20 students from among 30 students were able to participate in these lessons. Not everybody can participate. This is a problem. Not everybody has a computer. Thus, they use their parents' phones. There are some students who cannot even reach their parents' phones as their parents are working. And as their siblings are using the phones available, some students cannot even find a phone to connect. Some cannot participate as they have internet problem. None of them said "I do not want"; in my opinion, they cannot participate as they do not have the required conditions. But I cannot do anything. (T8)

I personally take distance education more seriously in eight graders. In my one class, there are 12 students and in another, there are 16 students. But 7 students from among 12 students in one of my classes, and only 8 students from the other class participate in lessons. I am working in small groups. The children living in village school lack the required opportunities. They are already connection via a telephone. The students who are most active are those preparing for High School exam. Their motivation is higher to participate. They are somehow solving the problem of internet. Some students miss some lessons as they do not have internet connection. Then they participate again when they find an internet connection. (T13)

Parent Profile

The distance education process is a process that children spend at home with their families. In this regard, the primary guide of students at home is now their parents. The teachers' experiences have revealed that the most important difficulty for parents is to handle both children's care and educational responsibilities. In addition, according to the teachers, parents' educational status is the most important factor making students advantageous or disadvantageous in this process.

Children are completely our responsibility at school. Now most of the responsibility is on the shoulder of parents. In this process, students having educated parents are more advantageous. More importantly, the children of parents caring for their education and the children supported by their parents come to the fore in this process. Some parents are completely indifferent to their children in this process; their relationships with the school are bad and the children of these parents almost never participate in lessons. (T10)

There are 3-4 children in the same house. How can the needs of these children be met? Which of these children can the mother support? For each child, there are different WhatsApp groups. She should follow all these groups for her children. It is a complete mass. There are many courses. Although I have just one class, I cannot follow the messages sometimes. How can a mother handle all these? Moreover, if the mother is not educated, then it can be a disaster. Naturally, they remain out of the system. I can only reach 20% of them. (T9)

Parents have great difficulties. They cannot manage the process. For example, a parent has three children. She sent one of the children to his/her aunt. People at home are always arguing and she cannot deal with this. Here the greatest responsibility is on the shoulder of parents yet parents do not exactly know what to do. On the other hand, some parents really want to support their children but they do not know how to do this. Thus, these children can be misdirected as their parents do not know how to monitor the process and what to do. It is also difficult to teach them what is correct. Educated families manage the process better. Others cannot. (T3)

In addition to the above-mentioned negativities, it is observed that the negative behaviours that children are exposed to at home depending on the parents' situation are directly affected by the process. In this regard, one of the teachers explained her opinions as follows:

I think that parents are in a difficult situation because their children cannot go out and to school and have to stay at home. There are many children experiencing problems in the family. Many children are in traumas. When they come to school, they get away from home and socialize with their friends. But now, mothers and fathers are at home; children are within conflicts. Everyone says, while they are altogether, there are more conflicts. Parents are fighting and children are exposed to this. Everyone has more important problems now. When children go to school, they are away from this environment. There are quarrels at home. You try to learn something from the lesson taught in Zoom while your parents are quarrelling at home. This is quite difficult. (T2)

Students' Success in the Class

This code points to the math success of students in the class. All of the teachers stated that students with low success level in the class either did not attend at all or did not continue in this process of distance education. Based on their experiences in this regard, teachers expressed their opinions as follows:

The level of the student has become more important in this process. Students who are very good or good successfully continued in this process. They are fulfilling their responsibilities. They rarely need us. Good students succeed in any case, being in the class or online. We cannot reach students of low level. On the other hand, the child seems as if he/she was listening in this distance education but in fact nobody knows what he/she is doing. I have great difficulty in drawing their attention even in the classroom; here it is much more difficult. Students having auto control seem to be more advantageous. (T12)

Children have the fear of mathematics. In math, the feeling of failure is more prevalent. Therefore, children who reach us and children we can reach are generally successful students. They are already successful at school. In this process, the children who were average or below the average in the class got completely lost. They got more passive. Children who needed little support to progress in the class cannot find this support here; thus, they are getting worse. They try a bit and when they experience any failure, they can easily give up. (T8)

I also deliver live lessons. It is better than just uploading videos. I connect my phone to the computer; thus, at least we have some communication, of course quite limited. If it goes on like this, we can completely lose some students. I had already difficulties in involving these students in lessons in the classroom environment. Yet, they completely got lost in the distance education environment. Now, I am teaching the same lesson

to all the students at the same time. When we were in the classroom environment, I used to give easier questions to the students below the average. I also used to give them extra support while others were solving problems. In this virtual environment, the child hides himself/herself. In the classroom on the other hand the whole student is there. In the distance education, as its name implies, they are distant. In the classroom, you can see what they are doing. You can see what they cannot understand. But here this is not possible; at first the child seems to be listening but then he/she does not participate because he/she cannot catch up with; he/she gets lost (T4)

The student should solve the problem and I need to watch him/her solving the problem and I need to intervene when needed. In Zoom, students respond altogether. For example, one student says I have done it by writing on Chat but I cannot see what he/she has done. In this process, I am not next to the student, I cannot see what he/she is doing, whether he/she is doing true or false and where he/she has a difficulty. Otherwise, he/she would easily progress easily with my help. Here, as students are in a group and I cannot see them as I see in the class, I cannot intervene with individual students. If I ask many questions to a student, he/she may feel worried. (T5)

Student Readiness

This code is related to students' level of readiness. The teachers' opinions are that students are not ready for distance education process, both psychologically and technologically, because they entered the process suddenly.

We cannot reach children. Children think they're on holiday. Children are not aware that this is also an educational process. The school was closed before the children knew what it was. We could not prepare them. On the last day of the school, most of them went home without even taking their books. Most of the children are like having a holiday. Only those who will take the exam from the 8th graders are active in this process because they have a purpose. But from among them, only the ones feeling motivated for the exam are active. Others seem to be completely lost. (T1)

I actually teach at a school of a higher socio-cultural level. Children have computers etc. Yet, they use their computers for Facebook or to play games. When I tell them to download Zoom, they feel confused as they cannot figure out how to set it up. I need to explain them one by one. For example, there was a student who was good at drawing. We encouraged him to enter competitions like logo competition and he was successful there. But when I wanted him to set up Photoshop program in his computer, he could not do it. Although they were born into the world of computers, their computer skills are not well-developed. As a result, it was really difficult for me to use ClassDojo or another program called "Derslikte" with these students. I am in communication with only 20% of the students (T4)

School Policies

Since the transition to the distance education process was very fast as a whole country, the Ministry of National Education did not set standards to be followed by schools in this process rather let them free because the conditions of all schools, teachers and students were not the same. In this context, it is seen that schools and teachers try to manage this process in line with their own means. In this sub-code, the policies of the school and the ministry will be examined.

Not all teachers are teaching but you are and thus students ask "you are teaching your lessons but others aren't, why? This is a serious problem. There is no unity. One teacher says "there is no need" while you say "yes we need to do this". It would be better if a common decision had been made. Now it completely relies on personal efforts and good-will. Our administration let us free to decide whether to teach or not live in the distance education environment. I did not want to leave students on their own. I did not want them to feel as if they were on holiday. On the other hand, this is a strange and challenging process. I decided to teach as I thought that we could see each other, that I could support them and increase their motivation and that they could learn something. In fact, I am making great effort but if some others think it unnecessary, my motivation is negatively affected. (T8)

Fourth Super-Theme – Psychological Factors

The codes under this super theme are collected under three sub-themes which are called changing living conditions of teachers in the pandemic, anxiety induced by cyber-bullying and emotional reasons.

Changing Living Conditions of Teachers in the Pandemic

During the pandemic, as in all people's lives, there occurred some changes in the living conditions of teachers. In this context, psychological situations that prevent teachers from adapting to distance education process are combined around three sub-codes. The first sub-code is the epidemic, the second sub-code is the economic effect of the epidemic and the third sub-code is changing life. Although one of the teachers is living in a small city, she closely witnessed the effects of the epidemic.

> *I just started my live lesson. I prepared my tablet and computer. One of my neighbours was diagnosed with Covid-19. Health care providers in white dresses came with an ambulance and took him to the hospital. His spouse and children stayed at home. We are using the same environment with them. We are living in the same apartment building. Children go to the garden. My psychology is not good. I have always listening to myself for three days, cleaning the house, washing my hands. I am worried about being infected. I am always wondering about this. I do not much care about the distance education of children; I just want to get rid of this epidemic. (T15)*

Another teacher stated that her husband lost his job in this process. Thus, her performance and motivation decreased because of the economic effects of the epidemic.

> *My husband lost his job. We have credits to pay. Everyone's income has decreased. I don't have any additional tuition fees. How can we pay our credits when my husband is unemployed? I have a salary but it is not enough. We have serious economic concerns. How will we pay our bills and debts? Everyone is thinking like me. There are concerns. Among these concerns, how can I learn to use web2? With this mood, I do not feel motivated to learn such things. We do not know what this illness is. My mother has a heart problem. As everyone's life has changed profoundly, it is very difficult to adapt to this new process for even educated people. It is not easy to manage this stress. You have to change your old routines. When my husband came home and told me that he lost his job, I was giving my online lesson; I was so shocked that I finished the lesson early. I could not go on. I have been feeling highly confused for three days. I am trying to recover but it is difficult because it directly affects our life. I cannot go out, I feel stressed, I feel tired; how can I teach? (T2)*

Due to the epidemic, living conditions of families, people around them and their working conditions have changed. Teachers are directly affected from this.

> *My mother was looking after my baby. Curfew was declared for a short period of time. My husband is working. My mom is old and taking my baby to her every day means risking her. She cannot come, either. My life has changed dramatically. Since I have a baby at home, I always tell my students to reach me in the evening because if they call me in the morning I cannot attend to them sufficiently. I can talk to them after 9:00 in the evening. Thus, I cannot find enough time. I think I cannot meet their needs. (T3)*

Cyber Bullying

One of the codes in this theme is cyber bullying. This code refers to inability of teachers to adapt to the process due to their concerns about cyber bullying and cyber fraud. Teachers clearly stated that they are afraid of being subjected to cyber bullying.

> *I am not a kind of person who can comfortably speak to the camera; I would like to be such person but I cannot. I feel tense. I need to see students in the real classroom environment. As a result, I cannot upload YouTube video; I cannot deliver live lessons. There are already ready-to-use lessons. I am just finding them and sending my students because I cannot do it myself. I am not good with the camera. There should be someone who I can interact with. In a live lesson, when you allow all students to speak, you cannot manage it. I am not a person who delivers monotonous lessons. I want to make jokes and I want to laugh and to be laughed. I want to see concrete reactions of students. This is not something I am used to. You need to be still in front of the camera. I do not like it. (T4)*

First of all, I don't want to make a synchronous lesson or a lesson on YouTube. What happened to the English teacher last week is known to everyone (the English teacher was lynched by social media because she spoke like a child while she was teaching on TV and used too many gestures). You make a mistake and you are criticized severely. This is not for everyone. Actually, I wouldn't want to experience that uneasiness. I cannot create a channel open to the public because I cannot trust my students and other people. Some part of my video can be cut off and some other unwanted things can be attached there; thus, something done with a good intention can harm you. How bad things have been told about the English teacher, who was really trying hard to teach something to students. A lot of criticisms. They even criticized him for the colour of the board he used. And he is much more successful than many teachers I know. So I feel uneasy. You deliver spontaneous lesson and the lesson is recorded (synchronous). You say something, you get confused. You can make a mistake. You are laughed at by students. It would not be good for my image as a teacher. (T2)

I feel concerned about security gap. I do not use it. There are free programs but you are sharing your screen and computer. Everyone can easily have access to others' screens. In today's world, there are many cyber-crimes. Accordingly, I cannot dare to download them. And I also heard from my friends that 58 dollars were withdrawn from the accounts of some teachers. I am concerned that my credit card information can be stolen. (T6)

Emotional Reasons

The teachers stated that the distance education process is a process carried out in the computer environment and this process emotionally limited the teachers. All the teachers emphasized that they had difficulty in establishing links and communicating with students during the distance education process.

You also affect the child emotionally in face-to-face education. You have a chance to affect them in every sense. Bu there are no emotional connections in the computer. No emotions. In the classroom, there is energy between you and students. When you cannot establish emotional connections with students, it is more difficult to make them interested in your lesson. Children should realize that they are cared for by the teacher. Here, it is too mechanical. (T2)

I am an emotional person. Teaching is an emotional profession. It is no good without emotions. I cannot do it. I need to laugh, smile, love and they laugh to me, they will respond to my jokes. I establish links with my students in this way. In my opinion, teaching requires feelings. The student needs to love either the teacher or the lesson. Yet, emotions cannot be expressed via the computer. We are highly restricted by it. I do not feel professionally satisfied. (T8)

Fifth Super Theme – Teachers' Readiness

This super-theme is focused on the readiness of teachers. There are two codes under this theme. First of these codes is related to the technical equipment to be possessed by teachers. All of the teachers mentioned the shortage of technical equipment and lack of materials.

I wish both teachers and students had the necessary software and hardware infrastructure. I was using GeoGebra at school but it is not possible for me to use it at home. Students cannot use it on their phones. They do not have computers. I was using z book in the smart board but this is also not possible at home. (T7)

My computer is old. When I download different programs then it works slowly. I have no camera. I have no tablet. I am trying to do it with my phone. (T6)

The requirements in this system seem to be endless, we continuously need something new. And everything is very expensive now. My computer is new but not touch screen. My phone did not have a pen so I had to buy a new phone. Although my phone is new, I bought a new phone with a bigger screen and pen. (T8)

There is a problem with the hardware. There is not touch screen graph tablet. I have no document camera. I want to buy one but its price increased too much. It was 300 TL but it is 1000 TL now. This is a lot of money for me. (T5)

The second sub-code is about whether teachers are ready for distance education in terms of their knowledge base. Most of the teachers stated that they are not ready for this process. They said that they are trying to adapt to the process with their own efforts.

> *We use smart boards in classrooms, but I realized that didn't know anything about distance learning. I even do not know Zoom. I have just looked at it and panicked. I do not have enough knowledge on this issue. (T3)*

> *Teachers do not have any training on this issue. There is a lack of hardware. First we should have been trained for a few weeks about internet-based distance teaching before starting this process. I am trying to learn Zoom with my own efforts through trial and error; I am also trying to learn WEB 2.0 tools. How much can I learn in such a limited time? How effectively can I use them? I have no child; thus, I have limited responsibilities at home. But there are many teachers who cannot spend so much time to learn these. Kahoot! and other Web 2.0 tools work in Zoom. Just textbooks, notebooks and board are not enough for an enriched lesson. If I use a program, they need to have the same program. They have no such programs. Such programs are expensive. Many of them do not have a computer. The teacher and students need to have the same program. And you need to be really good at these programs. Like a DJ you always need to change the material. I am not so knowledgeable. I know how it should be but I do not know how to do it. (T1)*

DISCUSSIONS AND CONCLUSION

In the current study, it was attempted to reveal the mathematics teachers' observations and evaluations of the distance education process in which they were suddenly involved. The teachers stated that the mathematics includes long mental processes and that the student should be activated and followed in this process and that these are not possible in distance education applications. It was emphasized that giving immediate feedback by following the student's actions is very important for the mathematics lesson, but it was stated that there is neither enough time nor suitable conditions to do this in distance education. Also, according to the teachers, the student is passive in live video and EBA TV lessons while he/she is supposed to be active and thus many students easily give up. The teachers stating that in the face-to-face education, they apply different interaction-based teaching methods and materials in the lesson in order to prevent students from getting distracted could not make use of such interactions in video lessons. Murphy (2020) also thinks that the transition to distance education as a result of social isolation will limit face-to-face classroom interactions. This supports the finding of the current study. In this sense, it was noteworthy that the point that teachers frequently emphasized is the limitation of communication and interaction.

Together with the spread of the pandemic all over the world, it was decided to suspend the formal education in the week following the detection of the first COVID-19 case in Turkey and distance education was started. Thus, the Ministry of National Education announced that classes would be conducted over EBA, which serves as a digital education platform. While the teachers interviewed in the current study gave mostly positive opinions about EBA Web contents, they added that there was a lot of trouble in accessing the platform and even there were times when it was never accessible due to overload. Some lessons could not be conducted as students could not access EBA Web. Zhou et al. (2020) emphasized in their study evaluating distance education activities conducted in China that large-scale online education cannot be carried out without a solid infrastructure. Accordingly, it can be concluded that the EBA platform, which was established in 2012 within the scope of FATIH Project, did not reach the desired level of infrastructural efficiency.

The participants stated that they turned to alternative web and communication tools as a result of the problems they experienced in accessing EBA. When the relevant literature is reviewed, it is seen that there are many different applications used worldwide such as Zoom, Slack, Google Meet, EduPage, Google Classroom, WhatsApp, Email, Moodle, Edmodo, ClassDojo, Schoology (Basilaia &Kvavadze, 2020; Gunawan, Suranti& Fathoroni, 2020; Syam, Nismawaty& Hakim, 2020). In the current study, it was determined that the majority of teachers preferred video conferencing applications and the most used video conferencing application was Zoom. In addition, "Derslik", a digital learning platform, was also preferred. However, the teachers stated that they had difficulties in using these applications and platforms. The reasons for these difficulties were found to include insufficiencies in the internet infrastructure, the lack of knowledge

and experience of teachers and students, and the limited use of computers, tablets or phones in students' homes. Moreover, a teacher emphasized that the language of many digital education platforms is English and that the number of Turkish platforms should be increased.

It was seen that all of the teachers participating in the study used WhatsApp, an instant messaging application, as a way of communicating with students. In the study conducted by Gunawan et al (2020), it was observed that it is the most used application by instructors as communication and education platform during the COVID-19 pandemic thus, the findings of the two studies seem to concur with each other. The teachers said that they set up various groups in WhatsApp, which they used to respond to the problems and needs of the students quickly, to assign daily homework and to share videos showing problem solutions. The popular use of WhatsApp as a distance learning tool was found to be interesting. But they also emphasized that there is intense traffic here and they often find it difficult to follow incoming messages.

During the pandemic, all of the GSM operators gave all users the 8 GB internet package for EBA Web. However, according to the teachers, the 8 GB internet package given to a single user was not sufficient in houses with more than one child, which caused many students to stay away from the education process. Telli Yamamoto and Altun (2020) emphasized that students who have financial difficulties encounter difficulties in accessing the internet and following the lessons accordingly. This finding concurs with the finding of the current study. This process is troublesome for students who do not have a computer and a tablet at home and who try to attend classes on their parents' phone. In this context, it can be concluded that the problem of inequality of opportunity arises in the process of using both EBA and alternative platforms as a distance education application.

Parent profile was also found to be important for the teachers because during the period of pandemic when they stay at home with their children, parents are expected to manage the distance education process. According to teachers, students can be successful in distance education in families with high education level and interested in their children. On the contrary, in families that are indifferent to their children, children do not participate in any way. Apart from the indifferent family factor, another factor that causes the student to move away from the lessons is the failure to provide the desired support to the students who are below the class average. The teachers emphasized that they follow the lower level students more closely in the face-to-face classroom education and that they try to draw their attention to the lesson and ask questions that are appropriate for their level. However, since they cannot provide these opportunities in distance education, the lower level students have the feeling of failure and do not attend the lessons. Here it is interesting that according to the teachers, distance education moves away the average and below average students from the education process.

It has been observed that there are factors that decrease the motivation of teachers in the distance education process. One teacher stated that many teachers do not teach their lessons as the conduct of distance education process is left to the discretion of the school administration and teachers, and that this has negative effects on students, and that although he makes large amount of effort, the lack of unity in applications decreases her motivation. This statement of the teacher shows that there are no specific and common practices in distance education and some of the teachers do not perform their duties unless an obligation is imposed.

Another factor that lowers the motivation of the teachers is the concerns about the health and economic situation. A teacher stated that as she witnessed a case infected with the highly contagious COVID-19 pandemic in her close vicinity, she could not continue distance education in fear and anxiety. Another teacher stated that she was unable to focus on giving lessons due to economic difficulties as a result of her husband's dismissal during the pandemic. These show that the COVID-19 pandemic affects teachers negatively and prevents them from performing their jobs efficiently.

As a result, in light of the opinions of the participating teachers, it has been revealed that mathematics lesson is not suitable to be carried out with distance education applications, teachers have difficulties in interacting and communicating with students, because of the limited interaction and lack of immediate feedback, some students stay completely away from the lessons, there is lack of information about the use of internet and technological tools, there are significant insufficiencies throughout the country in terms of hardware and infrastructure, inequality of opportunity occurs in the distance education process, COVID-19 disease causes fear and anxiety, and the motivation of teachers and students decreases accordingly.

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A SYSTEMATIC REVIEW OF THE TENDENCIES IN THE USE OF LEARNING MANAGEMENT SYSTEMS

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ABSTRACT

In this study, 59 SSCI-indexed articles published between 2012 and 2017 in the Web of Science database were analyzed by systematic review, identified by the keywords "Learning Management Systems / LMS" in their titles. This study aims to determine the current situation and future trends in using LMSs as one of the tools that are getting increasingly popular both in blended and online environments. Accordingly, our study has revealed that the highest number of the articles were published in 2016, Moodle is the most popular LMS, the open-source LMSs are preferred over other types, LMSs are most often used to measure success, South Korea and the United States (US) are the pioneering countries in this field, the quantitative method and questionnaire tool are the preferred methodological approaches in the LMS scientific research, students are more likely to be selected as a sample group, with the 0-100 range as the most common sample size, and that the technology acceptance model (TAM) is the most frequently used model. The findings are visualized with tables, graphs and maps. The study is concluded with some suggestions for researchers and higher education institutions.

Keywords: Learning management systems, blended education, online education, open and distance learning, systematic review.

INTRODUCTION

In the twenty-first century, higher education institutions make an extensive use of the information and communication technologies (ICT) to carry out their basic tasks such as teaching and learning (Mkhize, Mtsweni, & Buthelezi, 2016). Given this ICT-based evolution of learning / teaching, new ways to improve learning based on the use of the Internet and computers have been discovered (Conde et al., 2014). In particular, online learning in relation to open and distance education has begun to become a form of traditional learning in higher education, which has not only increased the number of institutions providing online-only education, but also has led universities offering traditional face-to-face campus education to offer online courses to meet their student needs (You, 2016). In recent years, learning management systems (LMSs) have become increasingly popular in higher education, allowing easier course management, content management, assessment and reporting, and are therefore gaining rapid popularity as technological systems of choice in academic institutions (Draskovic, Misic, & Stanisavljevic, 2016). Many higher education institutions benefit from these LMSs, which support learning activities of students by providing a comprehensive and integrated set of services and tools for students (Zanjani, Edwards, Nykvist, & Geva, 2017). LMSs have shaped the landscape of higher education by transforming the traditional face-to-face education into blended and online learning environments (Beer, Clark, & Jones, 2010).

There are various definitions of LMSs, which have changed in parallel with the developments in ICT. According to Gasamyeh (2017), LMS refers to software applications and web-based technologies that help learning and teaching processes as an ICT playing an important role in higher education. According to De Moraes (2012), LMSs allow online content, learning activities and course management to be published in a variety of ways, addressing both pedagogical and technological needs. Islam (2015) defines the LMS as web-based software that is used for delivery, tracking, and management of online content.

LMSs have emerged as ICT tools that provide learning opportunities without time and space constraints that facilitate the open and distance learning process (Ain, Kaur, & Waheed, 2016). Pilli and Sozudogru (2012) point out that the use of LMSs to organize, manage, present and evaluate educational and training activities has become increasingly popular both for on-campus and off-campus education. Although LMSs are the most popular educational technology application used in remote online education (Almarashdeh, 2016), they have been frequently used in recent years not only in distance education-based education systems but also in traditional face-to-face university education systems and strengthened blended learning environments (Emelyanova & Voronina, 2014; Islam, 2015; Laflen & Smith, 2017; Torrisi-Steele & Drew, 2013). The use of LMS in learning environments offers several key advantages. As systems that support and manage learning content that allows a variety of file formats and environments (Son, Jeong-Dong, Hong-Seok, & Baik, 2016), and with their inbuilt online learning tools, LMSs support both critical thinking and also higher-level learning skills by providing opportunities for knowledge sharing and creating collaborative online communities (Zanjani, Edwards, Nykvist, & Geva, 2016). LMSs help regulate the management of students; facilitate access to resources and provide support for some remote collaboration activities through established means (Alario-Hoyos et al., 2015). In summary, the usage trends of LMSs, which have become indispensable to higher education institutions, need to be assessed. For this reason, the rationale behind carrying out this study, the problems it aims to solve, and its contribution to the relevant literature are explained under the problem statement and purpose sub-headings in the following section.

Problem

In recent years, no comprehensive content analysis or systematic review has been carried out on LMSs, which are one of the most important online learning tools that strengthen the blended learning processes in higher education institutions in particular. To date, there has been only one study (Soykan & Simsek, 2017) reviewing LMSs in SSCI-indexed articles from various perspectives. Applying various criteria, their study presents an analysis of the articles focusing on LMSs between 2010 and 2014. The current study, however, has been carried out in a different context in terms of both the scope and the years studied. Our study is important because in addition to revealing the current status of LMSs, it describes the factors shaping higher education institutions' LMS preferences and their tendencies in using them as the online software tools that perform some basic tasks such as student follow up, course and content management, evaluation, and reporting. Also, the fact that there is only one study focusing on the use of LMS suggests that further research is needed on this specific subject.

Purpose

The purpose of this study is to examine, by applying the systematic review method, 59 SSCI-indexed articles published between 2012 and 2017 in the Web of Science database, which include the keywords "Learning Management Systems / LMS" in their titles. In order to achieve this purpose, the answers to the following research questions were sought:

1. How does the number of articles vary by year?
2. What are the types and names of LMSs used?
3. What is the purpose of using LMSs?
4. In which countries were the articles published?
5. Which research methods were used?
6. What data collection tools were used?

7. Who constitutes the sample group used in the articles?
8. What is the sample size used in the articles?
9. What are the theoretical frameworks and models used in the articles?

METHODOLOGY

Data Collection Tools and Inclusion/Exclusion Criteria

In this study, "Web of Science Core Collection" database was used as the data collection tool, which yielded a list of articles containing the keywords "Learning Management System" or the abbreviation "LMS" in their titles. These keywords were typed in quotation marks to ensure accurate results were obtained. In the timespan section, the period between 2012 and 2017 was selected and only the "Social Sciences Citation Index (SSCI)" was selected in the "Web of Science Core Collection: Citation Indexes" section. Then, on the opening webpage, the list was further filtered to include the articles only, which resulted in 61 articles. However, during the systematic review, it was determined that the words "LMS" in the titles of 2 articles had nothing to do with learning management systems. With the removal of these two articles, 59 articles were included the final list of articles selected for our systematic review. The journals publishing these articles are shown in Table 1.

Table 1. The journals where the articles were published

Journal	f	Impact Factor (2017)
Computers & Education	6	4.538
The International Review of Research in Open and Distributed Learning	6	1.826
Australasian Journal of Educational Technology	5	1.396
Journal of Educational Technology & Society	5	1.767
Computer Applications in Engineering Education	4	1.153
Computers in Human Behavior	4	3.536
Interactive Learning Environments	4	1.604
Eurasia Journal of Mathematics, Science and Technology Education	3	0.903
British Journal of Educational Technology	2	2.729
Expert Systems with Applications	2	3.768
Others	18	-
Total	59	

Note. One article was published in each journal in the "Others" column.

Data Analysis

In the current study, the systematic review method was used during the analysis. 59 articles were analyzed in various categories through a systematic review (Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou, 2004), which is defined as reviewing the literature according to a clear, rigorous, and transparent methodology. These articles were classified and analyzed according to nine research questions. During the analysis of the data, similar types of content were combined into the same category and the redundant data to be eliminated were removed from the related category. Using descriptive statistics, the findings were visualized with tables, graphics and maps.

FINDINGS

Change in the Number of Articles by Year

Figure 1 shows that there are nine SSCI-indexed articles published in 2012 including "LMS" or "Learning Management System" in their titles. However, the year 2013 (n=3) indicates a significant decline. Between 2014 and 2016, an increasing number of articles were published, which peaked in 2016 (n=19). However, 2017 witnessed a clear drop (n=9) in the published LMS articles again.

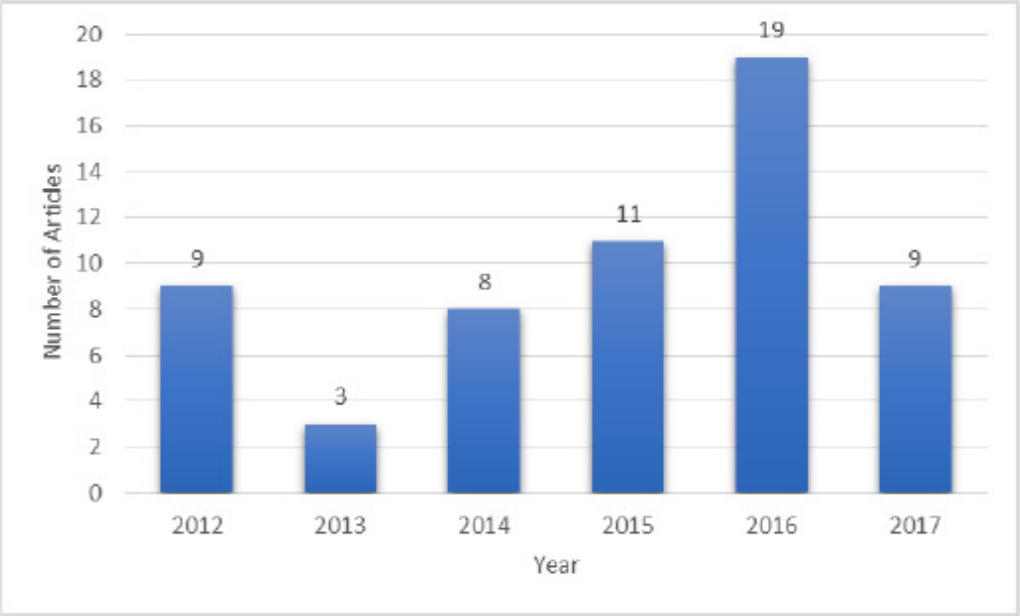

Figure 1. Change in the number of articles by year

Type and Name of LMS Used

Table 2 presents a classification of LMSs by their SCORM compliance, type, name, and quantity. Clearly, most of the LMSs used in the articles are of the open source type. Of these open source LMSs, the most commonly used LMS is Moodle (n=22). Besides Moodle, the other open source LMSs are Sakai, Ilias, Open eClass, eXe Learning and Glue LMS. The only commercial LMS encounteres in the reviewed articles is the Blackboard, which used to be known as WebCTs (n=5). In addition, some social network / Web 2.0 based LMSs have been used in recent years. Social networking sites such as Facebook (n=2), Twitter (n=2) and Google Plus (n=1) were found to be used as an LMS or integrated into an existing LMS. It also became clear that some universities or particular studies had specially developed their own LMSs for their specific purposes. Other than these, six of the articles gave no details about which particular LMS was used.

Table 2. SCORM compliance, type and name of LMS used

SCORM Compliance	Type	Name	f
SCORM Compliant	Open Source	Moodle	22
		Sakai	5
		Ilias	1
		Open eClass	1
		eXe Learning	1
		Glue LMS	1
	Commercial	Blackboard (WebCT)	5
	Social Network Based	Facebook	2
		Twitter	2
		Google Plus	1
SCORM Non-compliant	Self Developed		12
	Unspecified		6
Total			59

Purpose of Using LMSs for Students

A closer look at the purposes for using LMSs (Table 3) reveals that the most widely explored purpose was the effect of using LMSs on achievement. In addition, the articles investigated the effects and use of LMSs for collaboration, support, satisfaction, interaction/communication, evaluation, perception, attitude and engagement. In addition to all of these, it appears that in many articles the LMSs serve as multi-purpose tools, instead of serving just a single purpose.

Table 3. Purpose of using LMSs

Purpose of Use	f
Achievement	13
Collaboration	12
Support	10
Satisfaction	9
Interaction/Communication	9
Evaluation	8
Perception	7
Attitude	7
Engagement	6

Note. Some studies involve multiple purposes.

Countries Publishing the Reviewed Articles

Focusing on the countries where the articles are published (Figure 2), it is evident that the highest number of articles were published in South Korea (n=8) and United States (US) (n=8). In the third place are the Spanish (n=7) researchers. Australia (n=5), Portugal (n=4), Serbia (n=4), South Africa (n=4), Turkey (n=4), and Greece (n=3) are the other countries shown on the map above. The remaining countries not shown on the map are England, Finland, Saudi Arabia and Taiwan, with two articles each. Apart from these, 12 countries published one article each. It was also found that in some articles researchers from more than one country (international co-authors) were included in a single article.

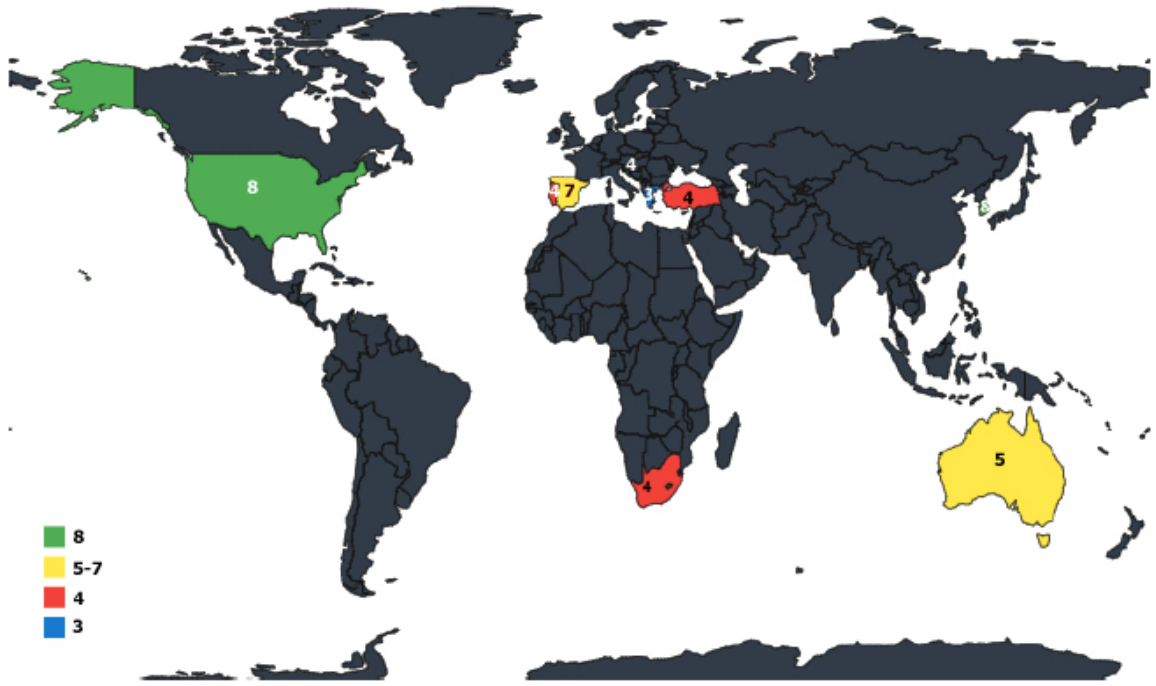

Figure 2. The countries where the reviewed articles were published

The Research Method

As can be seen in Table 4, in terms of the research method used, it is evident that quantitative (n=37) method is preferred the most, followed by the qualitative (n=10) method. While five articles employed the mixed method, one article applied the review method. In six articles, no method was used at all.

Table 4. The research method

Research method	f
Quantitative	37
Qualitative	10
Mixed	5
Review	1
None	6
Total	59

The Data Collection Tool

According to the classification by the data collection tool used the research articles listed in Table 5, it is clear that the questionnaire (n=33) is the most frequently applied tool. Log data were also used in a high number of articles (n=11), as some LMSs retain log data and have advanced analytics features. The test was also preferred especially in quantitative studies (n=10). The interview was listed as a data collection tool used in qualitative research (n=10). 9 studies included the use of scale and scale development processes. In 7 studies, no data collection tool was reported.

Table 5. Data collection tool

Data collection tool	f
Questionnaire	33
Log data	11
Test	10
Interview	10
Scale	9
None	7

Note. Several studies used multiple data collection tools.

Sample Group

When examined according to the sample group (Table 6), it can be seen that 43 studies include students as their sample group. Undergraduate students were also analyzed in terms of the type of teaching they were taught by. In this respect, LMSs are used in the blended teaching type in 27 studies, while students in 13 studies took part in fully online teaching environments. Regarding the students, it was found that post-secondary vocational school students were selected as the sample in two studies and secondary school students were included in one study. Apart from students, university faculty members were also frequently selected as the study sample (n=13). Academic staff such as instructors, lecturers, professors are also included in the studies. Furthermore, sample groups from different fields and environments such as School Teachers (n=2), Experts / Professionals (n=1), LMS Stakeholders (n=1), and Full Time Employees (n=1) were also included in the analyzed studies. We also found that many studies use multiple sample groups rather than a single sample group.

Table 6. Sample group

Sample Group	Instruction Level	Instruction Type	f
Students	Secondary School	Blended	1
	Post-Secondary Vocational School	Blended	2
	Undergraduate	Blended	27
		Fully Online	13
Faculty Members			13
Teachers			2
Experts/Professionals			1
LMS Stakeholders			1
Full Time Employees			1
Unspecified			6

Note. Some studies have more than one sample group.

Sample Size

When examined in the context of the sample size, it can be seen that the 0-100 range sample was used 17 times. The range of 0-100 is the most preferred sample size in the articles, which is followed by the 301-400 sample size. There were 10 articles with the size of 101-200 participants.

One of the notable findings in Table 7 is that there are five studies with a sample involving 1001 or more participants. Examining studies of such large samples, it was determined that these samples were included especially in the studies conducted at universities offering fully online instruction. In eight of the studies, no sample was reported.

Table 7. Sample sizes

Size of the sample	f
0-100	17
101-200	10
201-300	4
301-400	11
401-500	2
501-1000	2
1001+	5
Unspecified	8
Total	59

Theoretical Frameworks and Models Used in the Articles

When Table 8 is examined, it can be seen that many theories or models are preferred in the articles. In particular, the technology acceptance model (TAM) is noteworthy as the most widely used model (n=6) in these studies. In addition to this model, the unified theory of acceptance and use of technology model (UTAUT), theory of planned behavior (TPB), theory of reasoned action (TRA), quality of interaction (QoI) model, and expectation-confirmation theory were used twice. Other theories and models used in the articles were used once as detailed in Table 8.

Table 8. Theoretical frameworks and models used in the articles

Theory/Model	f
Technology Acceptance Model (TAM)	6
The Unified Theory of Acceptance and Use of Technology Model (UTAUT)	2
Theory of Planned Behavior (TPB)	2
Theory of Reasoned Action (TRA)	2
Quality of Interaction (QoI) Model	2
Expectation–Confirmation Theory	2
Activity Theory	1
Cognitive Load Theory	1
Cognitive Theory of Multimedia Learning	1
Concerns-Based Adoption Model (CBAM)	1
Delone and McLean Model (D&M model)	1
Extended-Technology Acceptance Model (eTAM)	1
Felder and Silverman's Learning Style Model	1
Fuzzy QoI Model	1
Information System Success (ISS) Model	1
Kano's Satisfaction Model	1
Two-factor Theory	1
User Satisfaction Evaluation Model (USEM)	1

Note. Some studies used multiple theories or models.

DISCUSSION AND CONCLUSION

In this study, SSCI-indexed 59 articles were published in the period of 2012-2017 including the words "Learning Management Systems" or "LMS" in their title were examined by the systematic review method and the usage trends of LMSs, as the web systems used frequently in online / blended learning systems, were determined. The findings obtained by this systematic review are listed under 9 subheadings.

The analysis of the distribution of 59 articles by journal revealed that these articles were published in 28 journals. Computers & Education and The International Review of Research (IRRODL) journals, which are the leading publications in the field of distance learning and education technologies, draw attention as the two journals most frequently publishing on the subject of LMS. The finding by Soyuk and Simsek (2017) indicating that the Computers & Education journal leads in the number of articles on LMS supports this conclusion as well. The analysis of the scope of the journals and the research focus of the articles reveals that the articles are published especially in the field of education, but also in various fields such as computer science, engineering, psychology, anthropology, which demonstrates the multidisciplinary nature of the LMS-related articles.

When the change in the quantity of article publication by year is examined, a great decrease is observed from 2012 to 2013. This could have been driven by the popularization of web 2.0-based learning, called staff learning environments, which is claimed to be superior to LMS by some researchers (Chatti, Agustiawan, Jarke, & Specht, 2010; Dabbagh & Kitsansas, 2012). The decline in this period, in which connectivism theory was also very popular in learning environments (Barnett, McPherson, & Sandieson, 2013; Duke, Harper, & Johnston, 2013; Tschofen & Mackness, 2012), can be interpreted as an expected development. From 2013 until 2016, there was a continuous rise in the number of articles, which proves that LMSs tend to regain popularity in educational institutions. This resurgence of LMSs can be explained by the fact that in this year, the connectivism theory and the popularity of PLEs began to decline (Clara & Barbera, 2014). In 2017, there was a fall again. A new approach is observed in the development of LMS after 2017. It is also predicted in the Horizon report (Adams Becker et al., 2017) that adaptive and flexible "next-generation LMS" systems using multiple environments rather than a single component based on universal design standards will become popular. In sum, it can be said that classical LMSs tend to be replaced by innovative systems called "next-generation LMS".

The analysis of the type and name of the LMSs used in the articles reveals that most of the LMSs are open source. The most widely used open source LMS is Moodle. Moodle had over 148 million registered users as of 2019 (Moodle, 2019) as a free, widely used, open source LMS (Seluakumaran, Jusof, Ismail, & Husain, 2011) that supports online learning based on the social constructionist framework. It can be said that Moodle is preferred because it is a free open source LMS, with an easy-to-install user-friendly structure. Blackboard is still used as a commercial LMS, and continues to be preferred in educational institutions (Atkinson & Lim, 2013) as a system facilitating the follow-up of students with advanced analytical tools, log data recordings, rubrics and rich evaluation tools. Soykan and Simsek (2017), who reviewed the 2010-2014 articles on LMS, found that the most preferred open-source LMS is Moodle and the most common commercial LMS is Blackboard (formerly WebCT).

There are some studies in which some social networking / Web 2.0 based LMSs are either individually developed or embedded in an existing LMS. For instance, Facebook (Meishar-Tal, Kurtz, & Pieterse, 2012; Wang, Woo, Quek, Yang, & Liu, 2012), Twitter (Conde et al., 2014; Pettit, 2014), Google Plus (Pilli & Sozudogru, 2012) were reported to be either used as an LMS or integrated into an existing LMS. In Facebook-based research, especially Facebook groups seem to be used like an LMS. In Twitter-based studies, Twitter is not used as a standalone LMS; it seems to be integrated into an existing or newly developed LMS. Google Plus, however, has been largely used as a standalone LMS separate from any social networking websites. The fact that all of these studies, including social networking tools, were published in the 2012-2014 timeframe can be explained by the fact that this period was when social networks became popular.

It seems that some universities have also developed LMSs designed by their own team or some specially produced as part of a certain study. These types of LMSs are designed with various approaches for social networking (Son et al., 2016), are semantic / ontologic (Rani, Srivastava, & Vyas, 2016), or are developed completely for mobile use (Han & Shin, 2016; Shin & Kang, 2015). Mobile LMSs have been found to

be especially prevalent. It is also noteworthy that there is no information on SCORM compliance in the self-developed LMSs. Additionally, it was found to be a very common practice to give nicknames to SAKAI-based LMSs in the studies we analyzed.

When the LMSs are evaluated from the perspective of their use, it can be seen that the highest number of articles intend to measure achievement in terms of multiple variables. Studies have been conducted to answer questions such as how student achievement has changed with the use of LMS, and the degree of their academic effectiveness. Soykan and Simsek (2017) found that the determination of student success has a lower priority regarding the intent for the use of LMS. LMSs are also highly preferred for collaborative work. The use of LMSs is a great convenience, not only for students but also for faculty members in the tasks that require team work. Through the LMSs, the collaborative learning approach can be used effectively not only in online distance learning but also in blended learning environments. In addition, since some LMSs (eg. Moodle) contain communication and collaboration tools, some interdisciplinary approaches such as human computer interaction have also been employed to determine the usability of LMSs (De Moraes, 2012).

It has also emerged that LMSs can be effectively used as support services. Particularly in terms of timely feedback, some studies report on both peer feedback mechanisms used by students and other support components that enable the instructor's feedback to be communicated quickly and smoothly. Furthermore, in the context of support services, some LMSs even have mechanisms that provide automated feedback through techniques such as artificial intelligence, learning analytics and data mining (Dias & Diniz, 2014; Mafuna & Wadesango, 2012; Park & Jo, 2017).

South Korea and the US are identified as the countries playing a leading role when the countries with the most studies on LMS are examined. This shows that there is a growing interest in LMSs in the Far East and North America. However, regarding research interest, it can be seen that research on LMS is not dominated by a single country, and researchers from various countries have published on the subject.

When the scientific research methods employed in the articles are examined, it is observed that the quantitative research method is used the most extensively, and this is followed by the qualitative research method. The availability of the records of large sample groups on LMSs and the detailed log records of these large masses of learners may be the reasons for the intensive use of the quantitative method. The frequent use of structural equality models is also noteworthy, especially in the quantitative research studies. In the quantitative research, while students were generally selected as the sample group, in the qualitative research, various groups such as faculty members and professionals were selected as the sample group as well as the students. Although scientific research methods such as mixed method and review are used, it is remarkable that no studies using the design-based research method could be identified.

It can be seen that the questionnaire tool is used as a data collection tool especially in the quantitative studies. Besides questionnaires, log data was also identified as a very popular data collection tool. In particular, keeping LMS log data in private databases has become an important data collection tool for highly valuable scientific studies. Studies using log data as their data collection tool was found to use innovative approaches such as learning analytics and data mining. However, few studies were found to use log data as a stand-alone data collection tool, and they are usually supported by tools such as tests or questionnaires. Apart from the tests used in experimental studies, the interview tool proved to be the most powerful data collection tool, especially for the qualitative research method. In seven studies, no research method was reported. These studies were concluded to be ones that should be evaluated within the scope of Engineering Sciences rather than Educational Sciences. Furthermore, when evaluated in terms of the data collection tools they used, the studies were found not to use a single data collection tool but instead to enrich their dataset with multiple data collection instruments.

In terms of the sample group, it was found that students were selected more often than other groups, with more tendency to include undergraduate students rather than the K-12 or post-graduate students. This finding is also confirmed by the study conducted by Soykan and Simsek (2017).

Since the LMS is a tool that is used both in fully online and blended educational environments (Laflen & Smith, 2017), both were analyzed. LMSs are used more heavily in blended environments. It was also found that studies related to online environments are dominated by South Korean researchers and that it is mostly in South Korean universities that students are educated in fully online environments. LMSs are actively used

in these universities, which are called an "online" or "cyber" university. It is also remarkable that the studies carried out with students have a larger sample size. In addition to students, faculty members such as instructors, lecturers, and professors are also included in these studies. The studies involving these groups were found to have been conducted mostly by applying qualitative methodology and with smaller sample sizes.

Focusing on the theoretical models and frameworks used in LMS studies, it was found that TAM and UTAUT are often used. It is only to be expected that these models (De Smet, Bourgonjon, De Wever, Schellens, & Valcke, 2012; Venkatesh, Morris, Davis, & Davis, 2003) which intend to determine the technology use priorities and the adoption level of technology are frequently used in LMS studies. However, TRA and TPB, from which TAM was derived, are also frequently used especially in the mobile LMS studies (Shin & Kang, 2015). Expectation-confirmation theory (Bhattacherjee, 2001; Davis, 1989), which describes measuring the degree of alignment between the perceptions of users' technology use expectations and their real performance, and QoI (Dias & Diniz, 2013) which intends to determine the quality and efficiency of user interactions in online teaching-learning environments, are two other notable theories and models that are frequently used.

In the light of the findings obtained by this study, the following suggestions can be made to researchers and institutions: The research questions examined through this systematic review can be expanded to include some other methods of analysis such as social network analysis, content analysis, or bibliometric analysis. In addition, different databases and digital libraries can be used instead of the Web of Science database used in the present study. Instead of SSCI, articles in other prestigious indices such as SCI-Expanded or ESCI can also be analyzed by other researchers.

Regarding methodology, it can be seen that the number of design-based studies in LMS articles is inadequate. Conducting further research in this regard is strongly recommended. Our review has also revealed that log data has been increasingly used in the studies conducted in recent years. It can be safely predicted that it will be used as a means of collecting data in a higher number of future studies. It may be suggested that researchers pay further attention to such log data. Keyword analyses of the articles can be conducted by different researchers and further lexical analyses can also be performed. In addition, although TAM and its derivatives are used extensively as a model, the connectivism theory, which was not detected in any of the LMS studies analyzed here, can be applied in new studies.

As for institutions, the increasing popularization of using free open source, LMSs with advanced support services such as Moodle may offer an idea to the higher education institutions that are in their LMS establishment/development stage. In addition, organizations would be well advised to take notice of the growing popularity of mobile devices and consider mobile LMSs as another alternative to achieve their educational objectives.

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ANALYSIS OF THE WEB APPLICATION ON BAYES' THEOREM CONSIDERING DATA SCIENCE AND TECHNOLOGICAL ACCEPTANCE MODEL

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ABSTRACT

This mixed research aims to design and implement the Web Application on Bayes' Theorem (WABT) in the Statistical Instrumentation for Business subject. WABT presents the procedure to calculate the probability of Bayes' Theorem through the simulation of data about the supply of products. Technology Acceptance Model (TAM), machine learning and data science are used to analyze the impact of WABT on the educational process. The results of machine learning (60%, 70% and 80% of training) indicate that WABT positively influences the Motivation, Autonomy, Personalized learning and Active role. Data science identifies predictive models of the impact of WABT on the teaching and learning process through the decision tree technique. In addition, WABT is a pleasant, simple, useful and innovative web tool for the educational field. Finally, teachers can use TAM model, data science and machine learning in order to identify the impact of digital tools on the educational process.

Keywords: Technology, learning, TAM model, data science, learning machine.

INTRODUCTION

The planning and organization of school activities in the 21st century are being modified due to the emergence of the new information and communication technologies (Abbott, 2016; Aparicio, Bacao, & Oliveira, 2016; Guerrero & Noguera, 2018). In particular, universities are identifying their strengths, opportunities, weaknesses and threats in order to innovate the educational context through technology (Salas & Salas, 2018; Tikoria & Agariya, 2017). The education system must modify the teaching-learning process in order to meet the expectations and demands of the Society, that is, students need to develop their skills and acquire an active role through digital tools (Fernandez, 2017; Marquez & Mourelle, 2018). Also, technology and learning methods improve knowledge assimilation, autonomy and motivation (Emelyanova & Voronina, 2017; Salas & Vazquez, 2017).

Advances of the internet are causing that educational institutions design, organize and use websites (Alvarez & Garcia, 2017; Sun, Xie, & Anderman, 2018). Therefore, Information and Communication Technologies (ICT) are transforming the functions and roles of students and teachers in the educational field (Murphy & Stewart, 2017; Roberts, 2018; Salas, 2019; Tejada & Pozos, 2018). For example, teachers need to develop digital competence in order to plan, design and build new teaching-learning environments (Tejada & Pozos, 2018). The incorporation of technological applications in school activities allows the innovation of teaching-learning methods and processes (Kryukov & Gorin, 2017; Lawrence, 2018). Even, the universities are identifying, selecting and using new strategies with the purpose of raising the educational quality (Diep, Cocquyt, Zhu, Vanwing, & Greef, 2017; Fernandez, 2017; Lee, 2010).

Due to the advancement of technology, various models have emerged on the impact, perception and influence of digital tools in the educational context (Kurt & Tingoy, 2017). In particular, TAM model describes the degree of acceptance about the use of technology in organizations through the beliefs, behaviors and intentions of individuals (Chow, Herold, Choo, & Chan, 2012; Kurt & Tingoy, 2017; Liu, Chen, Sun, Wible, & Kuo, 2010).

The students of the Statistical Instrumentation for Business subject have problems to assimilate the knowledge related to Bayes' theorem.Therefore, this mixed research proposes the construction of WABT in order to improve the teaching-learning process on the Bayes' theorem. Also, TAM model, machine learning and data science allow knowing the impact of this web application in the Statistical Instrumentation for Business subject.

The research questions are:

- What is the impact of WABT in the Statistical Instrumentation for Business subject considering machine learning (60%, 70% and 80% of training)?
- How does the use of WABT influence the teaching-learning process considering TAM model?
- What are the perceptions of the students about the incorporation of WABT in the educational process on Bayes' theorem?
- What are the predictive models about the use of WABT in the educational process by means of the decision tree technique (data science)?

TECHNOLOGY ACCEPTANCE MODEL

New information and communication technologies are changing the organization and realization of activities in the educational field (Baleghi, Ayub, Mahmud, & Daud, 2017; Salas, 2016). In fact, the use of digital tools is increasing in the classroom in order to achieve the development of skills (Bortnik, Stozhko, Pervukhina, Tchernysheva, & Belysheva, 2017). According to Doleck, Bazelais and Lemay (2017), there are several models that analyze the intention and perception of individuals about the use of technology in organizations, for example, Theory of Reasoned Action (TRA), Technology Acceptance Model (TAM), Theory of Planned Behavior (TPB) and Unified Theory of Acceptance and Use of Technology (UTAUT).

TAM model allows analyzing the factors that influence the educational process during the use of information systems (Baleghi, Ayub, Mahmud, & Daud, 2017; Fong, Lee, Chang, Zhang, Ngaia, & Lim, 2014). In 1986, Davis proposed this model considering mainly the aspects on Perceived Ease of Use (PEU) and Perceived Usefulness (PU) of the technological applications (Baleghi, Ayub, Mahmud, & Daud, 2017; Chow, Herold, Choo, & Chan, 2012; Ngai, Poon, & Chan, 2007).

Perceived Usefulness is related to the effect of technology on user performance and Perceived Ease of Use refers to the use of technology without effort (Baleghi, Ayub, Mahmud, & Daud, 2017; Teo, Lee, Chai, & Wong, 2009). In the field of education, Perceived Usefulness is the perception of students about the use of ICT to achieve the development of competencies (Baleghi, Ayub, Mahmud, & Daud, 2017). In addition, TAM model proposed by Davis includes external variables, attitudes and intentions (Baleghi, Ayub, Mahmud, & Daud, 2017; Liu, Chen, Sun, Wible, & Kuo, 2010).

Several authors (e.g., Baleghi, Ayub, Mahmud, & Daud, 2017; Chen & Chengalur, 2015; Doleck, Bazelais, & Lemay, 2017) have used TAM model to analyze the impact of the tools of information and communication in the teaching-learning process. For example, Baleghi, Ayub, Mahmud and Daud (2017) propose the use of TAM model to analyze the interactivity, technical support, ease of use and usefulness of the Learning Management System (LMS) in the universities.

Also, Doleck, Bazelais and Lemay (2017) propose the use of TAM model to analyze the ease of use (effectiveness and satisfaction) and utility (peer influence and relative advantage) of social networks in the educational context. Finally, TAM model determines the degree of acceptance related to the use of technology in organizations (Cabero, Gallego, Puentes, & Jimenez, 2018).

METHOD

The objective of this mixed research is to analyze the impact of WABT on the educational process considering TAM model, data science and machine learning. WABT presents the procedure to calculate the probability of the Bayes' theorem through the simulation of data about the supply of products by companies.

Participants

This mixed research was done in a Mexican university during the 2018 school year. The participants are 61 students of the Statistical Instrumentation for Business subject (See Table 1).

Table 1. Research participants

Bachelor's degree	Number of students	Average age
Administration	9	18.66
Commerce	19	18.78
Accountancy	15	18.86
Marketing	16	18.93
Information Technology	2	19.00

Procedure

The procedure of this study began with the design and construction of WABT with the purpose of facilitating the teaching-learning process on Bayes' Theorem through the simulation of data about the supply of products by companies. Figure 1 shows the elements of this web application.

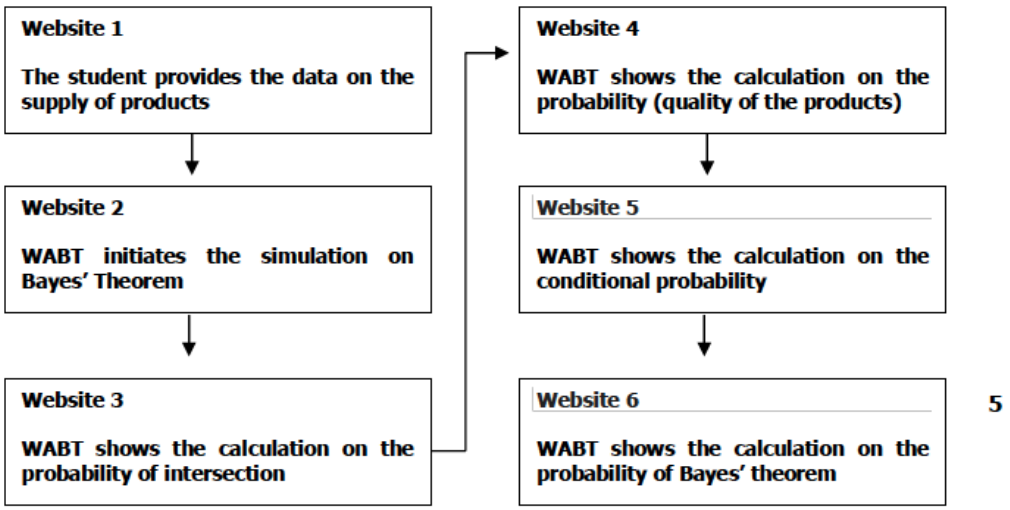

Figure 1. Elements of WABT

WABT asks for information of the probability on the supply of products: quality (good and poor) and providers (company 1 and company 2). Figure 2 shows the home page on WABT.

Figure 2. Web interface in WABT

To perform the calculation of Bayes' theorem, the probabilities of events (company 1 and company 2) and conditional probabilities (supply of the products) are necessary (See Figure 3).

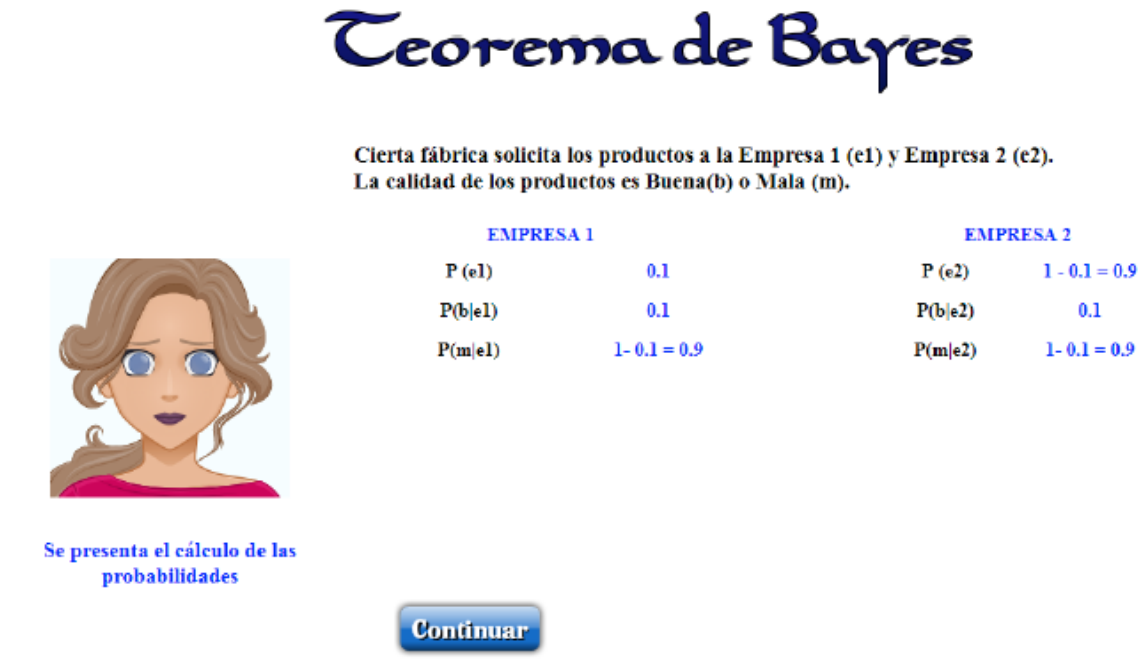

Figure 3. Calculation of probabilities in WABT

Figure 4 shows the calculation on the probabilities of the intersection about the quality (good and poor) and providers (company 1 and company 2) in WABT.

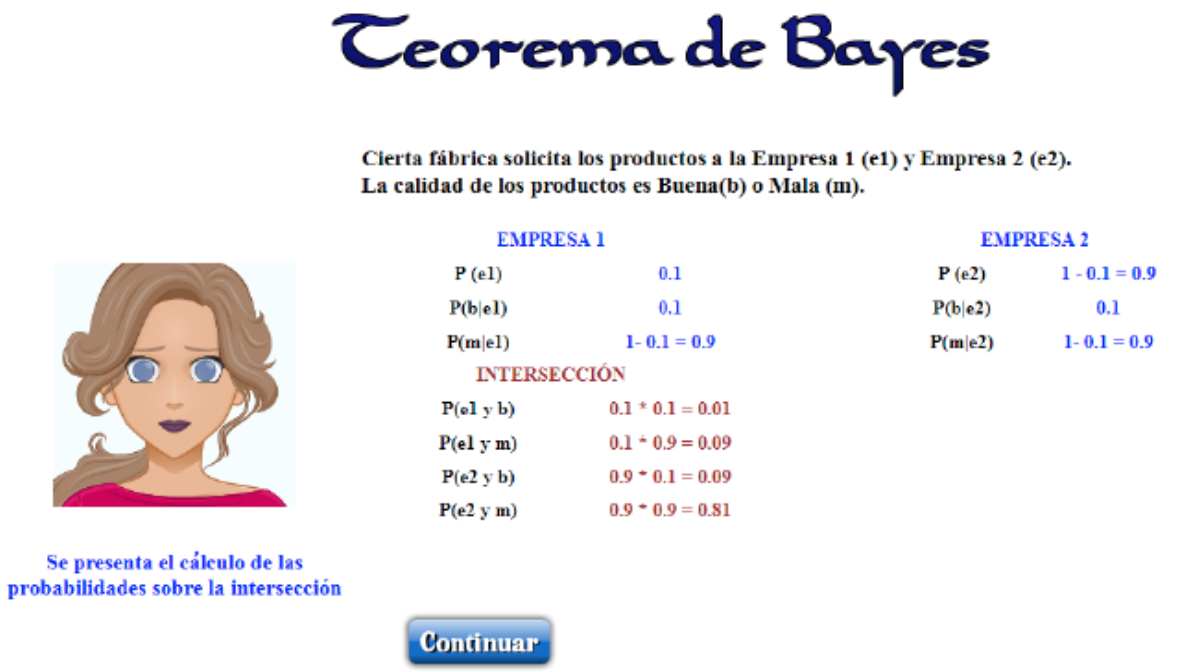

Figure 4. Calculation on the probability of intersection in WABT

WABT shows the calculation of the probabilities on the good and poor quality of the products (See Figure 5).

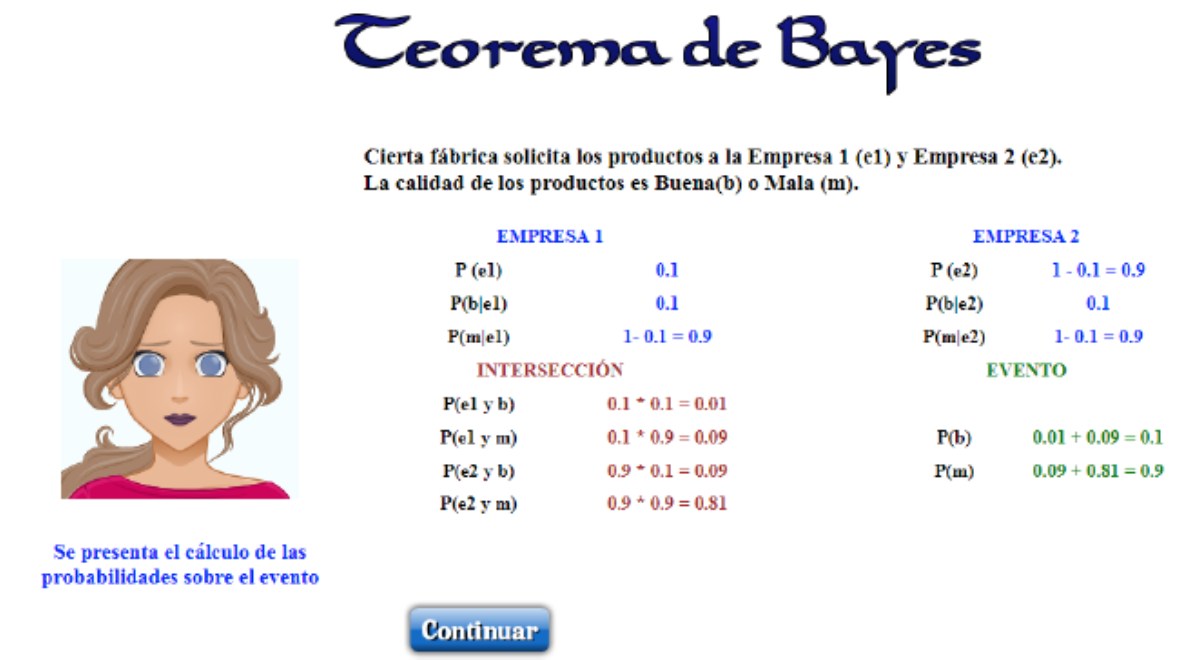

Figure 5. Probability on the good and poor quality of the products in WABT

To calculate the Bayes' theorem, the probabilities of the intersections and quality of the products (good and poor) are necessary (See Figure 6).

Figure 6. Probability of Bayes' theorem (good quality of the products)

Figure 7 shows the probability of Bayes' theorem on poor quality of the products.

Figure 7. Probability of Bayes' theorem (poor quality of the products)

The students of the Statistical Instrumentation for Business subject used WABT through the following web address:

http://sistemasusables.com/estadisticaavanzada/sistema4/inicio.html

This study proposes the development of a model to analyze the use of WABT in the educational process on Bayes' theorem considering TAM model (See Figure 8).

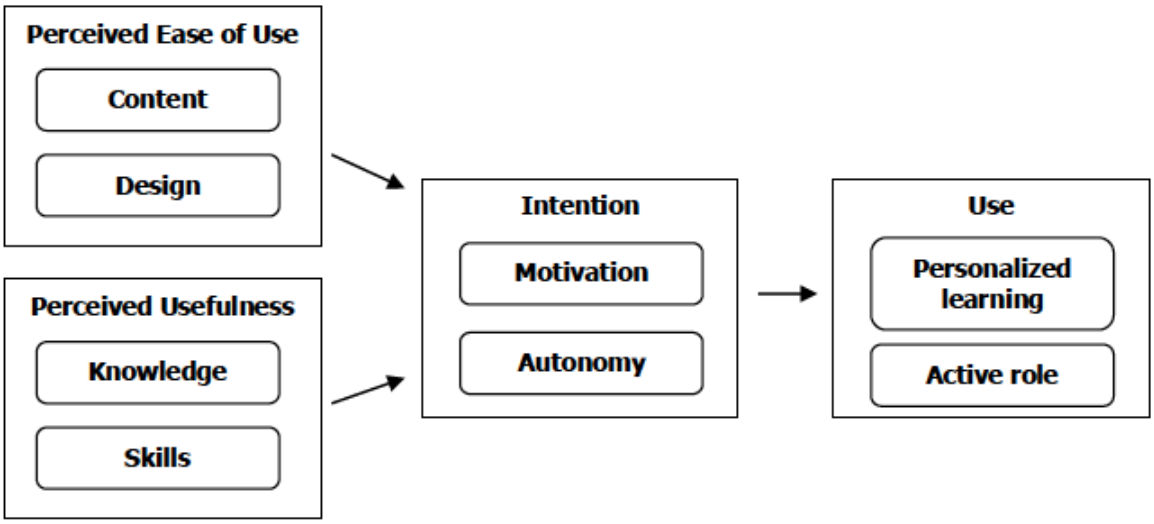

Figure 8. Use of TAM model in this research

Table 2 shows the elements of TAM model used in this research.

Table 2. TAM model

Item	TAM model	Dimension	Description
1	Perceived Ease of Use	Content of WABT	Simulation of data about the supply of products by companies
		Design of WABT	Aesthetics of the web interface (color, font, images and distribution of objects)
2	Perceived Usefulness	Knowledge	Assimilation of knowledge about the Bayes' theorem through WABT
		Skills	Development of mathematical skills on Bayes' theorem through WABT
3	Intention	Motivation	Positive attitude for learning through WABT
		Autonomy	Ability to organize learning through WABT
4	Use	Personalized learning	Management of learning through WABT
		Active role	Participation in learning through WABT

The hypotheses of this research related to the aspects of Intention and Perceived ease of use are:

H1: The content of WABT positively influences the motivation of the student during the learning process

H2: The design of WABT positively influences the motivation of the student during the learning process

H3: The content of WABT positively influences the autonomy of the student during the learning process

H4: The design of WABT positively influences the autonomy of the student during the learning process

Also, the hypotheses about Intention and Perceived Usefulness are:

H5: The assimilation of knowledge through WABT positively influences the motivation of the student during the learning process

H6: The development of skills through WABT positively influences the motivation of the student during the learning process

H7: The assimilation of knowledge through WABT positively influences the autonomy of the student during the learning process

H8: The development of skills through WABT positively influences the autonomy of the student during the learning process

The hypotheses about the Intention and Use of WABT during the teaching-learning process are:

H9: The motivation of the student positively influences personalized learning during the use of WABT

H10: The autonomy of the student positively influences personalized learning during the use of WABT

H11: The motivation of the student positively influences the active role for learning during the use of WABT

H12: The autonomy of the student positively influences the active role for learning during the use of WABT

The tools used in this research are Rapidminer tool and SPSS software. Rapidminer tool allows the construction of predictive models (decision tree technique) and calculation of linear regression by means of machine learning with 60%, 70% and 80% of training. On the other hand, SPSS software allows calculating Load factor, Cronbach's alpha and Average variance extracted in order to validate the measurement instrument.

Figure 9 shows the use of Rapidminer tool for calculating the linear regression (machine learning). Data Split component allows adjusting the training values (60%, 70% and 80%).

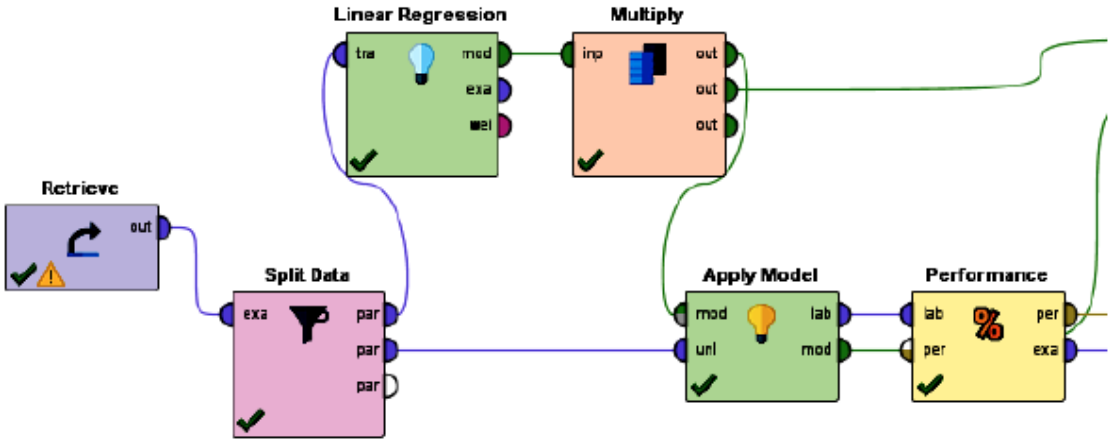

Figure 9. Use of Rapidminer tool for machine learning

The information on the elements of TAM model and the student profile (sex, age and Bachelor's degree) are used for the construction of the following predictive models on the impact of WABT in the motivation and autonomy during the educational process:

- Predictive model 1 on the content of WABT and motivation of the student during the learning process
- Predictive model 2 on the design of WABT and motivation of the student during the learning process
- Predictive model 3 on the content of WABT and autonomy of the student during the learning process
- Predictive model 4 on the design of WABT and autonomy of the student during the learning process

Also, the predictive models of Intention and Perceived Usefulness are:

- Predictive model 5 on the assimilation of knowledge through WABT and motivation of the student during the learning process
- Predictive model 6 on the development of skills through WABT and motivation of the student during the learning process
- Predictive model 7 on the assimilation of knowledge through WABT and autonomy of the student during the learning process
- Predictive model 8 on the development of skills through WABT and autonomy of the student during the learning process

The predictive models of the Intention and Use of WABT are:

- Predictive model 9 on the motivation of the student and personalized learning during the use of WABT
- Predictive model 10 on the autonomy of the student and personalized learning during the use of WABT
- Predictive model 11 on the motivation of the student and active role for learning during the use of WABT
- Predictive model 12 on the autonomy of the student and active role for learning during the use of WABT

Figure 10 shows the use of Rapidminer tool for the construction of predictive models on WABT in the educational process.

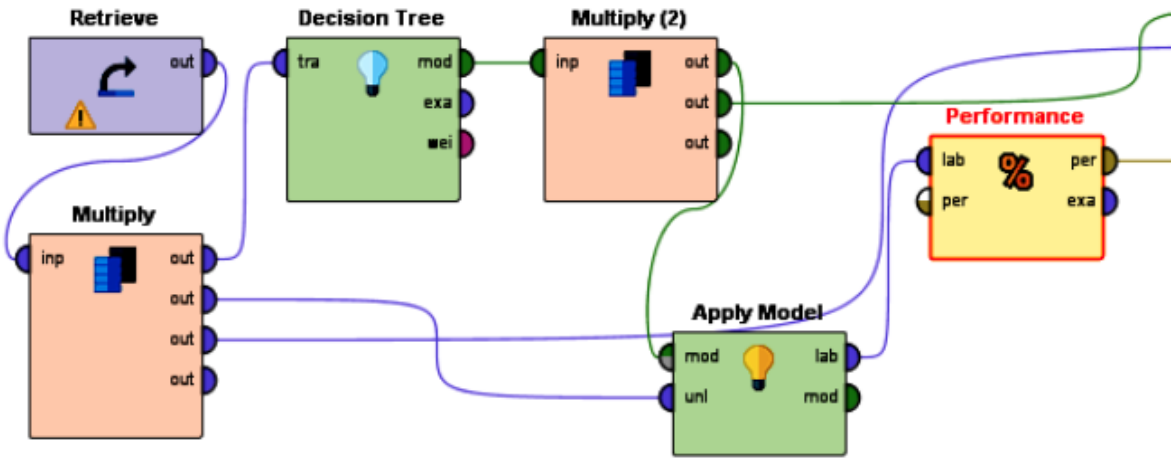

Figure 10. Use of Rapidminer tool for predictive models

Data Collection

Table 3 shows the measurement instrument used in this research. The scale used is Very much (1), Some (2), Little (3) and Too little (4).

Table 3. Measurement instrument

Variable	Dimension	Load factor	Cronbach's alpha	Average variance extracted
Perceived Ease of Use	Content	0.928	0.849	0.711
	Design	0.749		
Perceived Usefulness	Knowledge	0.913	0.814	0.816
	Skills	0.894		
Intention	Motivation	0.826	0.805	0.780
	Autonomy	0.937		
Use	Personalized learning	0.787	0.744	0.740
	Active role	0.928		

According to Pock (2007), the values must be higher than 0.60 in Cronbach's Alpha and 0.5 in Load factor to cover the reliability and validity requirements. Table 3 shows that all the variables meet these requirements.

Also, Average variance extracted must have a value greater than 0.5 (Pock, 2007). All the values are higher than 0.71 (See Table 3). The variables on the profile of the students are Sex, Age and Career. On the other hand, the qualitative variables are educational process, innovative tool, simulation, benefits, satisfaction and useful.

Analysis of Data

At the end of the topic on the Bayes' theorem, the measurement instrument is applied. Using SPSS software, the values on Load factor, Cronbach's alpha and Average variance extracted are calculated. Also, Rapidminer tool allows the construction of predictive models (decision tree technique) and calculation of linear regression by means of machine learning with 60%, 70% and 80% of training.

RESULTS

The results about the impact of WABT on the educational process are analyzed through machine learning and data science.

Perceived Ease of Use

The results of machine learning with 60% of training indicate that hypothesis 1 (0.394), hypothesis 2 (0.540), hypothesis 3 (0.672) and hypothesis 4 (0.606) are accepted (See Table 4).

Table 4. Machine learning about content and design of WABT (60% of training)

Hypothesis	Linear regression	Conclusion	Squared_error
H1: Content of WABT → Motivation	y = 0.394x + 0.866	Accepted: 0.394	0.296
H2: Design of WABT → Motivation	y = 0.540x + 0.663	Accepted: 0.540	0.185
H3: Content of WABT → Autonomy	y = 0.672x + 0.533	Accepted: 0.672	0.245
H4: Design of WABT → Autonomy	y = 0.606x + 0.601	Accepted: 0.606	0.177

Hypothesis 1, 2, 3 and 4 of WABT (Content and Design) are accepted through machine learning with 70% of training (See Table 5).

Table 5. Machine learning about content and design of WABT (70% of training)

Hypothesis	Linear regression	Conclusion	Squared_error
H1: Content of WABT → Motivation	y = 0.439x + 0.823	Accepted: 0.439	0.338
H2: Design of WABT → Motivation	y = 0.565x + 0.646	Accepted: 0.565	0.194
H3: Content of WABT → Autonomy	y = 0.710x + 0.470	Accepted: 0.710	0.321
H4: Design of WABT → Autonomy	y = 0.565x + 0.646	Accepted: 0.565	0.163

The results of machine learning with 80% of training indicate that hypothesis 1 (0.498), hypothesis 2 (0.610), hypothesis 3 (0.715) and hypothesis 4 (0.584) are accepted (See Table 6).

Table 6. Machine learning about content and design of WABT (80% of training)

Hypothesis	Linear regression	Conclusion	Squared_error
H1: Content of WABT → Motivation	y = 0.498x + 0.736	Accepted: 0.498	0.483
H2: Design of WABT → Motivation	y = 0.610x + 0.578	Accepted: 0.610	0.267
H3: Content of WABT → Autonomy	y = 0.715x + 0.473	Accepted: 0.715	0.414
H4: Design of WABT → Autonomy	y = 0.584x + 0.632	Accepted: 0.584	0.169

Figure 11 shows the predictive model 1. If the student considers that the content of WABT facilitates some the teaching-learning process and studies the Bachelor's degree in Administration (Adm) then this web application favors some the motivation of the student during the educational process on Bayes' theorem.

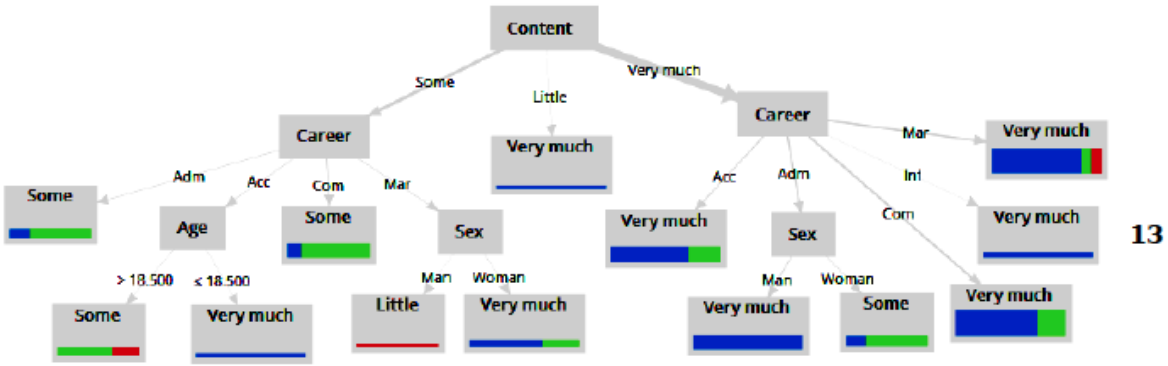

Figure 11. Predictive model 1

The accuracy of the predictive model 1 on the content of WABT and motivation of the student is 80.33% (See Figure 12).

accuracy: 80.33%

	true Very much	true Some	true Little	class precision
pred. Very much	35	7	1	81.40%
pred. Some	3	13	1	76.47%
pred. Little	0	0	1	100.00%
class recall	92.11%	65.00%	33.33%	

Figure 12. Accuracy of the predictive model 1

Figure 13 shows the predictive model 2. If the student considers that the design of WABT facilitates some the teaching-learning process, studies the Bachelor's degree in Marketing (Mar) and is woman then this web application favors very much the motivation of the student during the educational process on Bayes' theorem.

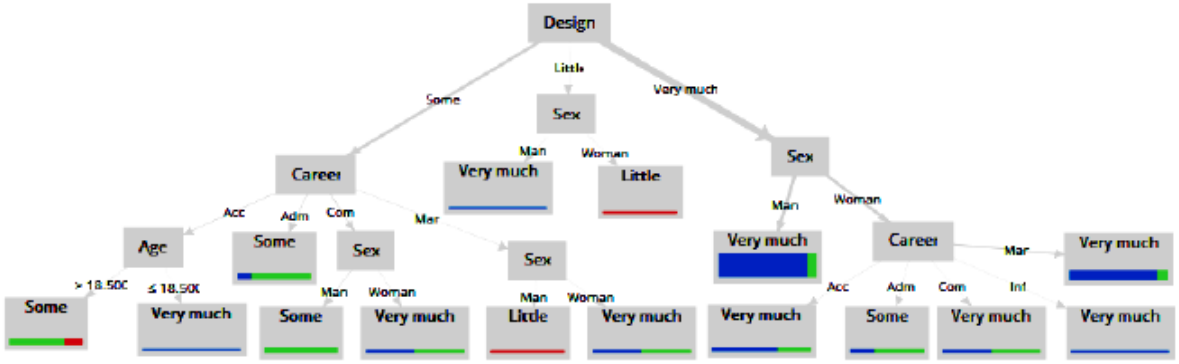

Figure 13. Predictive model 2

The accuracy of the predictive model 2 on the design of WABT and motivation of the student is 83.61% (See Figure 14).

accuracy: 83.61%

	true Very much	true Some	true Little	class precision
pred. Very much	36	7	0	83.72%
pred. Some	2	13	1	81.25%
pred. Little	0	0	2	100.00%
class recall	94.74%	65.00%	66.67%	

Figure 14. Accuracy of the predictive model 2

Figure 15 shows the predictive model 3. If the student considers that the content of WABT facilitates some the teaching-learning process and studies the Bachelor's degree in Marketing (Mar) then this web application favors some the autonomy of the student during the educational process on Bayes' theorem.

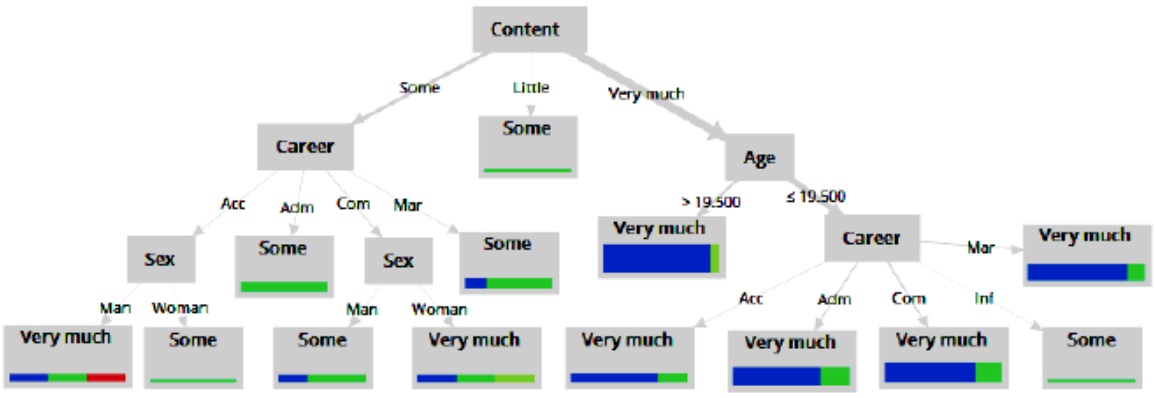

Figure 15. Predictive model 3

The accuracy of the predictive model 3 on the content of WABT and autonomy of the student is 78.69% (See Figure 16).

accuracy: 78.69%

	true Very much	true Some	true Little
pred. Very much	36	8	2
pred. Some	2	12	0
pred. Little	0	0	0
pred. Too little	0	0	0
class recall	94.74%	60.00%	0.00%

Figure 16. Accuracy of the predictive model 3

Figure 17 shows the predictive model 4. If the student considers that the design of WABT facilitates very much the teaching-learning process and is older than 19.5 years then this web application favors very much the autonomy of the student during the educational process on Bayes' theorem.

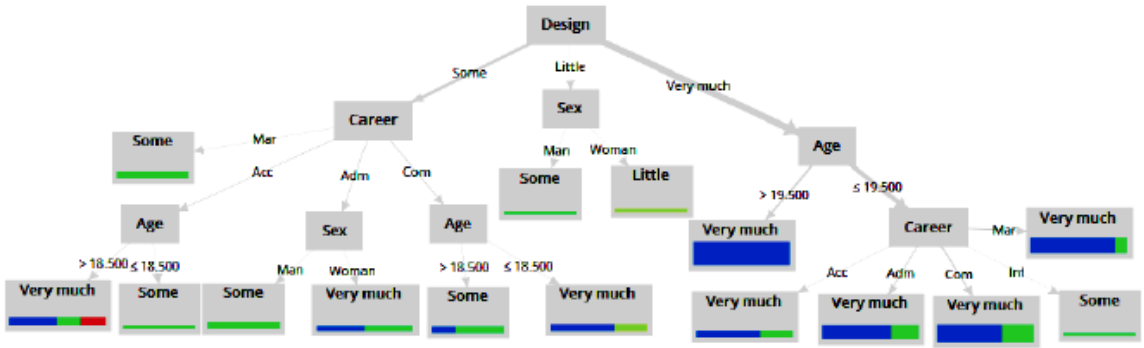

Figure 17. Predictive model 4

Also, if the student considers that the design of WABT facilitates some the teaching-learning process, studies the Bachelor's degree in Administration (Adm) and is woman then this web application favors very much the autonomy of the student during the educational process on Bayes' theorem (See Figure 17). The accuracy of the predictive model on the design of WABT and autonomy of the student is 80.33% (See Figure 18).

accuracy: 80.33%

	true Very much	true Some	true Little
pred. Very much	37	9	1
pred. Some	1	11	0
pred. Little	0	0	1
pred. Too little	0	0	0
class recall	97.37%	55.00%	50.00%

Figure 18. Accuracy of the predictive model 4

Perceived Usefulness

The results of machine learning with 60% of training indicate that hypothesis 5 (0.440), hypothesis 6 (0.727), hypothesis 7 (0.403) and hypothesis 8 (0.880) are accepted (See Table 7).

Table 7. Machine learning about knowledge and Skills of WABT (60% of training)

Hypothesis	Linear regression	Conclusion	Squared_error
H5:Assimilation of knowledge through WABT → Motivation	y = 0.440x + 0.818	Accepted: 0.440	0.172
H6: Development of skills through WABT → Motivation	y = 0.727x + 0.454	Accepted: 0.727	0.253
H7: Assimilation of knowledge through WABT → Autonomy	y = 0.403x + 0.892	Accepted: 0.403	0.213
H8: Development of skills through WABT → Autonomy	y = 0.880x + 0.287	Accepted: 0.880	0.282

Hypothesis 5, 6, 7 and 8 of Assimilation of knowledge and development of skills through WABT are accepted through machine learning with 70% of training (See Table 8).

Table 8. Machine learning about knowledge and Skills of WABT (70% of training)

Hypothesis	Linear regression	Conclusion	Squared_error
H5:Assimilation of knowledge through WABT → Motivation	y = 0.535x + 0.697	Accepted: 0.535	0.201
H6: Development of skills through WABT → Motivation	y = 0.731x + 0.459	Accepted: 0.731	0.300
H7: Assimilation of knowledge through WABT → Autonomy	y = 0.425x + 0.841	Accepted: 0.425	0.231
H8: Development of skills through WABT → Autonomy	y = 0.889x + 0.257	Accepted: 0.889	0.371

The results of machine learning with 80% of training indicate that hypothesis 5 (0.537), hypothesis 6 (0.706), hypothesis 7 (0.414) and hypothesis 8 (0.824) are accepted (See Table 9).

Table 9. Machine learning about knowledge and Skills of WABT (80% of training)

Hypothesis	Linear regression	Conclusion	Squared_error
H5:Assimilation of knowledge through WABT → Motivation	y = 0.537x + 0.674	Accepted: 0.537	0.230
H6: Development of skills through WABT → Motivation	y = 0.706x + 0.464	Accepted: 0.706	0.340
H7: Assimilation of knowledge through WABT → Autonomy	y = 0.414x + 0.857	Accepted: 0.414	0.236
H8: Development of skills through WABT → Autonomy	y =0.824x + 0.331	Accepted: 0.824	0.326

Figure 19 shows the predictive model 5. If the student considers that the assimilation of knowledge through WABT facilitates some the teaching-learning process, studies the Bachelor's degree in Commerce (Com) and is older than 19.5 years then this web application favors very much the motivation of the student during the educational process on Bayes' theorem.

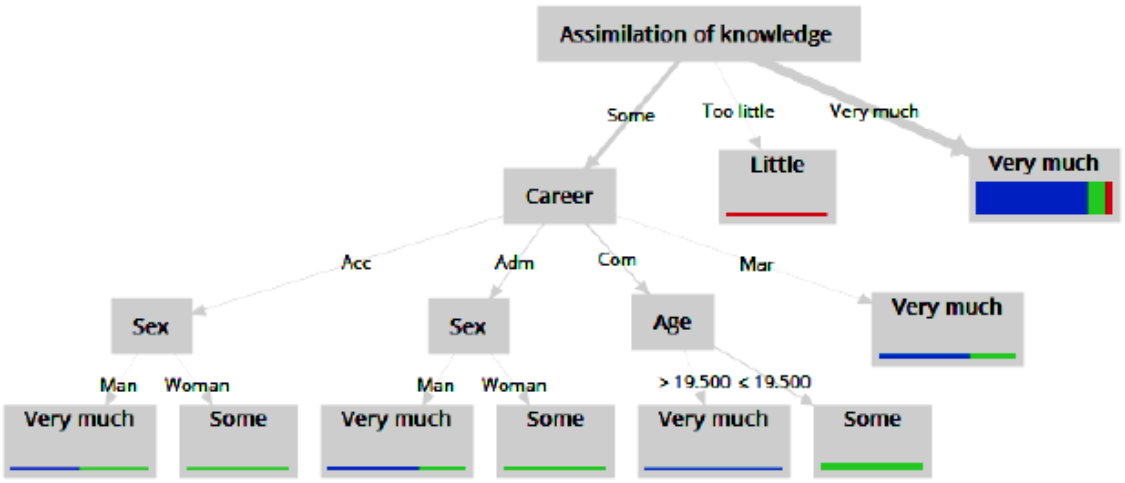

Figure 19. Predictive model 5

The accuracy of the predictive model on the assimilation of knowledge through WABT and motivation of the student is 83.61% (See Figure 20).

accuracy: 83.61%

	true Very much	true Some	true Little	class precision
pred. Very much	38	8	2	79.17%
pred. Some	0	12	0	100.00%
pred. Little	0	0	1	100.00%
class recall	100.00%	60.00%	33.33%	

Figure 20. Accuracy of the predictive model 5

Figure 21 shows the predictive model 6. If the student considers the development of skills through WABT that facilitates some the teaching-learning process and studies the Bachelor's degree in Administration (Adm) then this web application favors some the motivation of the student during the educational process on Bayes' theorem.

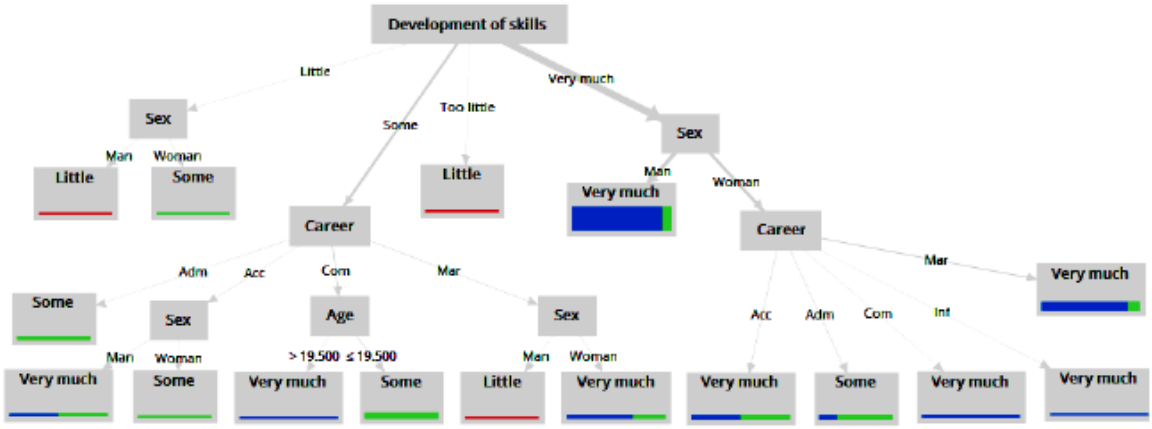

Figure 21. Predictive model 6

The accuracy of the predictive model on the development of skills through WABT and motivation of the student is 86.89% (See Figure 22).

accuracy: 86.89%

	true Very much	true Some	true Little	class precision
pred. Very much	37	7	0	84.09%
pred. Some	1	13	0	92.86%
pred. Little	0	0	3	100.00%
class recall	97.37%	65.00%	100.00%	

Figure 22. Accuracy of the predictive model 6

Figure 23 shows the predictive model 7. If the student considers that the assimilation of knowledge through WABT facilitates some the teaching-learning process and studies the Bachelor's degree in Administration (Adm) then this web application favors some the autonomy of the student during the educational process on Bayes' theorem.

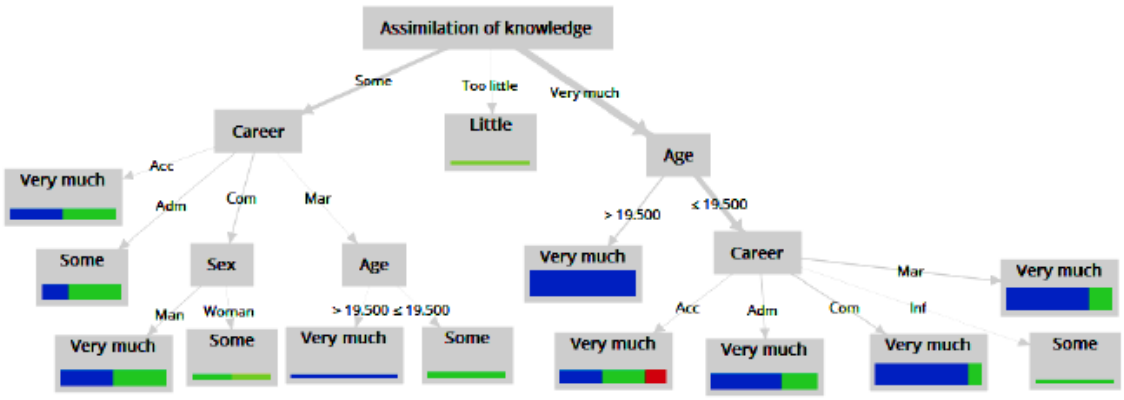

Figure 23. Predictive model 7

The accuracy of the predictive model on the assimilation of knowledge through WABT and autonomy of the student is 73.77% (See Figure 24).

accuracy: 73.77%

	true Very much	true Some	true Little	true Too little	class precision
pred. Very much	36	12	0	1	73.47%
pred. Some	2	8	1	0	72.73%
pred. Little	0	0	1	0	100.00%
pred. Too little	0	0	0	0	0.00%
class recall	94.74%	40.00%	50.00%	0.00%	

Figure 24. Accuracy of the predictive model 7

Figure 25 shows the predictive model 8. If the student considers that the development of skills through WABT facilitates some the teaching-learning process, is older than 19.5 years and studies the Bachelor's degree in Marketing (Mar) then this web application favors very much the autonomy of the student during the educational process on Bayes' theorem.

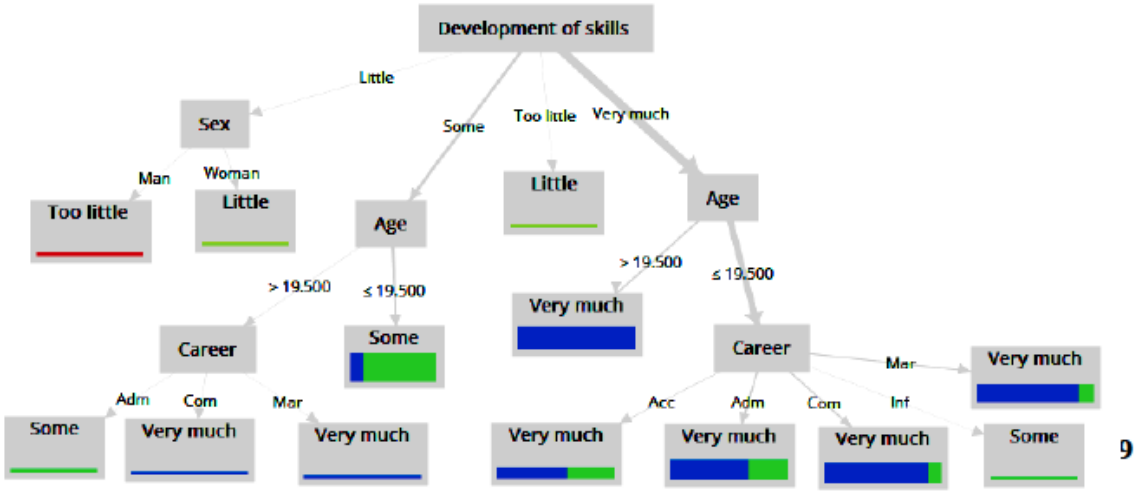

Figure 25. Predictive model 8

The accuracy of the predictive model on the development of skills through WABT and autonomy of the student is 85.25% (See Figure 26).

accuracy: 85.25%

	true Very much	true Some	true Little	true Too little	class precision
pred. Very much	36	7	0	0	83.72%
pred. Some	2	13	0	0	86.67%
pred. Little	0	0	2	0	100.00%
pred. Too little	0	0	0	1	100.00%
class recall	94.74%	65.00%	100.00%	100.00%	

Figure 26. Accuracy of the predictive model 8

Intention

The results of machine learning with 60% of training indicate that hypothesis 9 (0.351), hypothesis 10 (0.421), hypothesis 11 (0.282) and hypothesis 12 (0.351) are accepted (See Table 10).

Table 10. Machine learning about Motivation and Autonomy (60% of training)

Hypothesis	Linear regression	Conclusion	Squared_error
H9: Motivation → personalized learning through WABT	y = 0.351x + 0.840	Accepted: 0.351	0.173
H10: Autonomy → personalized learning through WABT	y = 0.421x + 0.731	Accepted: 0.421	0.136
H11 Motivation → active role through WABT	y = 0.282x + 0.853	Accepted: 0.282	0.382
H12: Autonomy → active role through WABT	y = 0.351x + 0.803	Accepted: 0.351	0.340

Hypothesis 9, 10, 11 and 12 of Motivation and Autonomy are accepted through machine learning with 70% of training (See Table 11).

Table 11. Machine learning about Motivation and Autonomy (70% of training)

Hypothesis	Linear regression	Conclusion	Squared_error
H9: Motivation → personalized learning through WABT	y = 0.340x + 0.827	Accepted: 0.340	0.187
H10: Autonomy → personalized learning through WABT	y = 0.430x + 0.702	Accepted: 0.430	0.149
H11 Motivation → active role through WABT	y = 0.325x + 0.801	Accepted: 0.325	0.438
H12: Autonomy → active role through WABT	y = 0.384x + 0.757	Accepted: 0.384	0.398

The results of machine learning with 80% of training indicate that hypothesis 9 (0.395), hypothesis 10 (0.447), hypothesis 11 (0.381) and hypothesis 12 (0.434) are accepted (See Table 12).

Table 12. Machine learning about Motivation and Autonomy (80% of training)

Hypothesis	Linear regression	Conclusion	Squared_error
H9: Motivation → personalized learning through WABT	y = 0.395x + 0.757	Accepted: 0.395	0.229
H10: Autonomy → personalized learning through WABT	y = 0.447x + 0.675	Accepted: 0.447	0.159
H11 Motivation → active role through WABT	y = 0.381x + 0.736	Accepted: 0.381	0.574
H12: Autonomy → active role through WABT	y = 0.434x + 0.694	Accepted: 0.434	0.534

Figure 27 shows the predictive model 9. If the student considers that the motivation of the student favors very much the teaching-learning process on Bayes' theorem and studies the Bachelor's degree in Accountancy (Acc) then this web application facilitates very much the personalized learning through WABT.

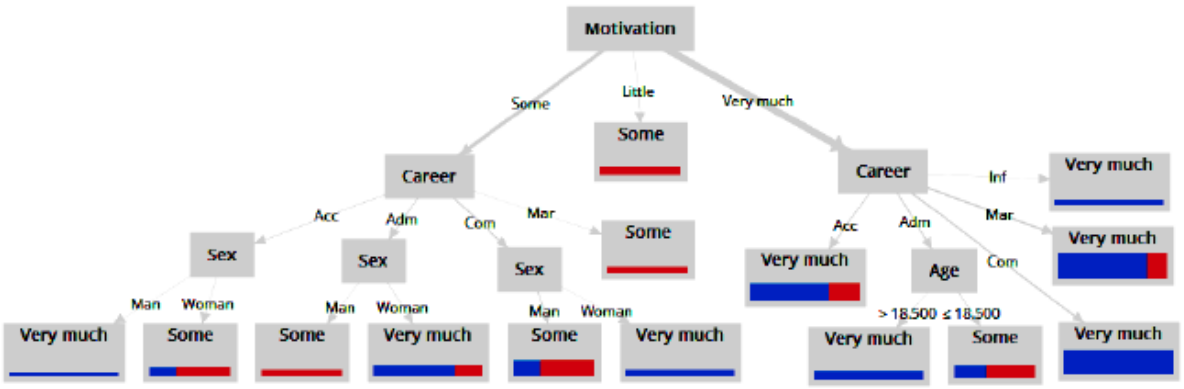

Figure 27. Predictive model 9

If the student considers that the motivation of the student favors very much the teaching-learning process on Bayes' theorem and studies the Bachelor's degree in Marketing (Mar) then this web application facilitates very much the personalized learning through WABT (See Figure 27). The accuracy of the predictive model on the motivation of the student and personalized learning through WABT is 83.61% (See Figure 28).

accuracy: 83.61%

	true Very much	true Some	class precision
pred. Very much	35	5	87.50%
pred. Some	5	16	76.19%
class recall	87.50%	76.19%	

Figure 28. Accuracy of the predictive model 9

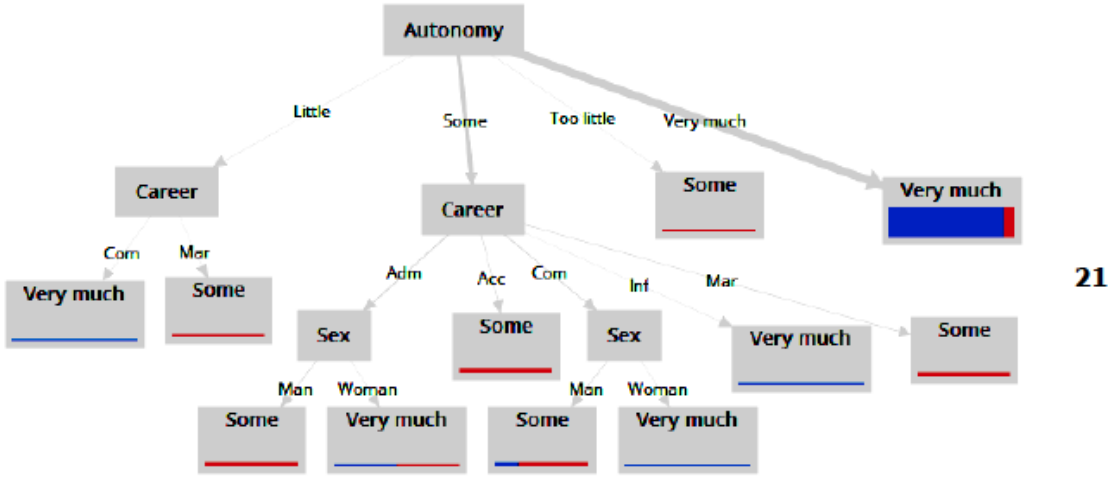

Figure 29. Predictive model 10

The accuracy of the predictive model on the autonomy of the student and personalized learning through WABT is 91.80% (See Figure 30).

accuracy: 91.80%

	true Very much	true Some	class precision
pred. Very much	39	4	90.70%
pred. Some	1	17	94.44%
class recall	97.50%	80.95%	

Figure 30. Accuracy of the predictive model 10

Figure 31 shows the predictive model 11. If the student considers that the motivation of the student favors some the teaching-learning process on Bayes' theorem and studies the Bachelor's degree in Administration (Adm) and is man then this web application facilitates some the active role through WABT.

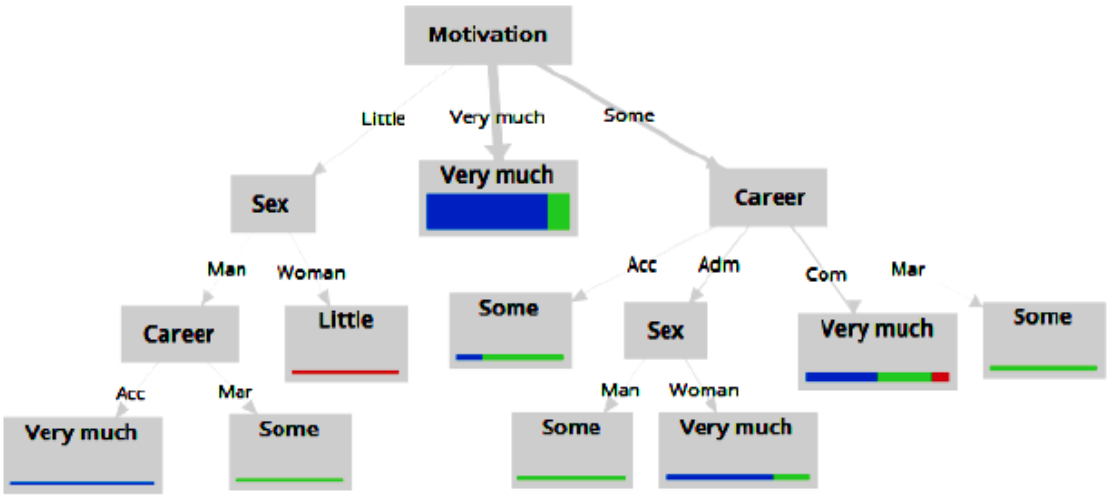

Figure 31. Predictive model 11

The accuracy of the predictive model on the motivation of the student and the active role through WABT is 80.33% (See Figure 32).

accuracy: 80.33%

	true Very much	true Some	true Little	class precision
pred. Very much	40	10	1	78.43%
pred. Some	1	8	0	88.89%
pred. Little	0	0	1	100.00%
class recall	97.56%	44.44%	50.00%	

Figure 32. Accuracy of the predictive model 11

Figure 33 shows the predictive model 12. If the student considers that the autonomy of the student favors some the teaching-learning process on Bayes' theorem, studies the Bachelor's degree in Commerce (Com) and is man then this web application facilitates very much the active role through WABT.

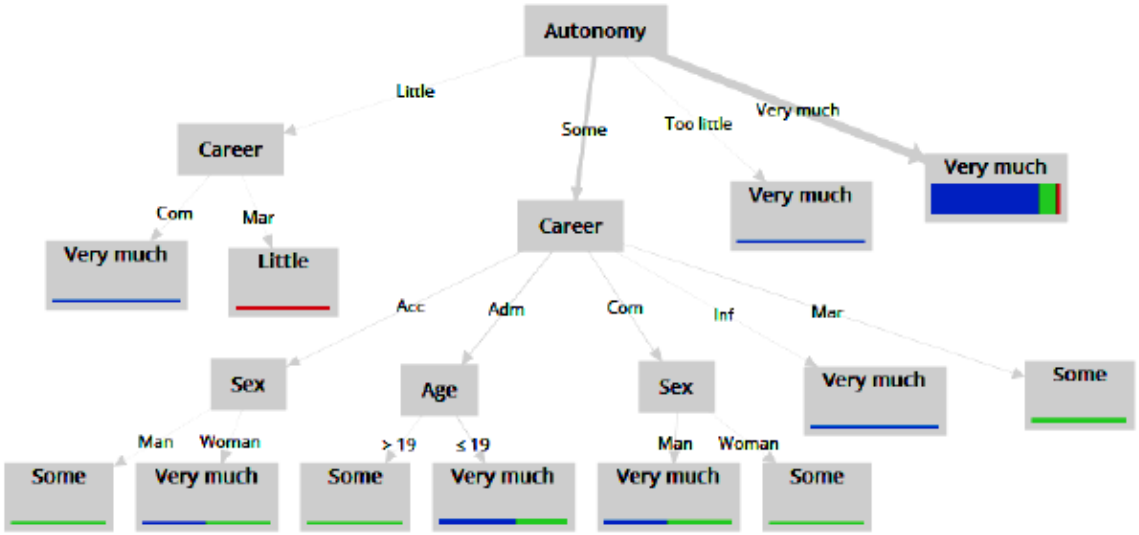

Figure 33. Predictive model 12

The accuracy of the predictive model on the autonomy of the student and the active role through WABT is 81.97% (See Figure 34).

accuracy: 81.97%

	true Very much	true Some	true Little	class precision
pred. Very much	41	10	1	78.85%
pred. Some	0	8	0	100.00%
pred. Little	0	0	1	100.00%
class recall	100.00%	44.44%	50.00%	

Figure 34. Accuracy of the predictive model 12

Perception of the Students

According to the students of the Statistical instrumentation for Business subject, WABT facilitates the teaching-learning process on Bayes' theorem:

Yes, it helps to practice the probability of Bayes' theorem (Student 10, Female, 20 years old, Marketing).

Yes, it helps to understand the topics (Student 50, Female, 18 years old, Marketing).

WABT is an innovative web tool for the field of statistics:

Yes, it is not like the traditional methods (Student 26, Female, 19 years old, Accounting).

Yes, because it shows the results in detail (Student 61, Female, 20 years old, Administration).

According to the participants, the web interface of WABT is friendly and attractive:

Yes, it is attractive (Student 1, Female, 18 years old, Marketing).

Yes, it is very friendly (Student 23, Male, 19 years old, Commerce).

Likewise, the simulation of WABT facilitates the presentation of the procedure to calculate Bayes' theorem:

Yes, because we can analyze several cases (Student 6, Male, 19 years old, Accounting).

Yes, because it shows the procedure and results (Student 40, Male, 18 years old, Accounting).

One of the benefits of WABT is related to ease of use and fast:

Easy to use and friendly (Student 3, Male, 20 years old, Accounting).

Easy, simple, fast and dynamic (Student 20, Female, 19 years old, Marketing).

Another benefit on WABT is linked to the learning process:

Innovation and personalization of learning (Student 50, Female, 18 years old, Marketing).

Help to review (Student 51, Male, 18 years old, Administration).

The students of the Statistical Instrumentation for Businesses subject are satisfied to use technology during the educational process on the Bayes' theorem:

Yes, I liked using it (Student 11, Female, 18 years old, Commerce).

Yes, because I improved my knowledge (Student 48, Female, 18 years old, Accounting).

Finally, the students point out that WABT is a useful application for the teaching-learning process:

Yes, it helps a lot (Student 23, Male, 19 years old, Commerce).

Yes, it is very helpful (Student 30, Male, 18 years old, Administration).

DISCUSSION

In the 21st century, teachers are transforming school activities through technological tools (Morales, Escandell, & Castro, 2018; Salas, Salas, & Salas, 2019). In particular, this mixed research analyzes the impact of WABT during the educational process on Bayes' theorem. This study shares the ideas of various authors (e.g., Morales, Escandell, & Castro, 2018; Tikoria & Agariya, 2017) on the role of digital tools as strategic resources to achieve the objectives of educational institutions. For example, WABT uses simulation to present the probabilities of events, intersection and conditional about the supply of products.

The educational context has changed due to the use of applications in school activities (Tikoria & Agariya, 2017). In particular, the students of the Bachelor of Administration, Commerce, Accounting, Information Technology and Marketing mention that WABT is an innovative and useful web tool for the field of statistics. The results of machine learning (60%, 70% and 80% of training) indicate that all the hypotheses about the impact of WABT in the educational process are accepted. For example, the content and design of WABT positively influences the motivation and autonomy of the student. In the same way, the assimilation of knowledge and development of skills through WABT positively influences the motivation and autonomy of the student. On the other hand, the motivation and autonomy of the student positively influences the personalized learning and active role during the use of WABT.

Universities are promoting the use of applications in the classroom to develop competences in students (Hajhashemi, Caltabiano, & Anderson, 2016). Therefore, teachers must use the models on the acceptance of technology in order to analyze the impact of digital tools in the teaching-learning process. TAM model is a reference framework designed to analyze and evaluate the degree of acceptance about the use of technology in organizations (Chen & Chengalur, 2015; Doleck, Bazelais, & Lemay, 2017; Liu, Chen, Sun, Wible, & Kuo, 2010). In this research, this model indicates that WABT favors the personalized learning and active role of students in the Statistical Instrumentation for Business subject. In addition, Perceived Ease of Use and Perceived Usefulness of this web application positively influence the motivation and autonomy during the educational process on Bayes' theorem.

According to Guspatni (2018), the font, images and color allow the construction of pleasant and useful web spaces for the educational field. In particular, WABT presents a pleasant, simple, useful, easy and fast interface for the teaching-learning process. Data science (decision tree technique) allows the identification of predictive models on the use of WABT in the educational process about Bayes' theorem. The accuracy of these predictive models is between 73.77% and 91.80%.

Finally, ICTs play a fundamental role during the organization and implementation of school activities (Negre, Marin, & Perez, 2018). In fact, technological tools facilitate student-centered learning (Bortnik, Stozhko, Pervukhina, Tchernysheva, & Belysheva, 2017).

CONCLUSION

Technology is transforming the conditions for teaching and learning. In particular, WABT facilitates the educational process on Bayes' theorem by simulating the probabilities of events, intersection and conditional about the supply of products. TAM model allows identifying the impact of WABT in the educational field, that is, this web application favors the personalized learning and active role of students in the Statistical Instrumentation for Business subject. Also, Perceived Ease of Use (content and design of WABT) and Perceived Usefulness (assimilation of knowledge and development of skills through WABT) positively influence the motivation and autonomy of students.

The limitations of this research are related to the simulation of Bayes' theorem through the presentation of an exercise about the supply of products. In addition, the content of WABT is designed only in the Spanish language. Therefore, future research can build web applications to show various simulations of probability. Artificial intelligence can be used in data simulation to customize the contents of applications. Also, the construction of the content must consider the use of different languages.

Rapidminer tool is an ideal application to perform calculations on machine learning with 60%, 70% and 80% of training(linear regression) and build predictive models by means of data science (decision tree technique). Technology is fostering the creation of new scenarios for learning and teaching such as WABT. Therefore, teachers must identify, select, analyze and evaluate the impact of digital tools in order to develop competences in students.

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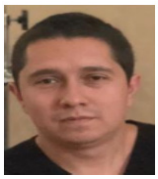

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SELF EFFICACY BELIEFS OF PRE-SERVICE TEACHERS ON TECHNOLOGY INTEGRATION

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ABSTRACT

The great use of technology in every part of life eventually forced educators to integrate up-to-date technologies into the teaching environments concerning the increased demands of millennial learners. Thus the teachers' efficacy of technology integration into the teaching environments becomes a considerably vital issue besides the potential and positive roles of using the technology in the educational settings. The studies in the literature emphasize that increasing self-efficacy beliefs of pre-service teachers on technology integration during their education process will ultimately lead to successful technology integration in the future. Thus, it is believed that the studies examining the self-efficacy beliefs of pre-service teachers are worth conducting. Regarding this tenet, the present study intended to explore the self-efficacy beliefs of pre-service teachers enrolled in four different teacher education programs of a state university in Turkey. A total of 439 pre-service teachers (male= 145, female= 291, missing value=3) who enrolled in 1st, 2nd, 3rd and 4th grades of English language teacher education (n=115), Primary school teacher education (n=115), Turkish language teacher education (n=92) and Science teacher education (n=117) programs have participated in the study on voluntary bases. The present study, which adopted a non-experimental quantitative research design, gathered its data through a self-administered Likert-type survey accompanied by some demographic questions. The statistical analysis of the quantitative data revealed that pre-service teachers have high self-efficacy in technology integration in general. Additionally, it is found that while technology integration self-efficacy of pre-service teachers show a significant difference in line with some majors and grade level variables, there found no difference in terms of the gender variable.

Keywords: Technology integration, self-efficacy, technology readiness, teacher education.

INTRODUCTION

The omnipresence of social digital and educational technologies, as well as their extensive influence on the daily lives of individuals, lead to fundamental changes in all aspects of education, including the ways of teaching and learning. The millennial learners, who are generally labeled with a widely recognized metaphor -"digital natives" (Prensky, 2001)-, usually prefer born-digital materials and contents as appropriate means to support their learning processes. Moreover, as some studies (Bennett, Maton & Kervin, 2008; Brown & Czerniewicz, 2010; Kennedy, Judd, Churchward, Gray & Krause, 2008; Li & Ranieri, 2010) highlighted, the digital natives are good at using new technologies, and have enhanced information-seeking and analysis skills. As for the teachers, most of whom are so-called "digital immigrants" (Prensky, 2001), have to meet the demands of their digital-born learners. Thus, intellectuals all over the world commonly agree that practitioners in the field of teaching should have specific knowledge and skills to incorporate educational technologies into their lessons successfully. Besides, the teachers should dedicate themselves to integrate

cutting-edge technologies to create overwhelming teaching environments. Likewise, the technology is very pleasing and innovative in the classroom when there are dedicated teachers who use it effectively.

Moreover, the enthusiasm in the integration of recent technology into teaching ought to contemplate the essential mission of education -improving the quality of education for all students (Earle, 2002). As Fullan (2013) states, the teacher must be the change agent who utilizes the pedagogy as the driving force and technology as the accelerator. Similarly, Fisher (2006) emphasizes that the mere presence of technology might not support learning unless teachers utilize it as an integrated pedagogical tool, yet not as a sole source of instruction.

When the related literature is reviewed, it is observed that scholars have their unique ways of understanding the gist of the technology; accordingly, they defined it from different perspectives (Wahap, Rose & Osman, 2012). While some scholars defined it as the knowledge of techniques, process, and the like, some others considered it as a means to fulfill any personal purpose. For instance, Bain (1937, p. 860) found the technology as the combination of the instruments or tools and the skills by which people produce and use them. Similarly, while defining the technology as a system, Volti (2009, p. 6) highlighted the importance of knowledge in creating the objects and techniques used for achieving specific objectives. As for educational technology, it has various definitions as well; however, their common point is that educational or instructional technology- which often used interchangeably- is used to enhance the learning and teaching processes. For instance, Richey, Silber, & Ely (2008) defined educational technology as "the study and ethical practice of facilitating learning and improving performance by creating, using, and managing appropriate technological processes and resources." Similarly, Spector (2015) claimed that educational technology involves the disciplined application of knowledge to improve learning, instruction, and/or performance. In other words, instructional technology is concerned with the content and effective instructional practices instead of the technology itself (Earle, 2002, p. 10); therefore, the technologies used in the classroom must improve the pedagogy and go beyond information retrieval.

The use of pedagogically comprehensive technology in the teaching environments will undoubtedly contribute to flourish the courses and enable learners to grasp the content in a better way. However, the vital point here is the appropriateness of the technology with the content and the knowledge and skill of using proper technologies in the teaching environments. Thus, teachers, who are the direct agents of technology-integrated classrooms, should be endowed with the required abilities to use the recent educational technologies in their classrooms. The review of available literature revealed that plenty of studies all around the world dealt with the issue from various dimensions and reached some conclusions. For instance, some studies (Sandholtz, Ringstaff, & Dwyer, 1997; Wozney, Venkatesh & Abrami, 2006; Zhao & Frank, 2003) consented that teachers must possess a positive attitude toward technology to integrate it effectively into their instruction. Because, as Pierson (2001) claims, teachers' perceptions of technology can determine whether technology has an integral role in student learning or as a subsidiary tool for supplemental use only. Likewise, Liu (2011) stated that teachers' pedagogical beliefs about technology integration could influence their teaching methods when using technology. The grounds of such beliefs originated from the assumption that "technology-mediated learning environments provide opportunities for students to search for and analyze information, solve problems, communicate and collaborate, hence equipping them with a set of competencies to be competitive in the 21st-century marketplace" (Lim, Zhao, Tondeur, Chai, & Tsai, 2013).

The perspectives or beliefs are central predictors of behavior, which may even influence the knowledge of teachers in addressing specific tasks or issues and regarded as one of the most valuable constructs for teacher education (Kagan, 1992; Pajares, 1992). For instance, Cox's (2013) study exposed that perceived successes and failures -the beliefs of teachers- in integrating technology were the factors that influenced teachers most in the integration of technology in their classrooms. Similarly, Lee and Tsai's (2010) study, which examined technology self-efficacy of 558 K-12 teachers in Taiwan, found positive correlations between positive attitudes toward technology and the likelihood of integrating technology. Likewise, Paraskeva, Bouta and Papagianni (2008) claim that teachers' attitudes towards technology integration might influence the efficient use of these technologies in a school setting.

Incorporating the latest technologies in teaching plays a vital role in augmenting the course contents for millennial learners. For instance, Agodini, Dynarski, Honey, and Levin's (2003) study confirmed that student learning was improved where teachers demonstrated an interest in using technology. However, several studies (Chen, 2008; Caliskan, 2017; Hermans, Tondeur, van Braak & Valcke, 2008; Hew & Brush, 2007;

Ertmer, 1999; Palak and Walls, 2009) exposed that most of the teachers seem hesitant to undertake such a demanding mission in their professional lives though they impressively use the digital social technologies in their deeds. Even some studies (Caliskan, 2017; Picciano, 2006) revealed that teachers might not believe in the advantages of using computer technology in the classroom.

On the other hand, several studies (Hall & Trespalacios, 2019; Lawless & Pellegrino, 2007; Zmuda, Curtis & Ullman, 2015) shown that acceptance and success of ICT based educational technologies to augment the learning process generally rooted in the preparation of the teachers. As Greeno, Collins, & Resnick (1996) indicated, the teaching tendencies of teachers are almost similar to what they experienced as students. The review of available literature revealed that although some studies (Carle, Jaffee & Miller, 2009; Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur, & Sendurur, 2012; Liu, 2011) claim that there are plenty of studies on technology integration in classroom practices, the scantiness of studies on teacher self-efficacy in technology integration seems as a problem. Regardless of the intensity of studies dealing with self-efficacy of teachers in technology integration, the review of available literature revealed that studies on self-efficacy beliefs of pre-service teachers on technology integration are somewhat neglected beside the studies dealing with technological pedagogical content knowledge (TPACK) initiated with the pioneering research of Mishra and Koehler (2006).

Moreover, most of the studies on the teachers' technology use implied that before engaging their profession, teachers should be educated and encouraged to use technology in their classrooms. As Kirschner & De Bruyckere (2017) stated, twenty-first-century education requires seamless and proper integration of technologies in teaching environments. Thus, increasing self-efficacy beliefs during the pre-service teacher education programs will ultimately lead to successful technology integration in the future (Abbitt, 2011) and may increase teacher's acceptance and use of current technologies in the education system (Holden & Rada, 2011). Therefore, examining the perceptions of pre-service teachers' self-efficacy on technology integration in their classrooms seems contributive to teacher education. Bearing such facts in mind, we believe that the pre-service teachers' self-efficacy in integrating technologies in their classrooms is worth examining to shed light on the future of technology integrated teaching.

Additionally, teachers might have developed preconceived notions during their pre-service education, and such beliefs might avert the usage and integration of technology in their classroom. Therefore examining their perceived self-efficacy on technology integration might provide the lens through which teacher educators confidently benefitted while reframing the teacher education curricula. Besides, as most of the studies in the field suggested, the more studies deal with the perspective of pre-service teachers to integrate the educational technologies into their classroom lead the more appreciated grounds for the education of digital native learners in the millennium. As studies endeavored to define the current levels of the pre-service teachers' technology integration self efficacies and provide support to their growth concerning their needs, the acculturation of the pedagogical paradigm shift might achieve its goals.

As Bandura (1977, p. 3) acknowledged, personal efficacy beliefs play a vital role in the thoughts and actions taken by people. If people do not believe in their power to change the outcomes of anything, they might not attempt to make things happen. Accordingly, pre-service teachers' perceived self-efficacy, which focuses on judgments of personal capability (Bandura, 1997) on technology integration, is worth to blueprint and form the impending methods of teaching the millennial learners. Hence, a particular focus on how pre-service teachers perceive their use and integration of technology in their future classrooms helps to gain an understanding of the status quo from a new window. Thus, the present study aims to figure out the perspectives of pre-service teachers about their self-efficacy in integrating educational technologies in their future profession. In line with this broad aim, the present study sought answers to the following research question and its sub-questions;

- What is the technology integration self-efficacy level of the pre-service teachers?
    - Is there any relationship between pre-service teachers' technology integration self-efficacy beliefs and their majors?
    - Is there any relationship between pre-service teachers' technology integration self-efficacy beliefs and their grade levels?
    - Is there any relationship between pre-service teachers' technology integration self-efficacy beliefs and their genders?

REVIEW OF LITERATURE

Ample studies have examined the various aspects of teachers' beliefs (Kim, Kim, Lee, Spector & DeMeester, 2013); however, the present study focused it on a narrower sense and examined the pre-service teachers' beliefs only associated with technology integration in the teaching environments. In one of those studies, Wang, Ertmer and Newby (2004) examined the impact of technology-integrated learning experiences on preservice teachers' self-efficacy for technology integration. They found that pre-service teacher's self-efficacy for technology integration increased when they educated on computer use in the classroom through observing exemplary technology-using teachers. Their findings indicated that teacher educators should be models for preservice teachers to learn about technology integration as such experiences help future teachers to develop the confidence needed to integrate technology effectively.

In another study, Abbitt and Klett (2007) scrutinized the factors that influence pre-service teachers' self-efficacy in technology integration and their attitudes towards technology integration in their future professions. Their findings revealed that the perceived comfort level with computer technology was a significant predictor of self-efficacy beliefs in regards to technology integration. One of the implications of their study is the need to have a pre-service education course that focuses on issues relating to technology integration.

Similarly, in an experimental study Abbitt (2011) examined the self-efficacy beliefs of pre-service teachers in technology integration. The findings of his research revealed that there was a strong, positive correlation between self-efficacy and technology integration tendencies of pre-service teachers. Additionally, the findings of the study showed that educating the pre-service teachers on some specific domains in technology use ultimately increased the pre-service teachers' self-efficacy beliefs in technology integration in the future.

Al-Awidi and Alghazo (2012) examined the role of pre-service teachers teaching experiences on their self-efficacy on technology integration and found that teaching experiences, especially mastery and vicarious experiences, significantly affected their self-efficacy in technology integration. That is, the teaching experiences of pre-service teachers help them foster their self-efficacy on technology integration since they were able to put into practice what they have learned during their teacher education. Similarly, Ozel and Arikan (2015) found that English language instructors reported that they used Web 2.0 tools, namely blogs, podcasts, wikis, and social networking in their personal lives. However, although they believed that these tools should be used in their classrooms as instructional tools, a vast majority of them stated that they were not used in their teaching environments efficiently.

In a similar vein, Niederhauser and Perkmen (2010) studied self-efficacy of teachers concerning technology integration and use, as well as technology outcome expectations regarding technology integration into teaching practice. Their findings revealed that teachers must become intrinsically motivated to use technology for its value in training students. Additionally, they found a balance between the self-efficacy of pre-service teachers and outcome expectations as long as teachers learn to gain new skills. That is, addressing outcome expectation issues help pre-service teachers provide the self-motivational force and self-efficacy that will help them seamlessly integrate technology.

As for the Turkish context, a review of the available literature revealed that there are plenty of studies dealing with teachers' technology integration attitudes besides the studies dealing with TPACK of teachers or pre-service teachers. However, it is observed that studies dealing with preservice teachers` self-efficacy on technology integration are rather scarce.

For instance, in one of those studies, the core focus of which is determining preservice teachers` techno-pedagogical knowledge competencies, Kabakci-Yurdakul (2011) found that the preservice teachers have high-level techno-pedagogical knowledge competencies which in turn indicates pre-service teachers have highly positive attitudes towards technology integration in their future classes.

Similarly, Unal's (2013) study, which examined the relationship between technology integration self-efficacy beliefs and techno-pedagogical competency of pre-service teachers, figured out a significant, positive, and high-level correlation between the technology integration self-efficacy beliefs and the techno-pedagogical competencies of the participants. Additionally, while the findings of the study show no significant difference in terms of department variable, gender and class variables depicted significant differences in preservice teachers' beliefs on technology integration self-efficacy.

In another study, Keser, Karaoglan-Yilmaz and Yilmaz (2015) investigated the technology integration self-efficacy perceptions and techno-pedagogical competency level of pre-service teachers and found that the pre-service teachers have high-level TPACK competence and self-efficacy perception about technology integration. Their study additionally showed that although there was a statistically significant difference in technology integration self-efficacy beliefs of pre-service teachers in terms of their grade levels, there was no statistically significant difference concerning the gender of the participants.

In a similar vein, **Isler** and Yildirim (2018) examined perceptions of pre-service EFL teachers on their technological pedagogical content knowledge and found that almost all of their participants found themselves as competent technology users and have an awareness of using technology in language teaching and learning conditions. As for technology integration, their findings revealed that almost all of the participants agree on the benefits of technology integration into English language teaching since they believed that technology integration enables individualized learning and makes learning enjoyable, engaging, and interactive.

Through examining pre-service teachers' views on technology integration, Bakac (2018) tried to determine the effect of self-directed learning tendencies of pre-service teachers on their self-efficacy beliefs of technology integration. The findings of the study revealed that pre-service teachers' self-directed learning tendencies are a significant predictor of their self-efficacy beliefs.

In their study, Birisci and Kul (2019) investigated the levels of techno-pedagogical competency and its relation with technology integration self-efficacy beliefs of teacher candidates enrolled at the pedagogical formation education program. The results of their study showed that participants had high levels of technology integration self-efficacy beliefs, with a high-level positive correlation with techno-pedagogical competency.

In brief, a review of the related literature revealed that self-efficacy beliefs influence preservice teachers' use and integration of technology. Nonetheless, some studies (Caliskan, 2017; Petko, Prasse, & Cantieni, 2018) pointed out that the teachers' readiness for technology integration has links to their knowledge and skills in their technology use. Additionally, while some studies (Abbitt & Klett, 2007; Gunduz & Odabasi, 2004) emphasized the role of technology courses in teacher education in increasing preservice teachers' self-efficacy in technology integration, some others (Al-Awidi and Alghazo, 2012; Arslan, 2012; Demir & Bozkurt, 2011; Niederhauser & Perkman, 2010; Paraskeva et al., 2008; Wang et al., 2004) highlighted that spending time using technology as well as having positive experience on technology use boosted pre-service teachers' self-efficacy in technology integration. Additionally, the studies dealt with the relationship between technology integration self-efficacy and TPACK of pre-service teachers found a significant correlation between these two aspects. On the whole, almost all of the studies in the related literature suggested that conducting new studies on the technology integration in the teaching environments, especially the studies with the participation of pre-service teachers will contribute to the growing body of the research on the field and shed light on the issue from different perspectives.

METHOD

Design of the Study

The present study adopted a non-experimental quantitative research design to illustrate the self-efficacy beliefs of pre-service teachers on technology integration. Primarily, the study was carried out in survey model, which is generally employed to "explore the characteristics of a situation, seek explanation and make deep inferences about a population" (Kelley, Clark, Brown, & Sitzia; 2003) through "questioning individuals on a topic or topics and then describing their responses" (Jackson, 2011, p. 17). The data of the study collected through a self-administered survey with Likert-type questions accompanied by some demographic questions. Additionally, to examine associative relationships among the variables and self-efficacy beliefs of pre-service teachers on technology integration, the correlation coefficient was computed.

Participants

The sample frame of the present study consisted of pre-service teachers studying four different teacher education programs in an education faculty of a state university in Turkey; nevertheless, the name of the university is not given here due to ethical concerns. The selection of the participants was based on

convenience sampling, which is a non-probabilistic sampling technique that depends on data collection from a population that is proximate to the researchers and conveniently available to participate in the study. The descriptive statistics for participants' demographic characteristics in line with their genders, grades, and programs are provided in Table 1.

Table 1. Descriptive statistics for participants' demographic characteristics

	Variable	Category	Frequency	Percent	Total
Participants' demographic information	Gender	Male	145	33	439
		Female	291	66	
		Missing Values	3	.7	
	Department	English Language Teacher Education	115	26.2	
		Primary School Teacher Education	115	26.2	
		Turkish Language Teacher Education	92	21	
		Science Teacher Education	117	26.7	
	Class	1st grade	114	26	
		2nd grade	104	23.7	
		3rd grade	110	25.1	
		4th grade	111	25.3	

As seen in the Table 1, a total of 439 pre-service teachers (male= 145, female= 291, missing value=3) who enrolled in 1st, 2nd, 3rd and 4th grades of English language teacher education (n=115), Primary school teacher education (n=115), Turkish language teacher education (n=92) and Science teacher education (117) programs have participated in the study on voluntary bases. As for their grade levels, while 114 participants were freshmen (1st grade), 104 of them were sophomore (2nd grade), 110 of them were junior (3rd grade), and 111 of them were senior (4th grade) pre-service teachers.

Data Collection Instruments

The data of the present study is collected using the *Technology Integration Self-Efficacy Scale* (TISES), which was initially developed by Wang, Ertmer and Newby (2004) and adopted into Turkish by Unal (2013). The Turkish version of TISES is a 5-point Likert scale which has 19 items inquiring technology integration self-efficacy of pre-service teachers in two factors, namely, *self-efficacy in using computer technologies* and *self-efficacy in making others use computer technology.* The adaptation of the original scale into Turkish was also studied by Unal and Teker (2018) in an article where the Cronbach alpha reliability coefficient was calculated as .936, and the item-total correlations coefficients of the scale was founded as ranged from .60 to .707. That is, Unal and Teker (2018) re-confirmed that the Turkish version of the *Technology Integration Self-Efficacy Scale* (T-TISES) is a valid and reliable instrument.

Although the reliability and validity estimations of the T-TISES were confirmed in two studies (Unal, 2013; Unal & Teker, 2018), the Cronbach's alpha internal consistency coefficient of the T-TISES should be re-computed for the present study, since the scale is administered to a different study group. Thus, an exploratory factor analysis (EFA) is run to obtain evidence about the construct of the scale.

As a result of the principal components factorization technique and varimax vertical rotation method in EFA, the two-factor structure explaining 56.89% of the total variance was found appropriate to the theoretical basis. The analysis revealed that while the factor loadings of the first Factor, which consisted of 13 items, ranged from .49 to .73, the factor loadings of the second Factor, which covered six items, ranged between .61 and .84. Upon collecting evidence for construct validity, the Cronbach alpha reliability coefficient was calculated as well. Consequently, the Cronbach's alpha reliability coefficients of the measures were found as .92 for Factor 1; .87 for Factor 2 and .945 for overall scale. Since the reliability coefficient of .70 and above is accepted as reliable (Domino & Domino, 2006), the reliability coefficients of the scale are considered as sufficient. In other words, the analysis revealed that the answers given by the participants are consistent, and the instrument is valid and reliable to gather the data since the scale holds the required psychometric features

for being used in the present study. The result of the exploratory factor analysis (EFA) run for the T-TISES that used in the present study is illustrated in Table 2.

Table 2. Exploratory factor analysis and reliability results

Factor	Items	Factor Loadings		Communalities	Cronbach Alpha Reliability
		Factor 1	Factor 2		
Self-efficacy in using computer technologies	19	.73		.65	.92
	17	.72		.65	
	12	.71		.78	
	11	.70		.73	
	18	.69		.66	
	14	.69		.72	
	15	.67		.67	
	13	.64		.72	
	16	.62		.74	
	8	.60		.75	
	10	.56		.75	
	9	.55		.72	
	7	.49		.61	
Variance Explained: 32.13 %					
Self-efficacy in making others use computer technologies	2		.84	.73	.87
	1		.82	.57	
	3		.69	.71	
	5		.63	.75	
	4		.63	.61	
	6		.61	.72	
Variance Explained: 23.76 %					
TOTAL VARIANCE EXPLAINED: 56.89 %					
Scale Overall Reliability: .945					

Data Analysis

As for figuring out the answer to the main research question, the mean score and standard deviation of the total scores gathered through T-*TISES* calculated using a statistical software program, and the results were employed to determine the overall technology integration self-efficacy levels of the participants. The technology integration self-efficacy levels of the participants were assessed in line with the criteria defined in Unal's (2013) study. That is, if mean scores obtained from the scale were below 48, the technology integration self-efficacy perceived as low; if they were ranging from 48 to 66, the self-efficacy regarded as undecided, and if the scores were above 66, then the technology integration self-efficacy level is considered to be high.

To answer the first sub-research question, which inquires the relationship between pre-service teachers' technology integration self-efficacy beliefs and their majors; and the second sub-research question, which probes the relationship between pre-service teachers' technology integration self-efficacy beliefs and their grade levels, the One-way ANOVA was run respectively, and their results are presented in the findings section. Finally, as for the third sub-research question, which sought the relationship between pre-service teachers' technology integration self-efficacy beliefs and their genders, an independent samples t-test was run, and its results are presented in the findings.

FINDINGS

The findings based on the statistical analysis of the data are presented in line with the research questions of the study. Since the answer to the main research question, which inquired the technology integration self-efficacy level of the pre-service teachers, depends on the responses of the succeeding sub-research questions, the layout of the presentations of the findings started with the answers of the sub-research questions.

As the first phase in the analysis of data related to the first sub-research question, the homogeneity of variances for the majors (departments) of the participants was computed, and its findings are illustrated in Table 3.

Table 3. Test of homogeneity of variances (majors)

	Levene Statistic	df1	df2	P
Factor 1	2.384	3	435	.069
Factor 2	3.780	3	435	.011
TISES	2.748	3	435	.042

As seen in Table 3, the Levene test results revealed that the p-value of Factor 1 was higher than .05; thus, the assumption of homogeneity of variances was provided. Therefore, Tukey posthoc multiple comparison test results are taken into account. As for Factor 2 and overall scale score (TISES), the p values were found lower than .05, which indicates that the assumption of homogeneity of variances is not provided. Hence, Games-Howell posthoc multiple comparison test results are considered for further analyses. The results of one-way ANOVA for the majors of the participants are displayed in Table 4.

Table 4. One-way ANOVA results by major

		Sum of Squares	df	$\bar{X}$	F	P	Significant relationships
Self-efficacy in using computer technologies (Factor 1)	Between Groups	712.175	3	237.392	3.374	.018	Science T.E. > Turkish L.T. E
	Within Groups	30610.628	435	70.369			
	Total	31322.802	438				
Self-efficacy in making others use computer technologies (Factor 2)	Between Groups	200.809	3	66.936	3.681	.012	Science T.E. > Turkish L.T.E.
	Within Groups	7910.299	435	18.185			
	Total	8111.108	438				
TISES (Scale total)	Between Groups	1467.237	3	489.079	3.465	.016	Science T.E. > Turkish L.T.E.
	Within Groups	61392.422	435	141.132			
	Total	62589.658	438				

According to one-way ANOVA analysis results -presented in Table 4-, there was a statistically significant difference across the majors in terms of *self-efficacy in using computer technologies, self-efficacy in making others use computer technology* and *technology integration self-efficacy (TISES)* since the significance values were below .05 for these groups. Additionally, to find out the majors that have a significant relationship, the posthoc test was computed. Concerning the results of the posthoc test, a meaningful relationship observed between the *Science Teacher Education program* and the *Turkish Language Teacher Education programs* ($p<.05$). The results of the descriptive statistics of one-way ANOVA in line with the majors of the participants are depicted in Table 5.

Table 5. Descriptive statistics of one-way ANOVA analysis by major

		N	$\bar{X}$	Sd	SE
Self-efficacy in using computer technologies (Factor 1)	English Language Teacher Education	115	48.9248	9.23936	.86157
	Primary School Teacher Education	115	49.6255	8.42675	.78580
	Turkish Language Teacher Education	92	48.3322	9.11742	.95056
	Science Teacher Education	117	51.7055	6.70769	.62013
	Total	439	49.7253	8.45655	.40361
Self-efficacy in making others use computer technologies (Factor 2)	English Language Teacher Education	115	22.4909	4.44364	.41437
	Primary School Teacher Education	115	21.8862	4.08197	.38065
	Turkish Language Teacher Education	92	20.9650	4.99096	.52034
	Science Teacher Education	117	22.8130	3.58752	.33167
	Total	439	22.0986	4.30331	.20539
TISES (Overall Scale)	English Language Teacher Education	115	71.4157	12.94078	1.20673
	Primary School Teacher Education	115	71.5117	11.75145	1.09583
	Turkish Language Teacher Education	92	69.2972	13.14204	1.37015
	Science Teacher Education	117	74.5185	9.66760	.89377
	Total	439	71.8238	11.97978	.57176

When the descriptive statistics in Table 5 were examined, it is seen that the significant difference between *the Science teacher education* and *the Turkish language teacher education* programs was in favor of the *Science teacher education program* in all of the variables. In other words, the pre-service teachers in the *Science teacher education program* outperformed than others in terms of *self-efficacy in using computer technologies, self-efficacy in making others use computer technology* and *the overall technology integration self-efficacy (TISES).* Consequently, the findings revealed that the pre-service teachers studying in the Turkish language teacher education program showed the lowest scores in all factors.

The present study sought answers to whether there is a meaningful relationship between the pre-service teachers' technology integration self-efficacy beliefs and their grade levels as well. Thus, the homogeneity of variances for the grade levels of the participants was tested initially, and its findings are illustrated in Table 6.

Table 6 Test of homogeneity of variances (grade)

	Levene Statistic	df1	df2	P
Factor 1	5.722	3	435	.001
Factor 2	7.088	3	435	.000
TISES	5.504	3	435	.001

As seen in Table 6, the Levene test results revealed that the p values of all the groups were lower than .05, and the assumption of homogeneity of variances was not provided. Therefore, Games-Howell post hoc multiple comparison test results were considered. The results of one-way ANOVA for the grade levels of the participants are displayed in Table 7.

Table 7. One-way ANOVA results by grade

		Sum of Squares	df	$\bar{X}$	F	P	Significant relationships
Self-efficacy in using computer technologies (Factor 1)	Between Groups	973.486	3	324.495	4.651	.003	1<4, 3<4
	Within Groups	30349.316	435	69.769			
	Total	31322.802	438				
Self-efficacy in making others use computer technology (Factor 2)	Between Groups	229.396	3	76.465	4.220	.006	1<4
	Within Groups	7881.712	435	18.119			
	Total	8111.108	438				
T-TISES (Scale total)	Between Groups	2123.151	3	707.717	5.069	.002	1<4, 3<4
	Within Groups	60736.507	435	139.624			
	Total	62859.658	438				

According to one-way ANOVA analysis results, presented in Table 7, the significance values were below .05 for the groups, which in turn indicates that there is a statistically significant difference across grade levels in terms of *self-efficacy in using computer technologies, self-efficacy in making others use computer technology* and *overall technology integration self-efficacy (TISES)*. Additionally, the posthoc test was computed for further analysis to figure out the grade levels that have significant relationships. The posthoc test results revealed that there were meaningful relationships between *1st grade and 4th grade, and 3rd grade and 4th grade* ($p<.05$) in Factor 1 and overall score. However, the only significant difference was observed between 1st grade and 4th grade in Factor 2.

The results of the descriptive statistics of one-way ANOVA in line with the grade levels of the participants are illustrated in Table 8.

Table 8. Descriptive statistics of one-way ANOVA analysis by grade

		N	$\bar{X}$	Sd	SE
Self-efficacy in using computer technologies	1st Grade	114	48,2471	8,87549	,83127
	2nd Grade	104	49,7830	8,65685	,84887
	3rd Grade	110	48,7991	9,62948	,91814
	4th Grade	111	52,1071	5,73795	,54462
	Total	439	49,7253	8,45655	,40361
Self-efficacy in making others use computer technologies	1st Grade	114	21,3206	4,14631	,38834
	2nd Grade	104	21,9124	4,90666	,48114
	3rd Grade	110	21,8985	4,74233	,45216
	4th Grade	111	23,2703	3,02699	,28731
	Total	439	22,0986	4,30331	,20539
TISES	1st Grade	114	69,5677	12,32269	1,15413
	2nd Grade	104	71,6954	12,55220	1,23084
	3rd Grade	110	70,6976	13,64463	1,30096
	4th Grade	111	75,3774	8,00909	,76019
	Total	439	71,8238	11,97978	,57176

When the descriptive statistics in Table 8 are examined, a significant difference between 1-4 and 3-4 grade levels, which was in favor of the 4th grades in all the variables, is seen. That is, the senior pre-service teachers showed firmer self-efficacy beliefs than others in terms of using computer technologies, making others use computer technology, and integrating computer technologies.

As for the relationship between pre-service teachers' technology integration self-efficacy beliefs and their genders, independent samples t-test was run, and its results are presented in Table 9.

Table 9. Independent samples t-test results by gender

	Group Statistics				Independent Samples t-test		
	Gender	N	$\bar{X}$	Sd	t	df	P
Self-efficacy in using computer technologies	Female	291	49.48	8.25	-,752	434	.452
	Male	145	50.13	8.92			
Self-efficacy in making others use computer technology	Female	291	21.83	4.24	-1,838	434	.067
	Male	145	22.63	4.42			
TISES	Female	291	71.31	11.7	-1,190	434	.235
	Male	145	72.76	12.58			

As depicted in Table 9, the independent-samples t-test results based on the gender of the participants revealed that there was not any significant difference between groups for all factors and the overall scores of the scale ($p > .05$). That is, the participants' gender does not have any impact on their self-efficacy beliefs in using computer technologies and making others use computer technologies or on their technology integration self-efficacy beliefs. On the other hand, the analysis revealed that male participants possessed slightly higher mean values in sub-scales and the total scores of the scale. Nevertheless, since the significance value was higher than .05, the difference was not statistically meaningful.

CONCLUSION AND DISCUSSION

The analysis of the gathered data for the present study, which questioned the technology integration self-efficacy of pre-service teachers, revealed that pre-service teachers enrolled in different teacher education programs of a state university have a high degree of self-efficacy in technology integration into their teaching environments. As for the independent variables of the present study, which are majors, grade levels, and gender of the participants, the findings revealed that while majors and grade levels show a significant difference on the technology integration self-efficacy level of the pre-service teachers, the gender variable did not show any significant difference.

When the findings examined in detail, although the overall scores of pre-service teachers on their *technology integration self-efficacy* seem considerably high, their self-efficacies in *using computer technologies* found slightly around average levels, and *their self-efficacy in making others use computer technologies* is rather in low degrees. These findings show somehow similarities with previous studies conducted in a similar context. For instance, as for having a high degree of technology self-efficacy the results of the present study show similarities with the findings of Kabakci-Yurdakul (2011), Unal (2013), Keser, Karaoglan-Yilmaz and Yilmaz (2015), **Isler** and Yildirim (2018) and Birisci and Kul (2019).

The findings of the present study additionally revealed that the majors (departments) of the participants play a significant role in the technology integration self-efficacy of the participants. For instance, the pre-service teachers enrolled in the Science teacher education program ($\bar{x}$=74.51) outperformed than others, the pre-service teachers in the Primary school teacher education ($\bar{x}$=71.51), the English language teacher education ($\bar{x}$=71.41) and the Turkish language teacher education ($\bar{x}$=69.29). This finding, which revealed that majors of the pre-service teachers play a significant role in their technology integration self-efficacy, shows dissimilarity with the findings of Unal's (2013) study in which it is found that majors of the participants have not a significant role in the technology integration self-efficacy of pre-service teachers.

Although the courses related to technology use and other teaching profession-oriented courses have more or less parallel curriculums in all the majors within the study group, the findings depicted that there are significant differences concerning the majors of the participants. Thus, further studies should examine the possible reasons behind the significant difference found in line with the majors of the participants in detail.

When the findings concerning the grade levels of the participants were examined, the results of the analysis revealed that there is a statistically significant difference across grade levels in terms of *self-efficacy in using computer technologies, self-efficacy in making others use computer technology* and *overall technology integration self-efficacy.* That is, the descriptive statistics exposed that there is a significant difference between 1-4 and 3-4 grade levels, which was in favor of the 4th grades in all the variables. In other words, the senior pre-service teachers showed firmer self-efficacy beliefs than others in terms of *using computer technologies*, *making others use computer technology*, and *integrating computer technologies*. The reason behind such a finding might stem from the experience of the pre-service teachers in using and making others use the computer technologies throughout their teaching practice courses in which pre-service teachers were practicing the teaching in real environments. This finding of the present study show similarities with the results of studies conducted by Unal (2013) and Keser, Karaoglan-Yilmaz and Yilmaz (2015). Likewise, this finding of the present study confirms the inferences of Wang, Ertmer and Newby (2004), who claimed that pre-service teacher's self-efficacy for technology integration increased when they observe exemplary technology-using teachers and Al-Awidi and Alghazo (2012), who claimed that teaching experiences especially mastery and vicarious experiences significantly affected the pre-service teachers' self-efficacy in technology integration.

As for the role of gender in pre-service teachers' technology integration self-efficacy beliefs, the findings of the present study found that there was not any significant difference between groups for all factors and the overall scores of the scale ($p>.05$). In other words, the participants' gender does not have any impact on their self-efficacy beliefs in using computer technologies and making others use computer technologies or on their technology integration self-efficacy beliefs. Although the further analysis of gender depicted that male participants possessed slightly higher mean values in sub-scales and the overall scores, the difference was not statistically meaningful. The findings of the present study concerning the gender variable show similarities with results of Keser, Karaoglan-Yilmaz and Yilmaz (2015) who found no statistically significant difference, whereas, there seem a dissimilarity with the findings of Unal (2013) who found significant differences in preservice teachers' beliefs on technology integration self-efficacy concerning the gender of the participants.

All in all, the present study revealed in general that pre-service teachers have technology integration self-efficacy to some extent, and this self-efficacy progressively amplified through the advancement in the grade levels of the pre-service teachers. Moreover, the majors and the grade levels of the participants seem to have some effects on the technology integration self-efficacy of the pre-service teachers. Concerning the overall findings of the present study, we can claim that pre-service teachers are ready to integrate the technology into their future classrooms, although they have some downsides in making others use the technology. Thus, it can be suggested that the pre-service teacher education institutions should schedule some further initiatives to enhance the pre-service teachers' technology integration skills, especially in making others use the technology in the teaching environments.

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ONLINE DISTANCE LEARNING FOR TRANSLATION SUBJECTS: TERTIARY LEVEL INSTRUCTORS' AND STUDENTS' PERCEPTIONS IN SAUDI ARABIA

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ABSTRACT

Amid the vast spread of the novel coronavirus COVID-19, educational institutions worldwide have shifted to eLearning platforms. This abrupt shift from traditional face-to-face teaching to virtual online classes has brought about some challenges. The central objective of this study is to explore university instructors' and students' perceptions of utilizing eLearning platforms for teaching and learning translation subjects. The study sample consisted of mixed-gender faculty members (n = 22) and undergraduate students (n = 133) from the Department of English Language and Translation (DELT) in the College of Languages and Translation (COLT) at King Saud University (KSU). A quantitative research design was used. Two separate five-point Likert scale questionnaires were distributed to instructors and students, respectively. The findings revealed that neither instructors' nor students' perceptions of eLearning differed, and a number of benefits were reported. The paper concludes with the limitations and implications of the findings as well as suggestions for future research.

Keywords: eLearning translation, instructors' perceptions, students' perceptions, virtual classrooms.

INTRODUCTION

Information technology (IT) has become a significant tool within modern educational processes as internet use is now widely adopted in educational institutions for learning purposes. IT has therefore influenced the evolution of eLearning in education, and higher education in particular (Northcote & Gosselin, 2016). This evolution has led to the establishment of modern educational environments such as distance learning, e-learning, and blended learning across higher education institutions in Saudi Arabia.

In the literature, there is no clear and explicit definition of eLearning, and the definitions that exist are sometimes contradictory (Rice & Gregor, 2016). The term "eLearning" is often used interchangeably with other terms such as "distance learning" and "online learning." In the field of teaching and learning languages, eLearning refers to instances where learning a language occurs fully online, with no face-to-face interaction in the context of the formal language course (Hockly, 2015). It is therefore seen as an interactive process within which students interact with teachers either synchronously (i.e., they are online simultaneously) or asynchronously (i.e., they do not have to be online at the same time) (Tunmibi, Aregbesola, Adejobi, & Ibrahim, 2015). This study uses the terms "eLearning" and "online distance learning" (ODL) interchangeably to refer to the process of distanced learning over the internet in an academic realm.

In Saudi Arabian higher education, eLearning has grown significantly over the past two decades, particularly in higher education, and this has led public universities to invest heavily in its development. King Saud University (KSU) was one of the earliest universities to implement online learning in Saudi Arabia, and over the years, it has made efforts to implement eLearning in all its colleges. This practice has been achieved through creating eLearning units across all colleges to establish an appropriate e-environment. The role of these units, supported by the Deanship of eLearning and Distance Education, extends to training faculty members on online teaching in general and the use of different eLearning platforms specifically, such as

the Learning Management System (LMS) (Aljaber, 2018). Through these units, KSU has continuously worked to improve the quality and standards of eLearning and successfully automated its eLearning system. Regardless, the sudden shift from traditional face-to-face teaching to a 100% online mode may bring about some challenges.

The vast spread of the novel coronavirus COVID-19 has led to great changes in education systems around the world, and Saudi Arabia is no exception. The most prominent change is the call for a rapid transition from face-to-face classes to virtual ones, i.e., online learning. Although several studies have looked into students' perceptions of ODL in Saudi Arabia (e.g., Zabadi & Alawi, 2016; Alfehaid, 2019; Alwahoub, Azmi, & Jomaa, 2020), the significance of the current research lies in its specific exploration of both instructors' and students' perceptions of the eLearning of English-Arabic Translation subjects at KSU. Perceptions are a key factor that shape how instructors and students approach tasks, and hence influence the entire learning process (Getie, 2020). Thus, knowledge about students' attitudes and perceptions will likely help educational institutions and faculty members understand current practices as well as promote and apply suitable forms of online learning to meet student needs. To achieve this, a large and growing body of literature has explored teachers and students' perceptions of eLearning and reported positive results.

It is worth noting that prior to the COVID-19 pandemic, all translation subjects at KSU were taught face-to-face in the Department of English Languages and Translation (DELT). Teaching translation subjects is different from teaching other English subjects, as specialized translation laboratories and interpreting tools are integral resources. Given the nature of these subjects, it is useful to explore instructors and students' perceptions of the efficacy of virtual environments for translation coursework. This study therefore attempts to answer the following questions:

a. What are instructors' perceptions of using eLearning for teaching translation courses?
b. What are students' perceptions of using eLearning for studying translation courses?
c. Is there a significant difference between the responses of instructors and students?

LITERATURE REVIEW

In recent years, special emphasis has been given to eLearning in educational institutions as research has reported several benefits. These benefits include the elimination of physical and temporal limitations (e.g., Hew, Qiao, & Tang, 2018), ease of content access and schedule flexibility (e.g., Zabadi & Alawi, 2016; Junior et al., 2019), and cost-effectiveness (Gulbahar, 2012). Other studies have shown that eLearning is effective for student gains and performance (e.g., Geta & Olango, 2016; Isti'anah, 2017; Cabi & Kalelioglu, 2019). However, in order to attain the best outcomes of eLearning, students must be actively involved in the learning process (Keengwe, 2015)—a concept often referred to as active learning (Kishore & Alekhya, 2018). Bonwell (1991) asserted that in active learning, students participate in the process, and they only participate when they do something and think about it.

A critical factor that can influence students' participation, such as their appropriate and active engagement in the learning process, is their attitude towards online learning. It is necessary, therefore, to consider discrepancies in teachers' and students' perceptions when implementing eLearning activities to avoid any resistance that may bring about disinclination or ineffectiveness (Alfehaid, 2019). According to Rhema and Miliszewska (2014), students' perceptions of eLearning are key determinants of future eLearning initiatives, and positive perceptions of eLearning are critical to students' readiness and inclusion in online learning.

Some studies have compared the effectiveness of virtual learning and traditional classroom learning. A longitudinal study by Banafshi et al. (2020) compared the impact of virtual and face-to-face learning on 60 EFL Iranian learners' vocabulary acquisition. Following a pre-/post-test design, participants were randomly divided into control and experimental groups. The control group received face-to-face instruction in the classroom, whereas the experimental group used the Telegram application. The post-test findings showed that although both groups improved, those who received online instruction showed significantly better improvement ($M = 26.60$) than the control group ($M = 20.80$). The researchers concluded that online classes were more effective. Other studies have extended this investigation by examining the effect of learning modes on the nature of interaction. For example, Tan et al. (2010) examined six pairs of beginner learners

who collaboratively completed two versions of seven writing tasks over 10 weeks. One set of tasks was completed in a face-to-face mode in a classroom, and the other was completed outside class time using an online platform. The study found collaborative patterns only in the group that received eLearning. The researchers concluded that computer-mediated learning was a useful L2 pedagogical tool and could promote higher engagement.

Several studies have attempted to elicit students' perceptions of face-to-face and computer-mediated learning. For instance, Nazara's (2016) mixed-methods study explored the perceptions of 42 EFL Indonesian students. Their attitudes were generally neutral toward face-to-face instruction but positive toward blended learning. The participants reported that blended learning was not only effective but also contributed to their critical thinking and self-learning. A quasi-experimental study by Suwantarathip and Wichadee (2014) compared the writing ability of students who collaborated on writing assignments using Google Docs with those working in groups in a face-to-face classroom and elicited their perceptions. The Google Docs group showed better performance than the face-to-face group as well as strong positive attitudes toward engaging in more online learning. A recent study by Al-Hattami (2020) explored instructors and students' perceptions of the transition from face-to-face to online learning. Online learning was perceived as effective because it reportedly helped instructors provide prompt and direct feedback, encouraged students to participate, and enhanced students' performance and achievements. Both instructors and students indicated they were willing to use eLearning in the future. Sanad (2020) conducted a study involving instructors and students from various Egyptian private and governmental universities to elicit their perceptions of eLearning implementation. The results indicated positive attitudes of instructors and students towards eLearning. There was a consensus among the participants that eLearning was easy to use, enhanced students' critical thinking, and contributed to their learning.

Studies in Saudi Arabia have also provided positive results from eLearning. For example, Alzahrani (2017) found a positive effect of blended learning on Saudi students' achievement and reported students' general satisfaction with eLearning. Sajid et al. (2016) likewise reported that EFL students were satisfied with blended learning as a novel, relevant, and effective approach and even agreed that it aided with exam preparation. The students also demonstrated a preference for more online lectures. Aljuda (2017) conducted a quantitative study targeting a large sample of male and female students (N = 500) at a Saudi university. All students, regardless of gender, reported positive perceptions of eLearning. Aljuda concluded that proper training, guidelines, and instructions were key factors that influenced student attitudes.

In a more comprehensive study, Alfehaid (2019) used both qualitative and quantitative methods to explore instructors and students' perceived influence of online English learning activities on academic achievement at a Saudi university. The findings showed that instructors and students perceived online activities to have a positive effect on academic performance. In addition, interviews with students revealed that online activities enabled them to practice the language independently outside the classroom. Alodail (2016) explored male and female instructors' attitudes towards eLearning at a university in Saudi Arabia. The findings revealed that all participants maintained a positive attitude towards eLearning, but the female group had positive attitudes higher than males. The researcher concluded that perceived computer competence was a key factor that influenced the participants perceptions. A recent mixed-method study by Anas (2020) showed students' positive attitudes towards eLearning as an interactive environment that enabled them to share information and collaborate in resolving learning challenges. The perceived usefulness of online learning has similarly been acknowledged at different levels of education beyond the university. As one example, Alwahoub et al. (2020) explored perceptions of eLearning in Saudi primary schools. The quantitative analysis showed positive perceptions of eLearning from students and teachers. Furthermore, teachers perceived eLearning as effective and said it promoted students' overall knowledge, while students agreed that eLearning helped them improve their knowledge and said it provided better opportunities for more collaboration with peers and teachers.

Although these studies explored teachers' and students' perceptions of eLearning at the tertiary level, the majority focused on the teaching and learning of English as a foreign language. Research investigating the perceptions of teaching and learning translation subjects is obviously scarce. In contrast to the above studies, this study investigates university instructors' and students' experiences of using online platforms to teach and learn English-Arabic translation subjects and to what extent the two groups perceive eLearning as having an influence on student achievement in translation subjects.

METHOD

Participants

The population of this study, selected randomly, consisted of instructors and undergraduate students in KSU's DELT. The instructors were male and female faculty members of COLT who had taught translation subjects online (i.e., written and oral translation subjects). Their academic ranks varied from teaching assistant to associate professor, and their age range was 21–61 years. There were 133 student participants from different academic levels (levels 6 to 10, where 10 is the final level). Their ages ranged from 19–25 years. Table 1 summarizes the participants' demographic characteristics.

By the end of the second semester of the 2019-2020 academic year, all participants had been using online learning for translation subjects for over two months due to the university closure following the COVID-19 outbreak. The data collection was anonymous and no personal information was collected from the respondents. The respondents were also informed that their responses would remain confidential and would be used for research purposes only.

Table 1. Demographic information of the participants

	Gender	Frequency	Percentage
Faculty members	Male	9	40.9
	Female	13	59.1
	Total	22	100
Students	Male	21	15.8
	Female	112	84.2
	Total	133	100

Design

For the purpose of answering the research questions, a quantitative approach was employed. Two questionnaires were developed by the researcher based on the related literature: one for the instructors and one for the students. The instructor and student questionnaires were given to seven experts (four Curriculum and Instruction and three EFL university professors) for validation. The content and construct validity of the instruments were examined and modified following the experts' suggestions and comments.

Instructor Questionnaire

The instructor questionnaire consisted of 21 items divided into two main sections: 1) demographic information (six items) and 2) perceptions of teaching translation courses online (15 items). The item responses used a five-point Likert scale (5 = strongly agree, 4 = agree, 3 = neutral, 2 = disagree, and 1 = strongly disagree). All items in the instructor questionnaire were checked for reliability, and the results showed a good internal consistency where Cronbach's alpha was 0.84.

Student Questionnaire

The student questionnaire was similar to the instructor questionnaire in that it used the same five-point Likert scale and the same number of items, but with slightly different wording adapted to fit the student experience. The questionnaire was piloted with nineteen students to establish its reliability. Cronbach's alpha was 0.82, thereby indicating a high internal consistency of items. The means of both the instructor and student questionnaires were classified as follows: "strongly disagree" from 1.00 and 1.80, "disagree" from 1.81 to 2.60, "neutral" from 2.61 to 3.40, "agree" from 3.41 to 4.20, and "strongly agree" from 4.21 to 5.00.

Data Collection and Statistical Analysis

Web-based versions of the instructor and student questionnaires were distributed to all participants at the end of the second semester of the 2019-2020 academic year. The instructor questionnaire was sent to 29 instructors, and 22 of them responded. The student questionnaire was circulated to 154 students at different levels (levels 6 to 10), and 133 students completed it. Once the questionnaires were collected, the data were processed and analyzed using the Statistical Package for Social Sciences (SPSS) to obtain the means and standard deviations for each item. Then, the outcomes of the two questionnaires were compared via an independent samples t-test.

FINDINGS

This study aims at exploring EFL instructors' and students' perceptions of using online learning for translation subjects. It also attempts to investigate whether there are any differences between the participants' perceptions. This section presents the findings based on the three research questions and provides explanations for the findings.

Instructors' Perceptions of Online Distance Learning

The first question of this study concerns instructors' perceptions of using eLearning for teaching translation subjects. Table 2 presents the means and standard deviations of each item in the instructor questionnaire.

Table 2. Means and standard deviations of the instructor questionnaire items

Item No.	Rank	Item	Mean	Standard Deviation
8	1	The methods of presentation and content delivery are appropriate for learning.	3.68	0.78
6	2	The tasks and assignments are easily understood and facilitate learning.	3.64	0.727
13	3	There is a lack of social interaction between the instructor and students, and among the students themselves.	3.59	0.959
9	4	It is easy for students to understand the content when studying online.	3.59	1.182
12	5	There are opportunities for collaborative work in ODL (i.e., completing tasks/assignments in cooperation with classmates).	3.50	0.74
7	6	Feedback on assignments and examinations is timely (i.e., feedback is sent back to students quickly).	3.46	0.912
1	7	ODL is useful for translation courses.	3.32	0.945
2	8	ODL enhances students' learning autonomy (i.e., self-learning).	3.14	0.889
4	9	ODL does not increase students' motivation for learning. (negative statement)	3.14	1.125
14	10	It is difficult to contribute to class discussions in an ODL translation course.	3.14	1.207
10	11	Students cannot be contacted easily. (negative statement)	3.05	1.214
11	12	Responding to students' inquiries takes time.	2.91	1.269
5	13	ODL contributes to students' learning achievements.	2.77	0.813
15	14	I would like to have more translation courses taught online.	2.5	1.263
3	15	I prefer ODL translation courses to the traditional ones (i.e., face-to-face teaching).	2.32	0.995
		Overall mean	3.18	0.233

The overall mean scores shown in Table 2 indicate neutral perceptions of the instructors towards using eLearning for teaching translation subjects (M = 3.18). Table 2 also shows that the mean scores ranged from 2.32 and 3.68, with standard deviations from 0.99 to 1.26. Items 8, 6, 13, 9, 12, and 7 had mean scores ranging from 3.46 to 3.68. These items fell within the "agree" category, which accounted for 40.01% of all the instructor questionnaire items. Table 2 also shows that Items 1, 2, 4, 14, 10, 11, and 5 had mean scores ranging from 2.77 to 3.32. These items fell within the "neutral" category, which constituted 46.66% of the total items. Items 15 and 3 had the least mean scores ranging from 2.32 and 2.50, respectively. These items fell within the "disagree" category, which comprised 13.33% of all items.

These findings show that the instructors agreed that the online methods of presentation and content delivery were appropriate for learning (Item 8, M = 3.68) and that the students understood the tasks and assignments easily, which helped facilitate their learning (Item 6, M = 3.64). They also agreed that there was a lack of social interaction between them and the students, and among the students themselves (Item 13, M = 3.59) but indicated that this did not impact the students' understanding of the course contents (Item 9, M = 3.59) nor their opportunities for engaging in collaborative work (Item 12, M = 3.50). The instructors responded that timely feedback was given on student assignments and examinations (Item 7, M = 3.46).

However, they were undecided about whether ODL was generally useful for translation subjects (Item 1, M = 3.32). The instructors were also neutral about whether ODL could improve students' learning autonomy, contribute to students' motivation for learning, or enhance class discussions (Items 2, 4, and 14, M = 3.14). They did not provide a clear answer concerning whether students could be approached easily using online platforms (Item 10, M = 3.05) or whether responding to student inquiries took time (Item 11, M = 2.91). In general, the instructors were neutral on the issue of whether online learning contributed to students' overall learning achievements (Item 5, M = 2.77). Moreover, the instructors were not in favor of having more translation subjects taught online (Item 15, M = 2.5), and despite the perceived benefits of ODL, they preferred the traditional face-to-face teaching of translation subjects compared to the online method (Item 3, M = 2.23).

Students' Perceptions of Online Distance Learning

The second question concerned students' perceptions of using eLearning platforms for translation subjects. Table 3 presents the means and standard deviations of each item according to the students' responses.

Table 3. Means and standard deviations of the student questionnaire items

Item No.	Rank	Item	Mean	Standard Deviation
2	1	ODL enhances students' learning autonomy (i.e., self-learning).	3.67	0.97
8	2	The methods of presentation and content delivery are appropriate for learning.	3.5	0.99
6	3	The tasks and assignments given can be understood easily and facilitate learning.	3.47	1.07
5	4	ODL contributes to students' learning achievements.	3.44	0.99
11	5	Responding to student inquiries takes time.	3.43	1.05
1	6	ODL is useful for translation courses.	3.38	1.28
13	7	There is a lack of social interaction between the instructor and students, and among the students themselves.	3.33	1.12
12	8	There are opportunities for collaborative work in ODL (i.e., completing tasks/assignments in cooperation with classmates).	3.31	1.23
9	9	It is easy for students to understand the course contents when studying online.	3.25	1.23
15	10	I would like to have more translation courses taught online.	3.19	1.42
7	11	Feedback on assignments and examinations is timely (i.e., feedback is sent back to students quickly).	3.17	1.27

4	12	ODL does not increase students' motivation for learning. (negative statement)	3.12	1.18
10	13	Course instructors cannot be contacted easily. (negative statement)	3.02	1.14
3	14	I prefer ODL translation courses to the traditional ones (i.e., face-to-face teaching).	2.96	1.42
14	15	It is difficult to contribute to class discussions in an ODL translation course.	2.93	1.22
		Overall mean	3.28	0.435

As shown in Table 3, the overall mean score of the students' perceptions of using online classes for translation subjects was neutral (M = 3.28). The means generally ranged from 2.93 to 3.67, with standard deviations from 0.97 to 1.42. Items 2, 8, 6, 5, and 11 had mean scores of 3.43 to 3.67. These items fell within the "agree" category, which roughly constituted 27% of the total number of items. Then, Items 1, 13, 12, 9, 15, 7, 4, 10, 3, and 14 had mean scores ranging from 2.93 to 3.38, which fell within the "neutral" category that constituted 73% of all items.

These findings showed that the students agreed online learning enhanced their learning autonomy (Item 2, M = 3.67). Further, similar to the instructors, the students believed the online methods of presentation and content delivery were appropriate for learning (Item 8, M = 3.5). There was a student consensus that the tasks and assignments could be easily understood, which helped facilitate their learning (Item 6, M = 3.47), and the students believed this contributed to their overall learning achievements (Item 5, M = 3.44).

The students reported that the instructors did not provide prompt responses to their inquiries (Item 11, M = 3.43). They were undecided about the overall usefulness of online learning for translation subjects (Item 1, M = 3.38) as well as about whether there were opportunities for social interactions (Item 13, M = 3.33) or collaborative work on tasks and assignments (Item 12, M = 3.31). For the remaining items (Items 9, 15, 7, 4, 10, and 3), they indicated neutral perceptions. Unlike the instructors, for example, the students were uncertain about whether they would like to have more translation courses taught online (Item 15, M = 3.19) and whether they preferred online learning to the traditional face-to-face method (Item 3, M = 2.96).

Instructors' and Students' Perceptions of Online Distance Learning

An independent samples t-test was performed to compare the instructors' and students' responses. Table 4 presents the results.

Table 4. Independent samples t-test to compare instructor and student responses

Dimension	Participant	n	Mean	SD	t	Sig
Perception of using Online Distance eLearning (ODL) for translation courses	instructor	22	3.18	0.233	-1.537	0.131
	student	133	3.28	0.435		

As can be seen from Table 4, there were no statistically significant differences between the instructors' responses (M = 3.18, SD = 0.23) and students' responses (M = 3.28, SD = 0.43) at the significance level of $p < 0.05$. This suggests the two groups had similar perceptions of the use of online learning for translation courses.

DISCUSSIONS AND CONCLUSION

This study explored instructors' and students' perceptions of using online platforms for teaching and learning translation subjects. Quantitative data were collected from a sample of 22 faculty members and 133 undergraduate students in the DELT at KSU.

Concerning the first research question about instructors' perceptions, the findings showed that, despite an overall neutral stance, instructors reported several benefits. They reported general agreement that eLearning was useful for appropriate delivery of course content, which might enable students to understand assignments more easily and facilitate their learning. This finding is consistent with those of Al-Ammary et al. (2014) and Alwahoub et al. (2020), who concluded that eLearning gave students easier access to materials and contributed to their learning. Another finding of this study was the instructors' belief that eLearning provided opportunities for collaborative work, in agreement with previous studies. Banafshi et al. (2020), for example, reported that students receiving eLearning instruction interacted more and engaged in more collaborative patterns. Alruwais et al. (2018) also noted more interaction in eLearning than conventional learning. This finding is unsurprising given that eLearning can provide more opportunities to practice and communicate beyond the limited time of an onsite classroom (Ortega, 2007). In computer-mediated L2 learning, learners have additional time to contribute to a task, thereby reducing pressure, particularly on shy students, and encouraging everyone to participate (Meyer, 2003).

However, the present study could not confirm the findings of Alfehaid (2019), who reported university instructors' belief in a positive impact of eLearning on overall academic achievement. This may be attributed to a number of factors. For example, learning in Saudi Arabia has shifted abruptly to an online mode due to the COVID-19 pandemic. Particularly for translation subjects, which were not previously provided online in the DELT, the experience may have rendered instructors unable to notice the effects of eLearning on student achievement. For instance, translation subjects are normally delivered face-to-face, where specialized laboratories and interpretating tools are used to solve translation tasks, promote written and verbal skills, and provide immediate constructive feedback. The absence of these essential resources as well as the technical issues that arose in the first few weeks following university closures could have restricted instructors and students' practices, leaving little-to-no chance for instructors to capture the actual effect of such experience on overall achievement. Moreover, these factors can explain why instructors in this study were unwilling to teach translation courses online, preferring face-to-face instruction. This finding is consistent with previous studies. For example, Alwahoob et al. (2020) concluded that although teachers found eLearning to be useful, they still regarded face-to-face interaction as important because it helped students strengthen their communication and other skills. In addition, Al-Hattami (2020) reported that teachers were willing to use eLearning in the future.

Next, concerning the second research question about students' perceptions, the study findings indicate general agreement among the students that ODL enhanced their learning autonomy. This is consistent with Cabi and Kalelioglu's (2019) finding that ODL improved students' self-directed learning skills. In this study, the students who used ODL platforms, either synchronously or asynchronously, were likely to have more opportunities to become more active participants with additional responsibilities that could ultimately have contributed to their overall learning autonomy. An important point reported by students in this study was that they understood assignments more easily and eLearning facilitated their learning. This result, in agreement with Aljuda (2017), may be attributed to ODL's flexibility. In translation subjects, students need time to read, look up words, and analyze texts carefully—tasks that normally have far more limited time in classrooms. Therefore, the accessibility of assignments, regardless of time and location, may have provided greater opportunities for conscious attention, through which students could analyze texts, notice errors, and solve text-related issues. Such processes can bring about better learning outcomes (Storch, 2013).

Despite some of the reported benefits, the results showed generally neutral perceptions from instructors and students. Therefore, instructors and students might have a preconceived awareness of several but not all benefits of eLearning. For this reason, the study recommends increasing this awareness through workshops on using eLearning platforms for translation, online help, and regular support. Extensive and consistent training would help instructors and students become more comfortable with this mode of learning. Similarly, Fathema and Sutton (2013) suggested users would like universities to offer extensive training programs. Furthermore, policymakers should expand the use of eLearning platforms to include particular types of instructional materials and tools. For example, university authorities could integrate translation software into their eLearning platforms to make these tools accessible off campus. Technical developers should also provide support to instructors and students to ensure effective and continuous implementation. Failure to provide more learning resources and technical support could lead to minimal use of eLearning.

Although the findings may add some insights to the field of teaching and learning translation subjects, this study has a number of limitations. The data were all from one university in Saudi Arabia, i.e., KSU. In order to make a valid claim, a larger scale study across different universities would be required to make the results generalizable to a larger context. Future research should also consider the impact of gender on participants' perceptions. Another limitation is that this study is merely quantitative. Thus, future studies should consider post-treatment interviews with both the instructors and students in order to investigate this topic more comprehensively. In conclusion, the results of the present study add to the body of studies on the perceptions of instructors and students regarding ODL in an EFL context.

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APPENDIX A

The Instructors' Questionnaire

The following questionnaire aims to elicit your perceptions of the recent experience of using Online Distance e-Learning (ODL) for teaching English translation subjects in the College of Languages and Translation (COLT), King Saud University (KSU). Please ensure that the information provided is accurate. All information collected will be highly confidential and will only be used for the purpose of this study. Your participation is very much appreciated.

Instructors' Questionnaire

Perceptions of using Online Distance e-Learning (ODL) to teach translation courses.

No	Item	Strongly Agree 1	Agree 2	Undecided 3	Disagree 4	Strongly Disagree 5
1	ODL is useful for translation courses.	o	o	o	o	o
2	ODL enhances students' learning autonomy (i.e., self-learning).	o	o	o	o	o
3	I prefer ODL translation courses to the traditional ones (i.e., face-to-face teaching).	o	o	o	o	o
4	ODL does not increase students' motivation for learning. (negative statement)	o	o	o	o	o
5	ODL contributes to students' learning achievements.	o	o	o	o	o
6	The tasks and assignments are easily understood and facilitate learning.	o	o	o	o	o
7	Feedback on assignments and examinations is timely (i.e., feedback is sent back to students quickly).	o	o	o	o	o
8	The methods of presentation and content delivery are appropriate for learning.	o	o	o	o	o
9	It is easy for students to understand the content when studying online.	o	o	o	o	o
10	Students cannot be contacted easily. (negative statement)	o	o	o	o	o
11	Responding to students' inquiries takes time.	o	o	o	o	o
12	There are opportunities for collaborative work in ODL (i.e., completing tasks/assignments in cooperation with classmates).	o	o	o	o	o
13	There is a lack of social interaction between the instructor and students, and among the students themselves.	o	o	o	o	o
14	It is difficult to contribute to class discussions in an ODL translation course.	o	o	o	o	o
15	I would like to have more translation courses taught online.	o	o	o	o	o

APPENDIX B

The Students' Questionnaire

The following questionnaire aims to elicit your perceptions of the recent experience of using Online Distance e-Learning (ODeL) for studying English translation subjects at the College of Languages and Translation (COLT). Please ensure that the information provided is accurate to help achieve the best outcomes for this study. All information collected will be highly confidential and will only be used for the purpose of this study. Your participation is very much appreciated.

Students' Questionnaire

Perceptions of using Online Distance e-Learning (ODeL) to study translation courses.

No	Item	Strongly Agree 1	Agree 2	Undecided 3	Disagree 4	Strongly Disagree 5
1	ODL is useful for translation courses.	o	o	o	o	o
2	ODL enhances students' learning autonomy (i.e., self-learning).	o	o	o	o	o
3	I prefer ODL translation courses to the traditional ones (i.e., face-to-face teaching).	o	o	o	o	o
4	ODL does not increase students' motivation for learning. (negative statement).	o	o	o	o	o
5	ODL contributes to students' learning achievements.	o	o	o	o	o
6	The tasks and assignments given can be understood easily and facilitate learning.	o	o	o	o	o
7	Feedback on assignments and examinations is timely (i.e., feedback is sent back to students quickly).	o	o	o	o	o
8	The methods of presentation and content delivery are appropriate for learning.	o	o	o	o	o
9	It is easy for students to understand the course contents when studying online.	o	o	o	o	o
10	Course instructors cannot be contacted easily. (negative statement).	o	o	o	o	o
11	Responding to students' inquiries takes time.	o	o	o	o	o
12	There are opportunities for collaborative work in ODL (i.e., completing tasks/assignments in cooperation with classmates).	o	o	o	o	o
13	There is a lack of social interaction between the instructor and students, and among the students themselves.	o	o	o	o	o
14	It is difficult to contribute to class discussions in an ODL translation course.	o	o	o	o	o
15	I would like to have more translation courses taught online.	o	o	o	o	o

STUDENT BARRIERS TO PROSPECTS OF ONLINE LEARNING IN VIETNAM IN THE CONTEXT OF COVID-19 PANDEMIC

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ABSTRACT

This study was conducted to investigate student barriers to the prospect of online learning in Vietnam, in the context of Covid-19 pandemic. This mixed-method study attracted the participation of 1165 students from twelve universities and nine high schools across thirteen provinces in the Mekong Delta. The findings revealed the additional three obstacles from the qualitative data analysis including (1) geographical features, (2) the economic status of Vietnamese people, and (3) Vietnamese culture and traditions in addition to the six groups of barriers being re-confirmed from Berge's framework (2005). The results of Binary Logistic Regression testified the negative impacts of obstacles in Learner Motivation, Cost and Access to the Internet, and Social Interaction on the prospects of online learning, though it is predicted to go farther in education in Vietnam in the future.

Keywords: Online learning prospects, online learning barriers, Covid-19 pandemic, impacts, influential factors.

INTRODUCTION

According to Nguyen (2020), online learning in Vietnam has been provided by some universities, but it is absent in general education. In another statement, he testified that the Ministry of Education and Training (MOET) in Vietnam has directed and guided the online implementation for both university and high school education since the last few years. As a fact of matter, a lot of institutions and high school have been applying online teaching at different levels in accordance with their own training purposes.

In the early of the year 2020, under the impact of the Covid-19 pandemic, UNESCO (2020)'s first release about the number of students out of school is approximately 290 million. In response to school closure, they call for the practice of online learning and open educational applications, which encouraged teachers to reach learners from a far distance to minimize the risk of educational disruption. To meet the call of UNESCO and join the educational mainstream worldwide in the context of pandemic, most universities in Vietnam in general, and the Mekong Delta in particular have switched to online learning temporarily. Vietnamese education has been trying to uphold the spirit: "Even if students have to stay off schools, their learning will not be interrupted." (Nguyen, 2020).

The idea of that research has arisen when there were a great number of different opinions from teachers and learners about compulsory online courses after the social distancing period. Predicting the future of online learning in the Mekong Delta is hoped to provide educators significant insights to have in time implementations for the local education.

LITERATURE REVIEW

The Overview of Online Learning

Online learning was taken into research in different ways of definition. AlHamad et al. (2014) perceived online learning as the chance to stay home and study as an advantage. Dabbagh and Bannan-Ritland (2005) figured out the presence of teachers and students in physical classrooms in a fixed time with teachers' linear teaching method being replaced by online learning with its all dynamic, unbound, and the practice of diversity pedagogical active learning and learner-centered approach (Barker, 2003; Browne, 2005). In addition, other researchers judged online learning as the flexibility of the classes (Atack, 2003; Fish, 2016; Horspool & Lange, 2012; Platt et al., 2014; Sargeant et al., 2004; Wyatt, 2005) the convenience with and without family issues and/or health problems (Dyrbye et al., 2009; Kokko et al., 2015), and also the proliferation and popularity (Landrum et al., 2020).

Standing on another perspective, Urdan et al. (2000) consistently defined the term "online learning" as web-based learning, Internet-based learning, virtual learning, cyber learning or net-based learning, also known as a subset of distance education. Basic manipulations of online learning courses were performed with the use of "text and graphic of the course, exercises, testing and record keeping" while the more complicated one involved in animations, simulations, audio and video sequences, peer and expert discussion group, online mentoring, link to material on a web and communication with corporate education records (Urdan et al., 2000, p. 8). It was, therefore, clearly to understand that online learning focuses on both online learning content and the support of obvious technology to provide meaningful and successful lessons. Similarly, based on the proportion of online content delivered, Allen and Seaman (2007) provided the four main kinds of learning. Specifically, traditional learning perceived the absent contribution of content delivered (0%), while Web-facilitated approach allows the percentage of 1 to 29% online content delivered; Blended or Hybrid learning is defined as the practice of 30 to 79% learning content being transferred online; and Online learning is with more than 80% of the learning process occurring virtually. Details could be found in Figure 1 below:

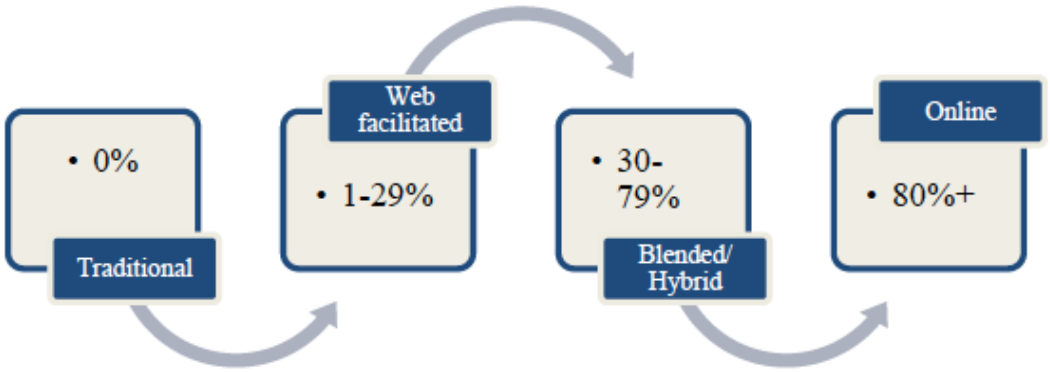

Figure 1. The proportion of online content delivered in different kinds of learning

Regarding online learning in higher education, Campbell (2004) argues the emphasis of online learning was on the metacognitive development of students such as reflexive and collaborative learning. Unplanned subject knowledge and learners' self-directedness, moreover, are hoped to be reached to optimize incidental learning and improve performance.

However, no good research has been done to investigate the best forms of online learning as well as what causes bad online pedagogy (Baggaley, 2014). Opposes of distance education or online learning have started for decades when considered as "digital diploma mills" (Noble, 1998) and the meaningless of schools without teachers (Moll, 1998). Baggaley (2014) emphasized that the teacher's role would not be degraded although online teaching has faced the reality of inconvenient truths, the massive student numbers and the inability

of teachers. In addition, adapting face-to-face environments to online learning environments to evaluate the teaching quality and measure teaching effectiveness in a traditional way would be irrelevant to online teaching (Berk, 2013; Loveland & Loveland, 2003; Lowenthal et al., 2015). There was a need for online learning to be evaluated particularly to this form of teaching (Lowenthal et al., 2015). Online courses were more favorable for qualitative and introductory courses (Comer et al., 2015). Comparing online and FTF classes, the prominent barriers involved in the quality of interaction among students in the classrooms (AlHamad et al., 2014; Dyrbye et al., 2009; Waldman et al., 2009) and the like from the instructors (Horspool & Lange, 2012), the timeliness of responses (Boyd, 2008), and the uncertainty of students' work evaluation (Platt et al., 2014)ublisher>Routledge</publisher><isbn>0260-2938</isbn><urls><related-urls><url>https://doi.org/10.1080/02.

Student Barriers to Online Learning in Different Contexts

Barriers can be learned as the obstacles that hinder learners in acquiring their personal learning goals (Henderikx et al., 2019). Relying on geographical characteristics, kinds of learners, the local educational policies or the progress of technology in certain region, a wide range of studies has been done to investigate online learning' hindrance factors (Al-Senaidi et al., 2009; Ardichvili, 2008; Bacow et al., 2012; Barker, 2003; Browne, 2005; Dabbagh & Bannan-Ritland, 2005; Fish, 2016; Henderikx et al., 2019; Horspool & Lange, 2012; Khalil & Ebner, 2014; Muilenburg & Berge, 2005; Platt et al., 2014; Waldman et al., 2009). Henderikx et al. (2019) synthesized online learning barriers from previous studies as learners' difficulties in reading, writing, typing skills, technical problems with computers, feeling of isolation, family issues, interaction, lack of time, insufficient academic background, workplace issues and lack of support from family and friends or the workplace, insufficient technology background, computer and/or Internet issues, and lack of instructor presence. Furthermore, results from the empirical study of Henderikx et al. (2019) showed problems in students' own responsibility for learning, lack of time, bad course content, lack of motivation, low quality of instruction and/or family issues.

Muilenburg and Berge (2005) discovered eight different barriers as (1) social interaction, (2) administrative/instructor issues, (3) time and supports for studies, (4) learners' motivation, (5) technical problems, (6) cost and access to the Internet, (7) Technical skills and (8) academic skills. Similarly, by naming the barriers from learners' perspectives, Ardichvili (2008) found different results as (1) interpersonal factors – e.g. fear of criticism and fear of misleading others; (2) procedural factors – i.e. lack of clarity on the best way of sharing, etc.; (3) Technological factors – i.e. lack of technological aptitude; and being different in other studies, the researcher had discovered the impact of (4) cultural factors – e.g. saving face, in-group orientation, etc.

By analyzing the views of the faculty or the participants with the teaching roles in distance learning, Al-Senaidi et al. (2009) found various barriers including (1) Lack of equipment, (2) lack of institutional support, (3) disbelief of ICT benefit, (4) lack of confidence, and (5) lack of time. Interestingly, the study of Bacow et al. (2012) generated some distinct hinders as (1) the fear of losing their faculty rank, (2) the higher time investment to prepare for an online.

Prospects of Online Learning

"Prospects" in Marketing are used to refer potential customers. According to Klein (2004), "prospects" connotes the probability of success. Oxford dictionary also defines it as the possibility that something will happen. In this study the prospects of online learning are understood as the tendency of continuing online courses in the future. The most concern is whether students, especially the ones without prior experience in learning online before the Covid-19 pandemic, will volunteer to continue with future online courses or not.

In a research of Mbuva (2014), online education was predicted to be grown "like a wild fire with no signs of quenching it", which attracted the concern of almost institutions, colleges to parents and students at different ages.

The Berge's Theoretical Framework (2005)

On the basis of inheriting results of previous works (Garland, 1993; Muilenburg & Berge, 2001; Schilke, 2001), the research was done in 2005 by Muilenburg and Berge with the aims of pointing out obstacles preventing online learning in the USA context. The questionnaire comprising 47 items was used as the instrument for quantitative research. The results after the main study accepted the deletion of the two unrelated issues. And the final of 45 items was adapted to be the instrument in our research. Details about the framework would be presented in Figure 2.

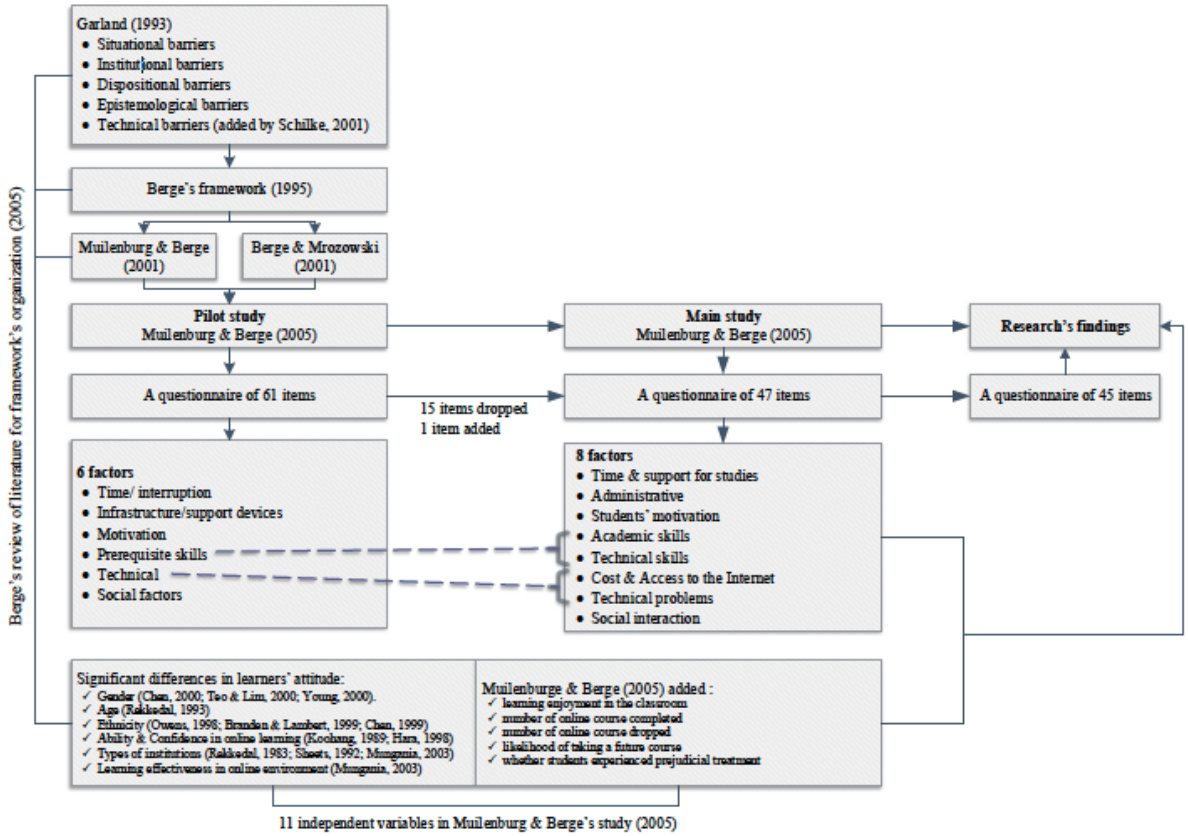

Figure 2. Berge's review of literature for framework (2005)

RESEARCH METHODOLOGY

According to Hurmerinta-Peltomaki and Nummela (2006), mixed-method approach gains a deeper and broader understanding of the phenomenon than study that is taken only with qualitative or quantitative approach. That integration also helps readers more confident in the findings and conclusion researchers draw in the studies (O'Cathain et al., 2010).

In this study, we firstly focus on barriers to the online learning process. An adaptation of Berge's framework (2005) is used to confirm online hindrance factors, with the support of Exploratory Factor Analyses. Then, we employed statistics on the percentage of students who answer will or will not take the future courses. By using Regression Binary Logistic, we would like to discover the correlation between perceived online learning barriers to their future decision. Also in this study, we wanted to go farther on learners' explanations for their extreme rating with any barriers. In search of finding new factors hindering the decision of continuing future online courses, the triangulation of both quantitative and qualitative results is hoped to provide an overview about the prospect of online learning and its obstacles during the time of Covid-19. The research model will be illustrated in Figure 3.

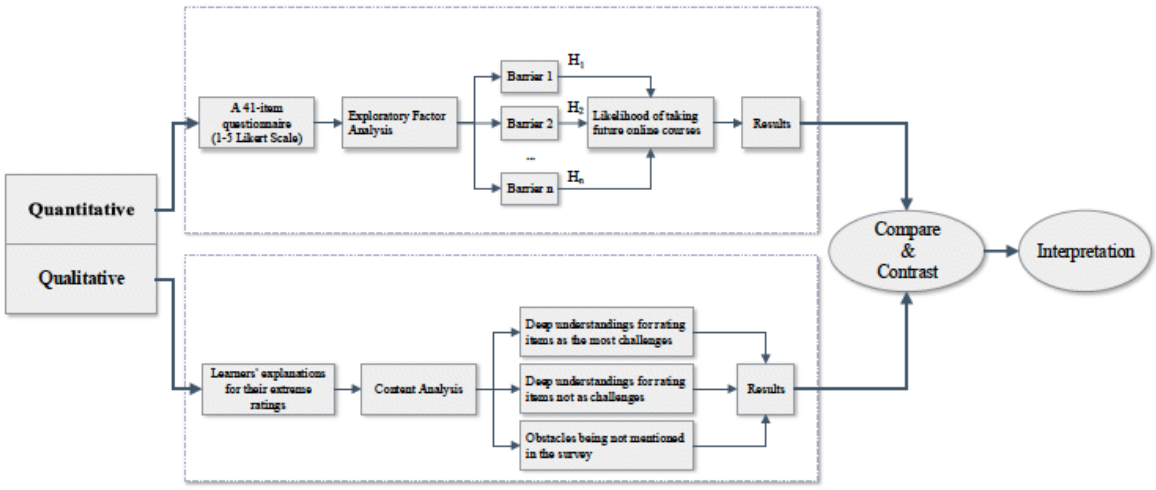

Figure 3. The research model

Research Instrument - An Adaptation of Berge's Framework

After considering the 45 items in the original version, which are all claims of barriers that students face while learning online, four items have been removed due to some certain reasons. Firstly, since participants in this study were all university and high school students aged from 16 to 25 years old, the item of "Fear family life will be disrupted" was deleted because of its inappropriateness. Furthermore, technical issues became predictable that most of the research has been discussed; we left our concern more on ranking other factors and looking for the new ones. Therefore, the three items were removed and Vietnamese version was generated to familiarize participants with the questionnaire. Participants were asked to rate each statement in accordance with their own reality while learning online on the 1-5 Likert Scale, ranging from "Completely agree" to "Completely disagree".

Cronbach Alpha was used to check the reliability of the 41-item questionnaire from Berge's adaptation (2005). Table 1 shows that all values are over 0.6 and the Correlated Item-Total Correlations are over 0.3. According to Nunnally and Bernstein (1994), the questionnaire is qualified to be studied in our context.

Table 1. Cronbach Alpha of each cluster in the questionnaire

Clusters	Number of items	Cronbach Alpha
Administrative/Instructors' issues	11	0.89
Social interaction	06	0.86
Academic skills	06	0.91
Technical skills	06	0.92
Learners' motivation	05	0.77
Time and support for study	04	0.76
Cost and access to the Internet	03	0.80

Participants

1221 online learners from more than twenty universities and high schools across thirteen provinces in the Mekong Delta joined in the survey. They were asked to respond the online Google Form from the end of April, 2020 to June 25, 2020. Data was selected carefully by removing fault or duplicated ones. The final of 1165 responses (95.4%) were valid to be processed by using SPSS to give findings. Table 2 provides basic descriptions about participants of the study.

Table 2. Descriptions of participants in the study (N=1165).

		N	(%)
Gender	Male	454	39
	Female	711	61
Level of education	University	794	68.2
	High school	371	31.8

FINDINGS

This section firstly presented an overview of barriers that Vietnamese students face when learning online during the social distancing time of Covid-19 outbreak, by combining quantitative results from Exploratory Factor Analyses (EFA) and the qualitative findings of students' explanations for their extreme ratings. Secondly, we reported the prospects of online education in Vietnam under the impacts of those hindrance factors. Once again, quantitative results from Binary Logistic Regression and the qualitative ones from answers of open-ended questions were triangulated to give final results.

An Overview of Online Learning's Barriers in Vietnam

An EFA with Principal Axis Factoring extraction and Promax rotation was used in the study. This extraction method combining with Promax rotation reflects the data structure more exactly than that of Principal Components extraction (Gerbing & Anderson, 1988). After removing disqualified items (these items being loaded into more than two groups with loading of 0.5 or greater), the remaining of 29 barriers to online learning (from the initial 41 ones) were loaded into six groups of barriers (see Table 4). Noticeably, all four items in the group of Time and Support for study were deleted after the processes, which cause the current study recorded the impacts of the six groups of factors, instead of seven as in the early stage. The factorability of the matrix was examined using the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO). In our study, KMO for the whole matrix was 0.937. The initial eigenvalues were greater than 1, which are considered significant. Bartlett's test has a significant level at 0.000; therefore, all variables are correlated. They were all accounted for 67.6% of the overall variance. According to Hair et al. (1998): "… in the social sciences, where information is often less precise, it is not uncommon to consider a solution that accounts for 60% of the total variance (and in some cases even less) as satisfactory" (p. 104). Some other hindrance factors discovered through the answers of open-ended questions are considered to provide deeper perspective about online learning barriers.

Table 3. Total variance explained

	Initial Eigenvalues		
Components	Total	% of Variance	Cumulative %
Technical skills	10.739	37.031	37.031
Administrative/Instructors' issues	2.850	9.829	46.860
Social interaction	1.911	6.590	53.451
Academic skills	1.648	5.681	59.132
Cost and access to the Internet	1.401	4.830	63.962
Learners' motivation	1.062	3.663	67.625

Table 4. Pattern Matrix[a]

	Factors					
Components (29)	1	2	3	4	5	6
Lack skills for using the delivery system	**.910**	-.013	.002	-.038	.021	-.050
Lack online learning software skills	**.825**	-.028	-.039	.052	.040	-.022
Fear computers and technology	**.814**	.069	-.059	.044	-.027	-.079
Unfamiliar with online learning technical tools	**.806**	-.016	.016	.009	-.007	.045
Shy or lack confidence for online learning	.788	-.003	.026	.035	-.006	-.035
Fear different learning methods used for online learning	**.744**	-.015	.045	-.087	-.028	.201
Lack of clear expectations/instructions	-.053	**.815**	-.048	-.030	-.014	.055
Instructors do not know how to teach online.	-.046	**.771**	-.094	.026	-.035	.001
Lack of timely feedback from instructor	-.011	**.771**	-.005	-.046	-.010	.008
Lower quality materials/instruction online	.079	**.662**	.014	.020	-.057	.011
Lack of access to instructor/expert	.023	**.596**	.185	-.065	-.022	.023
Difficulty contacting academic or administrative staff	-.012	**.580**	.066	.058	.093	-.119
Course materials not always delivered on time	.052	**.567**	.001	-.006	.083	-.037
Class size is not right for online learning	.008	**.510**	-.005	.015	-.001	.092
Online learning seems impersonal	-.037	-.063	**.916**	-.052	.005	.036
Lack of interaction/communication among students	-.005	-.015	**.816**	-.078	-.038	.049
Lack of student collaboration	-.032	.017	**.806**	-.005	.002	.005
Lack of social context cues	.024	.086	**.592**	.140	-.013	-.008
Afraid of feeling isolated	.074	.080	**.577**	.131	.042	-.119
Lack reading skills for online learning	.022	-.013	-.025	**.886**	-.021	.015
Lack reading skills for online learning	.006	.035	-.053	**.874**	.015	-.007
Lack language skills for online learning	-.001	.002	.030	**.815**	.007	.030
Lack communication skills for online learning	.022	-.044	.053	**.755**	-.010	.025
Online learning technology costs too much	.045	.017	-.019	-.018	**.812**	-.012
Needed technology is not available	-.011	-.007	.025	-.012	**.797**	-.008
Lack adequate Internet access	-.031	.000	-.023	.021	**.649**	.077
Lack personal motivation for online learning	-.041	-.004	.011	.012	**.035**	.855
Procrastinate, cannot get started	.079	.058	-.058	.090	-.024	**.693**
Online learning environment is not inherently motivating	.006	.005	.139	-.024	.045	**.633**

Extraction Method: Principal Axis Factoring. Rotation Method: Promax with Kaiser Normalization.

a. Rotation converged in 7 iterations.

Table 5. Priority of student barriers to online learning

Barriers factors (N= 1165)	Mean	SD
Cost and access to the Internet	3.25	0.86
Social interaction	3.12	0.83
Learners' motivation	2.9	0.86
Administrative and instructor's issue	2.67	0.68
Academic skills	2.63	0.81
Technical skills	2.53	0.79

Means of each factor were ranked to show the impact of these barriers on students' online learning. As presented in Table 5, the most influencing factors to Vietnamese students are problems about Cost and access to the Internet (M=3.25). Social interaction and Learners' motivation closely stand for the next most challenges (M=3.12 and 2.9). Less severe barriers are Administration and instructor's issues and Academic skills (M=2.67, 2.63). Participants rated Technical skills as a very low challenge to their online learning (M=2.53). Results gaining from text analysis provided learners' voice (with a total number of 170 students providing answers for open-ended questions, explaining their ratings) toward these groups of barriers as below.

Cost and Access to the Internet

All four items in this group received more approvals from participants. Twenty-three students mentioned the living conditions as impetuses or restraints of online learning occurrence. Other thirteen students admitted that they had no computers or laptops to study when they were in their hometown; their smartphones (if there were) were still not smart enough to run any online programs. Although this ratio was quite small in the general picture of online learning barriers, its existence would cause uncountable inconvenience for learners

Respondent #476 just simply stated that "Economy is different from person to person", but it was strong enough to prove the hard condition that a part of students has been suffering. Respondents #15, #32, #55, #131 and #256 had accepted their relative poor family status could not help them afford a private computer while they were learning in the college, and so was it at the time of pandemic, when money was much more of a challenge for them to earn.

For some students who have already had computers and laptops, the problems evolved in other perspectives such as using the available internet and the investment to set up the new ones or paying for 3G, 4G. Sixteen participants among 170 students giving answers for the open-ended questions said they were living in rural areas, where the Internet was still unpopular or they even did not have the Internet access. Respondents #17 and #114 shared the same ideas about the obligation of online learning which caused a lot of Internet problems. They had to pay a certain amount of money for it to be online promptly. Specifically, respondent #461 complained about the additional fee for 3G but its access was not always strong as his expectation. Additionally, respondent #1135 had to pay extra money to upgrade the Internet; and it would be worse when hearing the ideas from participant #214, there were two classes that he had to pay 40 thousand VND each for 4G due to power outage, which is also the concern of 23 other participants since electricity in some regions is often interrupted.

Once these problems happen, online learning finds it hard to run as smoothly as it can. In Vietnam, especially in the Mekong Delta, almost all universities are situated in the city centers and when coming back to their hometown, students are unable to enjoy better learning conditions as they used to in their institutions. All in all, learning from a far distance with the help of the Internet seems to raise a big challenge for the one who lives in the countryside and also the ones who live in disadvantaged conditions.

Social Interaction Issues

Most students agree that they prefer to learn in person. According to respondent #369, face-to-face teaching and learning optimize the ability of interaction between the teacher and students, and among students as well; while such interactions become the most shortcoming of online learning. Seventy-three explanations were received from a hundred and seventy respondents (42.9%) rating strongly agree with "Online learning lacks interaction among students." Respondents #71, #127, #197, #273 and other six respondents said virtual interaction via screens were extremely unnatural and easy to cause noises when lots of students wanted to discuss simultaneously. Respondent #211 felt it hard to adapt to the new learning environment. From sharing of the twenty participants, switching on Internet-based courses were accused of pushing them into a blurred learning environment where they were unlikely to absorb knowledge as well as when they learned in traditional classes. Social interaction, under responders' discussion was also the reasons for students' senses of distraction (Respondents #25, #122, #211, #353, and #407). As a result, difficulties caused by interaction drifted learners apart from online learning and gradually turned them back to traditional classrooms.

Some other students being in favor of online learning believed that interaction on cyberspace still took place normally as when they studied offline, though the reflections just occupied in cases.

Learners' Voice toward Other Group of Barriers

Learner motivation. As regards learner motivation factors, which are ranked in the third place (M=2.93, SD=0.7), especially with the statement "Must take more responsibility for learning". Among 170 responses from the open-ended questions, 30 students (17.6%) mentioned "responsibility" in the connection with self-study, autonomy to raise their own attitude in learning, especially in the time of pandemic. Staying focused on learning without teachers' reminders and friends' discussion seemed to be hard, but it was their mission in the quarantine time (respondent #860). Interestingly, with the item "Choose easier, less demanding aspects of assignments", a great number of participants (n=87) showed their strong reaction with their given online assignments. They totally admitted that they were asked to do a great deal of exercises with higher demand, which consequently caused them feelings of must-taking responsibility for their own learning. Respondent #109 reassured himself "Given homework was more demanding as usual to help learners be steadier in their self-study period."

While respondent #211 tiredly said: "Learning online requires students' high levels of self-study, extremely a lot. I just said the number of assignments is just from even to higher than the one when I learn offline." Similarly, "Assignment? I do not think it is simple enough. Just like and even more what we have to do in the traditional classroom.", said respondent #475.

Administration and instructor's issues. 169 students strongly opposed the idea that teachers do not know how to teach online. Not many explanations were given for this issues, however, respondents #203, #808, #926, and #1079 all believed teachers had been trained in online teaching skills in advance and they knew how to select appropriate tools for teaching and learning. Respondent #203 described his teachers' technological competence as adepts, or experts due to a wide range of teaching methods that he had experienced. A great deal of participants, on the other hand, provided more reasons why they did not approve "Low quality of materials/instructions online." 31 responders claimed that online materials were even more sufficient and more qualified than the printed ones, which were also transferred to students more quickly and economically.

> "I completely disagree with that saying because when learning online, my teachers send me PowerPoint slides of the lessons. That makes me feel better than when I study offline, because sometimes I could not keep up with the lessons", said respondent #22.

> "About learning materials, it has a lot and a lot on the Internet. It is even more updated than offline materials.", said respondent #273.

Time and Support for study. Aligning time-related obstacles, students agreed on keeping unchanged schedule for online classes benefited them from managing time for study (Respondents #139, #197, #369, #320 and the twelve others). Learning environment including family factors, neighborhood and other objective

reasons like imposing sudden household activities while learning caused them lots of difficulties. Fourteen respondents reported in detail some situations they were requested for help by other family members; some revealed the negative impacts of noise from TVs, vehicles and daily sounds on their concentration. Respondent #473 explaining much intervention occurred due to emergency cases from his families, loud music from his neighbors, Wi-Fi-lag, and power outage. Having an ethical mindset, respondents #211 said: "…because we are living in Vietnamese family, where private learning zones are not really typical. I cannot stay focused on my lessons longer. Adults have rights in making all decisions for all things. For instance, when I was learning, I was asked to go grocery shopping, cleaning the house, and even banishing dogs out of the yard. They are extremely normal."

In addition to those students with disadvantaged learning conditions, some of the others (n=21) expressed their opposite situations where they were supported by their family physically and mentally. Respondent #109 and #1131 informed that they received the best support from their parents, which inspired them a lot in online learning.

Academic skills. Being similar to Administrative and instructor issues, Academic skills are not great challenges.147 students (86.5%) admitted that there seemed no discrepancies between learning online and offline; therefore, reading, writing, listening, communication skills and so on did not cause any problems. Just some cases revealed their difficulties in learning foreign languages like English, Korean, and Chinese. They were not confident enough since the imbalance between time to answer the question and their limitation in language proficiency (Respondent #510, and #450).

Other Perceived Barriers from Answers of Open-Ended Questions

The six groups of factors with 29 barriers (Table 3) have just accounted for 67.3 % of the overall variance. Some other hindrance factors being discovered through the answers of open-ended questions are hoped to provide deeper understandings about online learning barriers.

Geographical issues. 20/170 students (11.8%) giving the answer for the open-ended questions distinguished the words "city" and "countryside" to mention the disadvantaged conditions that prevented or hindered them in learning online. Vietnam is still a developing country and remote areas find it impossible to have the better Internet connection (Respondents #177, #10 and #382). Sixteen participants said they were living in the rural areas, where Internet was still unpopular or they even did not have the Internet access. Especially in the time of Covid-19, respondents #17 and #114 shared the same ideas about the difficulties caused by the obligation of switching to online learning, including cost-related issues, electricity and distracting factors in their neighborhood.

The economic status of Vietnamese people. Due to the gap between rich and poor people in Vietnam, the rich can afford everything for their children while the poor cannot have enough conditions for laptops, smart phones, and the Internet. It caused a lot of difficulties when students were asked to switch to online learning due to Covid-19 pandemic. Thirteen students even said they had no technological devices to study online.

Family tradition and Vietnamese culture. Results found from the qualitative analysis showed that Vietnamese learners were dominated significantly by family factors. Being asked about the drop-out reasons from dropped-out participants, eighty-seven learners mentioned "family reasons" as an excuse for their escape. Thirty-two participants depicted the learning zone in their family as traditional designs of their houses, where people placed too much emphasis on common living space for the whole family members. As a consequence, learners had to suffer unexpected tasks while learning.

Prospects of Online Learning and the Impact of Perceived Barriers

A Binary Logistic Regression is constructed to identify the effect of these barriers on learners' decision to take future online courses. The dependent variable is students' decision (0- No, 1- Yes). The independent variables are the seven groups of barriers found from the result of EFA. They are (1) Cost and Access to the Internet, (2) Learner motivation, (3) Academic skills, (4) technical skills, (5) Administrative and instructors' issues, and (6) Social interaction. The 29 items constructing these factors were measured by 1-5 Likert scale,

ranging from 1- Completely disagree to 5- Completely agree. Omnibus Tests of Model Coefficients is used to evaluate regression coefficient of independent variables. Table 6shows that sig of Step, Block and Model are 0.000, lower than 0.05 so the regression model is statistically significant.

Table 6. Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	297.985	6	.000
	Block	297.985	6	.000
	Model	297.985	6	.000

Likelihood of Taking Future Online Courses

When students are asked about the ability to take online courses in the future, with the two options Yes and No provided in the survey, the results show that 502 students (43.1%) chose the "No" option, which means that they do not want to study online anymore. The remaining of 663 students (56.9%) decided to continue taking future online learning. These numbers help to reflect a positive outlook for online learning in our context.

Table 7 also reveals the ability of taking and not taking future online courses based on two criteria: factual analysis and prediction. Specifically:

- Among 502 responders said they will not want to study online in the future, 324 of them are predicted not to take the future online courses, the percentage correct is 64.5%.
- Among 663 responders said they will continue taking online courses in the future, 527 of them are predicted to take the future online courses. The percentage correct is 79.5%.
- The percentage correct of the whole model is 73.0%.

Table 7. Classification Table

			Predicted		
			Ability to take future online courses		Percentage Correct
			No	Yes	
Step 1	Ability to take future online courses	No	324	178	64.5
		Yes	136	527	79.5
	Overall Percentage				73.0

**Note. The cut value is .500*

The Correlation between Perceived Barriers and Prospects of Online Learning

Table 8 reports the correlation of each group of barriers on the likelihood of taking future online courses. Figures for Sig of Wald of Social Interaction, Cost and Access to the Internet and Learner Motivation are lower than 0.05. It can be concluded that these groups of factors have negative impacts on the likelihood of taking future online courses. Sig values of the others including Technical skills, Administrative and Instructors' issues and Academic skills are all above 0.05 and therefore, they are not statistically significant. Specifically, Learner motivation (B= -.727) has the most impact on learners' decisions. It means that the lower motivation students have, the more impossibilities they get in taking future online courses. Similarly, Cost and Access to the Internet is ranked as the second most influential factor (B=-706), followed by barriers in Social interaction (B=-519).

Table 8. Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1a	Technical skills	-.127	.116	1.213	1	.271	.880
	Administrative and Instructors' issues	.233	.130	3.218	1	.073	1.263
	Social interaction	-.519	.111	21.910	1	.000	.595
	Academic skills	.093	.107	.765	1	.382	1.098
	Cost and access to the Internet	-.706	.097	53.400	1	.000	.493
	Learner motivation	-.727	.111	43.128	1	.000	.483
	Constant	5.856	.448	171.059	1	.000	349.194

Note. Variable(s) entered on step 1: Technical skills, administrative and Instructor's issues, Social interaction, Academic skills, Cost and Access to the Internet, and Learner Motivation.

These correlations can be written as follows:

Log_e = (p_i (likelihood in taking future online courses)/1 - p_i) = 5.856 – 0.127 x Technical skills + 0.233 x Administrative and Instructors' issues – 0.519 x Social interaction + 0.93 x Academic skills -0.706 x Cost and access to the Internet – 0.727 x Learner motivation

After removing variables with no significance in the study, the results after re-analysis can be presented as follows:

Table 8. Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1a	Social interaction	-.519	.111	21.910	1	.000	.595
	Cost and access to the Internet	-.706	.097	53.400	1	.000	.493
	Learner motivation	-.727	.111	43.128	1	.000	.483
	Constant	5.856	.448	171.059	1	.000	349.194

The binary regression equation is rewritten:

Log_e = (p_i (likelihood in taking future online courses)/1 - p_i) = -0.519 x Social interaction – 0.706 x Cost and Access to the Internet – 0.727 x Learner Motivation

DISCUSSION AND CONCLUSION

The Consistency of Qualitative and Quantitative Findings

Comparing the results of Table 3 about the priority of perceived barriers and Table 8 about the variables in the equation, a consistency could be found in the top of the three most extreme barriers and the top of the three most influential groups of barriers on the prospect of online learning. It means that when students found these challenges the most difficulties, these always have direct negative impacts on their future decision. Nevertheless, the group of Social interaction, Cost and access to the Internet, and Learner Motivation exchanged their position together. While being ranked as the third extreme barriers (M=2.9, SD=0.86), Learner Motivation becomes the most influence of learners' decisions (B=-0.727). Cost and access to the Internet though causes the most difficulty for students (M=3.12, SD=0.83), it does not mean they are the most hindrance factors for future online courses, they stood at the second position, right before the barriers in Social interaction (B=-0.706, B=-0.519).

Possible explanations can be provided for other barriers, which have no impacts on the prospect of online education. Regarding technical skills, thirty-three students said computer knowledge became really basic nowadays and they did not see them as challenges. Respondents #43, #86, #145, #177, #297, and #824 believed technology was not their strengths, but they still knew how to study online. Respondent #325 emphasized the fact that students were asked to learn Information Technology since grade 6 of the K-12 education. Some students were even skilled at Office, in addition to using some social networks like Zalo and Facebook. Moreover, a lot of tutorial videos on YouTube can help them solve any problems. These barriers could be surpassed if learners give them a try. Moreover, "before being asked to study online due to the Covid-19, students were trained how to use vital apps and platforms to study", respondent #819 added. Being on a greater perspective, respondents #824 and #1022 saw online learning and high-end technology as modern issues and students, early or late, had to themselves update to join the future workforce.

The Prospects of Online Education in Vietnam

The findings indicated the prospects of online learning in Vietnam after the temporary education due to Covid-19, under the impacts of perceived barriers and some new factors discovered thanks to qualitative analysis. Specifically, together with the six groups of barriers being re-confirmed from Berge's study (2005), the other three new factors have been found including (1) geographical features, (2) economic status, and (3) Vietnamese culture and traditions. The results revealed a positive signal for online learning in Vietnam when receiving more students' supports, with 663 students' agreements (56.9%) with future online courses. The results also reflected the negative impacts of the three groups of barriers on learners' decision. Diverse explanations were mined to gain insights reasons that hindered online learning practices.

As regards the two most extreme barriers including Cost and access to the Internet and Social interaction, the coincidence was compatible with the mainstream of Dyrbye et al. (2009), (Waldman et al., 2009)(Waldman et al., 2009), and AlHamad et al. (2014) about the interaction among students. The cost-related problems, which are not really barriers to other research context, however, become extreme in our study. Explanations for that result were somehow related to the formation of additional barriers from answers of open-ended questions, where students blamed for the distribution of low-quality Internet condition in rural areas and also the reasons from poor living conditions.

Besides, the family distraction was also found as a barrier in the research context. Unintentionally, it is partly compatible with Dyrbye et al. (2009) and Kokko et al. (2015) about the convenience with and without family issues and/or health problems. Together with the explanations of dropped-out students when learning online, a new barrier has been found related to Vietnamese tradition, where is famous with learning tradition, but students are also bombarded with chores easily and more importantly, family's reasons are repeated as the most frequent excuse.

IMPLICATIONS

Imposing online learning at the time of Covid-19 had caused both opportunities and challenges for Vietnamese students to simultaneously experience online education in predictable disadvantages. Although the development of technology has created favorable learning conditions, a lot of hindrance factors interrupted students' expectation to continue distance learning. Predicting future of online courses on the basis of analyzing the impacts of online learning barriers helps to evaluate Vietnamese learners' preferences and pose a series of action to optimize online learning and teaching's effectiveness, which also provides educators on time adjustment to help Vietnamese students flow in the mainstream of international education, where online education has been a trend.

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TURKISH SENTIMENT ANALYSIS FOR OPEN AND DISTANCE EDUCATION SYSTEMS

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ABSTRACT

Students' opinions are the most essential source to enhance the quality of education and educational services in Open and Distance education (ODE) Systems. How to access and analyze students' real opinions is a problem for ODE institutions. The purpose of the present study is to conduct a sentiment analysis (SA) on the collected Turkish tweets about an ODE system to monitor students' opinions and sentiments about the system. Firstly, the related 63699 tweets about the ODE system are gathered and analyzed. Later, pre-processing is applied to the dataset. Sentence-based SA is performed with the data provided. The dataset is vectorized using two vector space models to test four classifiers which are Support Vector Machines, K-Nearest Neighbor, Logistic Regression (LR), and Artificial Neural Networks. F-score values obtained with these classifiers are evaluated, and the results are discussed. LR classifier gives the best F-score values with %75 for each vector space model. Through the SA results, students' dissatisfaction, appreciation, and concerns will be learned quickly by the university administration to develop strategies that will increase the quality of education and educational services.

Keywords: Sentiment analysis, machine learning, open and distance education system, natural language processing, social media, Twitter.

INTRODUCTION

Sentiment analysis (SA) - How people feel about a topic (e.g., their sentiment) can be just as critical as identifying the topic itself (Barbier & Liu, 2011). These feelings can be extracted from a written or spoken language using Natural Language Processing (NLP) techniques and machine learning. SA has raised growing interest, both within the scientific community, leading to many exciting challenges, as well as in the business world, due to the remarkable benefits to be had from financial and political forecasting, user profiling and community detection, computational advertising, and dialogue systems. However, mining opinions and sentiments from multimodal resources (texts, images, videos, audio-recordings, etc.) is a challenging task because it requires a deep understanding of the explicit and implicit, regular and irregular, features (linguistic, visual, or audio) of a resource (Dragoni et al., 2018).

In the literature, SA is alternatively named as opinion mining, sentiment mining, opinion extraction, subjectivity analysis, and artificial emotional intelligence (emotion AI). It will be useful to point out a common complication. In the literature, SA and opinion mining are often used interchangeably. For instance, as given by Sangam and Shinde (2019), "the task of analyzing the opinion, sentiment, and subjectivity computationally are known as opinion mining," and it is also called as SA. However, According to Pozzi et al. (2016), an opinion is more of a person's detailed view about something, whereas a sentiment is more of a feeling.

SA applications' primary purpose is to analyze people's sentiments or opinions toward entities such as topics, events, individuals, issues, services, products, organizations, and their attributes (Liu, 2012). In the Social Web context, through the popularization of the platforms, which provide access to large amounts of subjective data, trying to automate the understanding of people's opinions about theme, service, or product has been a key factor in the decision-making process (de Oliveira et al., 2021). In recent years, SA is used to analyze consumer behavior, predict revenue, and classify consumer reviews in several fields like healthcare, political events, finance, marketing, and education.

SA was used in healthcare to investigate the relation between neighborhood characteristics and obesity, diabetes (Nguyen et al., 2017) and Alzheimer's Disease Stigma on Twitter (Oscar et al., 2017). Especially, during election periods, SA is a powerful technique for candidates' promotional campaign decisions (Opuszko et al., 2018), (Ahmed et al., 2016) and prediction of selection results (Bansal & Srivastava, 2018), (Kušen & Strembeck, 2018), (Jaidka et al., 2019). On the marketing side, various shopping sites like Amazon and Flipkart take feedback from the customers, which will help them make proper decisions to improve the quality of their services (Sangam & Shinde, 2019). Stock price forecasting (Nguyen et al., 2015), detection of the determinants of Bitcoin Prices (Georgoula et al., 2015) and measuring inflation expectations (Goloshchapova & Andreev, 2017) are some of the examples of finance SA applications.

SA is also a powerful technique used in educational institutions. SA applications in education can be classified as instruction evaluation, institutional decision/policy making, intelligent information/learning systems enhancement and assignment evaluation, and feedback improvement according to the different task types that sentiment analysis tools have served in the domain of education (Dolianiti et al., 2019). It is not enough for educational institutions to consider students' education, registration, and course information to improve education quality in today's world. Open and distance education (ODE) represents approaches that focus on opening access to education and training provision, freeing learners from time and place constraints, and offering flexible learning opportunities to individuals and groups of learners. Open and distance learning is one of the most rapidly growing fields of education. Its potential impact on all education delivery systems has been dramatically accentuated by developing internet-based information technologies, particularly the World Wide Web (Kamisli Ozturk, 2012). In the ODE systems, considering the high number of students, all kinds of data from the students should be evaluated to improve the quality of education and educational services continuously. Students' opinions about educational institutions and their services play an essential role in enhancing quality. One of the biggest challenges faced by ODE institutions is accessing and analyzing students' real opinions and sentiments about the ODE system. Students' social media data is one of the best data sources to understand students' opinions about the institution because social media allows students to express their ideas freely. Twitter, Facebook, Google +, and Instagram can be given as examples of social media platforms where these opinions can be collected. Therefore, SA can be used to understand the students' opinions from these platforms.

This study, which is based on students' feedback improvement, aims to present a SA model to extract the opinions of an ODE institution's students in Turkey. The SA model classifies students' tweets about their institution into sentiments (positive, negative, or neutral) with different classifiers and vector space models. This study aims to use educational mining data to help managers in the decision-making process to achieve this goal. As it's given by Sorour et al. (2020), some levels in the organizations require real-time information for detection and correction of nonconformance to goal activities (Sorour et al., 2020). In this study, sentiment analysis studies have been conducted to understand students' opinions regarding the distance education system. Such an analysis provides the opportunity to analyze the text data to summarize the students' views about the educational institution they are affiliated with and identify positive and negative comments about the system. With this approach, it helps the relevant decision-making process for the whole system in distance education. From this point of view, the present study aims to answer the following research questions:

RQ1: How can we automatically classify the sentiment of the students' Turkish tweets about the ODE system for understanding the students' real sentiments about the system?

RQ2: Can different vector space models increase the success of sentiment classification?

The rest of this paper is structured as following: SA application in students' feedback improvement has been widely evaluated in Literature Review Section, the structure and principles of SA have been presented in the Sentiment Analysis Section, the methodology has been given in Methodology Section, the results and limitations of the presented study have been discussed in Discussions Section, and the conclusion and future works have been given Conclusions Section.

LITERATURE REVIEW

As Ali and Abdel-Haq (2020) mentioned in their study, using artificial intelligence in education has been the subject of enormous debates for the past 30. Generally speaking, we can say that artificial intelligence applications offer both potential pedagogical opportunities and opportunities for improving distance education systems to support students throughout their lifecycle. SA, one of the powerful tools of artificial intelligence, is crucial in education where student's feedback is required to be assessed for the learning (Kim & Calvo, 2010). In the literature, there are many studies about student feedback. These studies have collected data from opinion surveys, educational portals/websites/blogs, and social media.

Opinion Surveys

To better understand the influences and opportunities to increase student satisfaction, Thomas and Galambos (2004) used regression and decision tree analysis on data, collected from a student opinion survey at a public university. Aung and Myo (2017) gathered students' comments from the Faculty Evaluation Survey for the University of Computer Studies and applied a lexicon-based SA approach. Such feedbacks are generally gathered at the end of the semester with the use of survey forms. However, as Ullah (2016) mentioned, this process is very tedious, slow, and time-consuming.

Educational Portals, Web Sites and Blogs

Wen et al. (2014) explored collective mining sentiment from forum posts of Coursera, Massive Open Online Course platform, to monitor students' trending opinions towards the course and significant course tools, such as lecture and peer-assessment. Furthermore, Tucker et al. applied SA on student-generated textual data (e.g., online discussion forums) existing in MOOCs to quantify their impact on student performance and learning outcomes. Kechaou et al. (2011) applied SA to examine the nature and the structure of web forums and e-learning blogs to provide a better understanding of users' opinions regarding the e-learning system for the sake of its improvement. In their paper, Song et al. (2017) applied SA to help e-learning systems to know the users' opinions on the course-wares, the teachers, the charge or something else of the e-learning system, and to help the developers improve the services. Since system administrators control education portals, students may not freely express their opinions about institutions, courses, and lecturers.

Social Media

In teaching-learning improvement, Chauhan et al. (2019) illustrated the impact of aspects extracted from student's comments, collected from social media. Ortigosa et al. (2014) presented a SA model that combines lexical-based and machine learning techniques to extract information about the student's sentiments from Facebook messages in Spanish. Altrabsheh et al. (2013) collected students' tweets in English about their courses in real-time and used SA to improve teaching by some machine learning techniques. Altrabsheh et al. (2013), Sivakumar and Reddy (2017), and Nasim et al. (2017) also performed SA in English on the students' tweets to understand the students' opinions. Similarly, Kamisli Ozturk et al. (2017) have fetched students' tweets related to Anadolu University's open and distance education system and performed SA for Turkish to understand students' sentiments toward this institution. In another aspect, Kandhro et al. (2019) focused on teachers' evaluation and performed SA to identify the student sentiments from the piece of text. Also analyzing the student feedback on learning material, Cobos et al. (2019) have developed a tool to extract and analyze the opinion about their online courses. Gottipati et al. (2018) evaluated a solution using student feedback comments from seven undergraduate core courses taught at the School of Information Systems, Singapore Management University and compared rule-based methods and statistical classifiers to extract and summarize the explicit suggestions. To determine the current situation and trends of ODE students' use of Facebook, Firat et al. (2017) analyzed the density, centrality, and degrees of related Facebook groups and Facebook pages.

Nevertheless, as far as we know, the only SA study, which is about an open and distance education system in Turkish, is given by our sentiment research group (Kamisli Ozturk et al., 2017). Our previous study applied SA for a smaller dataset by using just one classifier as Naive Bayes. Here, our main contribution is the application of SA with different classifiers (Support Vector Machine, K-Nearest Neighborhood, Logistic Regression, Artificial Neural Networks) and vector space models (Bag of Words and Term Frequency-Inverse Document Frequency) to open and distance education system in Turkish.

SENTIMENT ANALYSIS

One of the main goals of SA is to exercise "Sentiment Polarity Classification" which is used to obtain the semantic polarity (positive, negative, or neutral) of a text (Saglam et al., 2016). There are three main approaches for this goal in SA; Lexicon-based Approach, Machine-learning-based Approach, and Hybrid Approach. Pandey et al. (2017) classified these approaches into sub-categories, as shown in Figure 1.

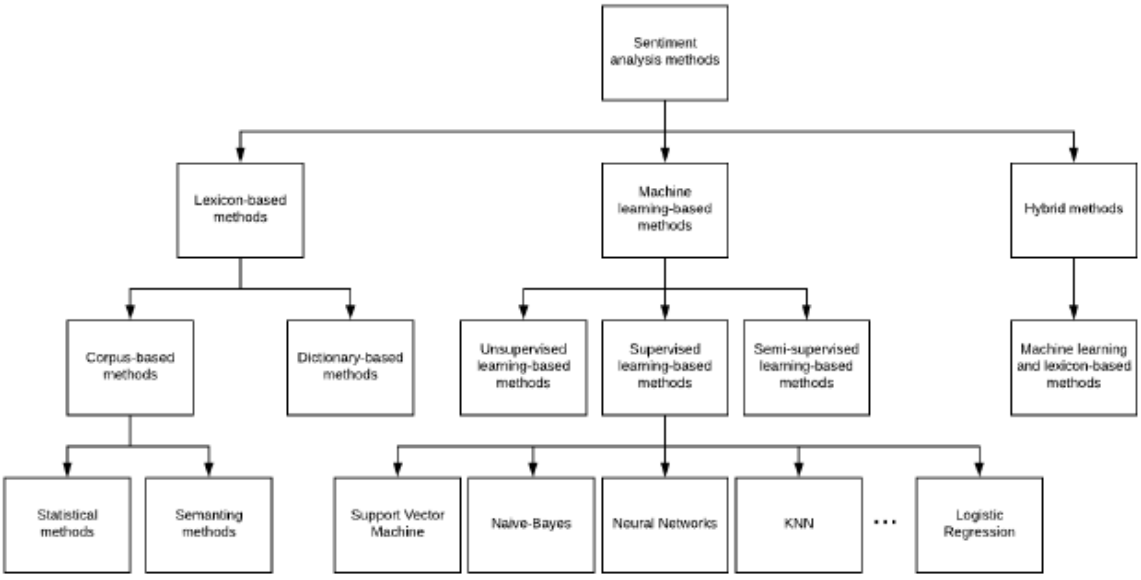

Figure 1. Classification of SA methods (Panday et al., 2017)

The lexicon-based approach requires predefined polarity lexicons to obtain the sentiment polarity of the words in a text. There is no such dictionary in Turkish, while there are comprehensive predefined polarity lexicons in English, Dutch, Spanish, and Spanish. Turkish language's distinctive characteristics, such as agglutinative, negation suffixes, make the Lexicon-based approach difficult; therefore, Lexicon-based SA studies in Turkish are based on translation-dependent lexicons or have relatively narrow focuses (Saglam et al., 2019). These studies are SentiTurkNet (Dehkharghani et al., 2016) by using Turkish WordNet (Bilgin et al., 2004) and SWNetTR (Ucan, 2014).

The machine learning-based approaches train a text classifier on the training set whose polarities are labeled by researchers. The first study in this category was performed by Pang et al. (Pang et al., 2002). They have shown that machine learning-based approaches classify with better performance than human-generated classifications. These approaches can be divided into three main categories: supervised, unsupervised, and semi-supervised learning-based methods. SVM, ANN, KNN, Naive Bayes, and LR have mostly used classifiers in supervised learning based category. In the Turkish language, the supervised learning based methods were used in many SA application areas such as politics (Kaya et al., 2012), marketing (Sternberg et al., 2018), (Karahoca et al., 2019)), and music (Durahim et al., 2018).

The last one, the hybrid approach, combines machine learning and lexicon-based approaches. There is only one study in literature until now (Ersahin et al., 2019), which applies the hybrid approach in Turkish.

In general, SA is performed at three levels: document, sentence, and aspect levels. The document level SA finds out the whole sentiment of a document, whereas the sentence level deals with each sentence individually. Aspect-level SA aims to classify sentiment according to specific characteristics (features) of an entity. Aspect-level SA can make different sentiment classifications for different characteristics of the same entity.

Machine learning-based methods are chosen in our study because there is no comprehensive polarity lexicon in Turkish, nor is there a narrow polarity lexicon containing terms related to ODE. Besides, (Turkmenoglu & Tantug, 2014), (Sevindi, 2013), (Ogul & Gonenc, 2016) showed that machine learning approaches perform better than lexicon-based in the Turkish language.

METHODOLOGY

The flowchart of the proposed methodology is given in Figure 2. In the following subsections, the steps of the flowchart will be explained in detail.

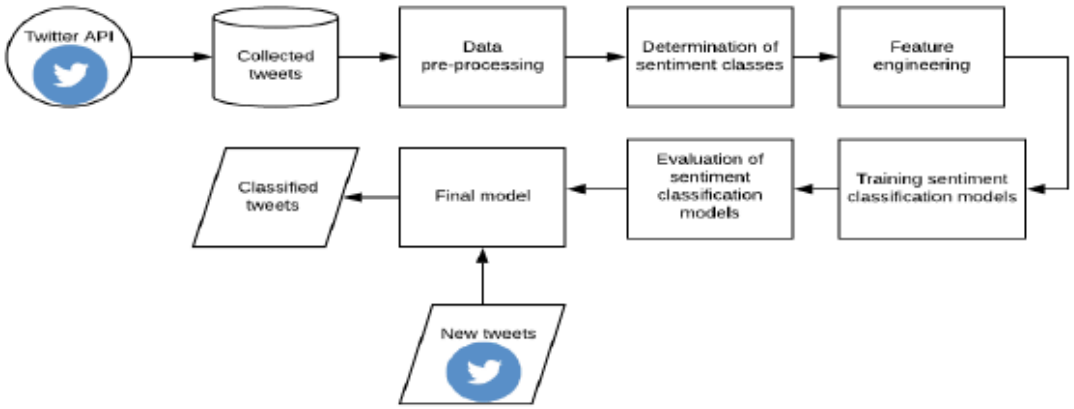

Figure 2. Flowchart of proposed methodology

Data Collection

Tweets were collected via Twitter API that returns public Tweets with a specific hashtag one week before the final examination and one week after the examination. We have used "aof", "aof", "acikogretim", "acik ogretim", "acikogretim", "acik ogretim" hashtags, which are related to the ODE, to fetch the tweets from Twitter. At the end of this step, 63699 tweets were collected as a dataset.

Data Pre-processing

Data pre-processing involves four steps in our study; cleaning, normalization, tokenization, and stop word removal. In the cleaning step; duplicated tweets, unrelated links, URLs, advertisements, and news were removed from the dataset using regular expression. Foreign languaged tweets were investigated with "Language Detection API", and we detected 103 foreign languages. These tweets were also removed from the dataset. 4652 tweets have remained in the dataset after these processes.

Normalization is the process of converting all text to the same case, eliminating punctuations, converting numbers to words, and so on. In the normalization step, we eliminated punctuations in the dataset and converted the dataset to a lower case.

Tokenization is the process of splitting the raw string into meaningful tokens (Hardeniya, 2015). In the tokenization step, tweets were split into words as a token by whitespaces.

Stop word removal is one of the most commonly used preprocessing steps in SA to reduce the vector space and enhance the classifier performance. Stop words have no significance in some of the NLP tasks like information retrieval and classification, which means these words are not very discriminative (Hardeniya, 2015). In the stop words removing step, we removed the stop words, which in the stop words list (Can et al., 2008) and the hashtags used in the data collection step from the tweets.

Determination of Sentiment Classes

To determine a sentiment class of each tweet, the tweets in the dataset were manually labeled as positive, negative, or neutral by three different native Turkish speakers via group decision-making.

Feature Engineering

Text needs to be represented as numerical feature vectors before applying machine learning algorithms. Bag of words (BoW), term frequency-inverse document frequency (TF-IDF), is used as vector space models in our study. In both models, the sequence of words is unigram or 1-gram, which means each word in the text represents a single word.

BoW model generates a feature vector that contains the counts of each unique word in the text without using semantics and order of the words. Figure 3 illustrates the logic of the BOW model.

Figure 3. An example of bag-of-words representation

TF-IDF is a well-known method to evaluate a word's importance in a text and multiplication of term frequency (TF) and the inverse document frequency (IDF). (TF) of a particular term (t) is calculated as the number of times a term occurs in a document to the total number of words in the text (Ahuja et al., 2019). IDF is the log of the inverse probability of a term being in the text.

Raw term frequency *(tf (t,d))* is the number of times a term *t* occurs in a document (Raschka, 2019). The term frequency-inverse document frequency *tf-idf(t,d)* is calculated as given in Equation (1).

$$tf - idf(t,d) = tf(t,d) \times idf(t,d) \quad (1)$$

Based on Equation (1) inverse document frequency *idf(t,d)* can be calculated by Equation (2):

$$idf(t,d) = log\frac{n_d}{1+df(d,t)} \quad (2)$$

Sentiment Classification

To determine a sentiment class of each tweet, the tweets in the dataset were manually labeled as positive, negative, or neutral by three different native Turkish speakers via group decision-making. Although Naïve Bayes classifier (NBC) is often preferred in SA, the success of NBC in our previous study (Kamisli Ozturk et al., 2017) did not exceed 60%. Therefore, in this study, we used Support Vector Machine (SVM), Logistic Regression (LR), K-nearest neighbor (KNN), and Artificial Neural Network (ANN) to classify the tweets into positive, negative, or neutral sentiments.

SVM, which Vladimir N. Vapnik and Alexey Ya invented, is a widely used optimization-based supervised machine learning algorithm for classification and regression. The aim of the SVM is to find a hyperplane in N-dimensional space (N-the number of features) that correctly classifies the dataset by maximizing the margin between the two classes. Since we had a multiclass imbalanced dataset, we applied one-vs-one (OvO) strategy for handling multiclass classification for an imbalanced dataset in SVM. This strategy selects a pair of classes from a set of n classes and develops a binary classifier for each pair, so it requires to train classifiers. At prediction time, all classifiers are applied to the test dataset, and the class, which got the highest number of predictions, gets predicted.

Logistic Regression (LR) is a statistical classification model for the prediction of a binary categorical variable. The aim of Logistic Regression is to find a relationship between features and the probability of the outcome. To limit the probability of outcome value between 0 and 1, the sigmoid function is used for LR. Here, we applied one-vs-rest (OvR) strategy for handling multiclass classification. This strategy selects one class from a set of n classes and develops a binary classifier against all the other classes, so it requires training n classifiers.

KNN is a simple, lazy learner, similarity-based, and non-parametric algorithm used for regression and classification. The basic idea behind the KNN is finding the k samples in the training dataset that are most similar to the point that to be classified. The new data point's class label is then determined by a majority vote among its k nearest neighbors (Raschka, 2019). We used the Euclidean distance as a similarity metric in this study.

Inspired by biological systems, mainly by research into the human brain, ANNs are able to learn from and generalize from experience (Zhang et al., 1998). A basic ANN model consists of one input layer, one hidden layer, and one output layer. The processing elements, which are called nodes or neurons, are interconnected. An ANN model can be described as a directed graph in which each node i perform a transfer function f_i of the form.

$$y_i = f_i\left(\sum_{j=1}^{n} w_{ij}x_j - \theta_i\right) \quad (3)$$

Where y_i is the output of the node i, x_j is the j^{th} input to the node, w_{ij} is the connection weight between nodes i and j (Yao, 1999). θi is the bias term of each hidden node and transfer function f_i is a nonlinear function such as sigmoid and tanh.

Parameter Setting

Parameter setting is a crucial issue to improve the performance of classifiers. We used the grid search technique for finding the optimal combination of parameter values of these classifiers.

Evaluation Measures

The selection of the evaluation measure plays a vital role in understanding the classifier performance correctly. While selecting the evaluation measure, the ratio of each class in a dataset should be considered. If the dataset is imbalanced, which means the class distribution is not uniform among the classes, F-score can be used as an evaluation measure.

In this study, we have three sentiment classes as 'neutral', 'positive', and 'negative' and the sentiment class distribution of tweets in our data set is 1075 negative, 3345 neutral, and 232 positive. It is clearly seen that our dataset is imbalanced; therefore F-score, which is the harmonic mean of precision and recall, was used to compare the performance of the classifiers. To calculate the F-score, confusion matrix is constructed as shown in Table 1. Equation (4), (5), and (6) represent the computation of precision, recall, and F-score, respectively.

Table 1. Confusion matrix

		Actual Class	
		Yes	No
Predicted Class	Yes	True Positive (TP)	False Positive (FP)
	No	False Negative (FN)	True Negative (TN)

$$Precision = \frac{TP}{TP+FP} \tag{4}$$

$$Recall = \frac{TP}{FN+TP} \tag{5}$$

$$F - score = 2\frac{Precision*Recall}{Precision+Recall} \tag{6}$$

Computational Results

In order to generalize the models, we have used 10-fold cross-validation for reporting the results. Python is used to implement SA classification models. Tables 2 provides the F-score of classifiers according to TF-IDF and BoW model. It is observed that the LR classifier outperforms the other classifiers for both of the two vector space models. On the other hand, ANN and SVM give the F-score values that are not different from LR, and only KNN's F-score is less than 64%. When we examine the results in terms of vector models, the BoW model gives better classification success rates for SVM, KNN, and ANN rather than the TF-IDF model. Imbalanced distributed sentiment polarities can explain the reason for this in the dataset. In the TF-IDF model, distinctive words for sentiment polarity determination took lower IDF values because of imbalanced distribution.

Table 2. F-score of classifiers according to TF-IDF and BoW model

	SVM	KNN	LR	ANN
BoW	0.7470	0.6341	0.7532	0.7411
TF-IDF	0.7350	0.6203	**0.7584**	0.7039

The LR and TF-IDF model's detailed results, which give the best F-score, are shown in the graphs in Figure 4. Each graphic in this figure indicates the number of tweets and accurately predicted tweets according to the sentiment classes in the test dataset for each fold. Satisfactory results were obtained in the negative and

neutral emotion classes with the best model available. Since the number of tweets belonging to the positive classes was lower in the dataset than the other sentiment classes, the model had difficulty in learning the positive classes class.

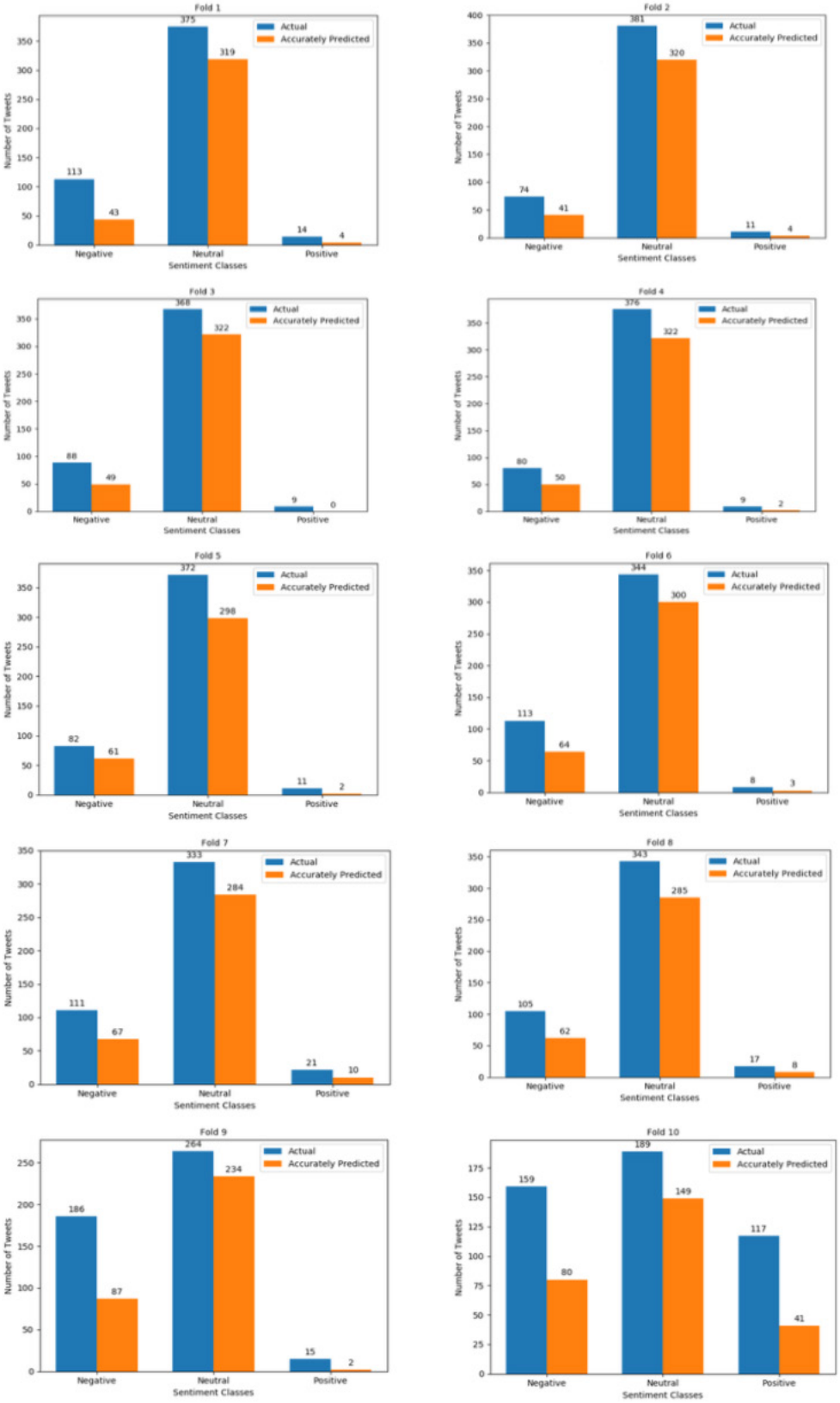

Figure 4. LR and TF_IDF model's detailed results for each fold

DISCUSSIONS

Learning analytics (Siemens, 2010) is the research field that combines techniques such as educational data mining, social networks analysis, sentiment analysis, and educational data conceptual modeling, to gather information and gain knowledge about the function and the results of an educational course at different levels. More specifically, through the learning analytics, an early detection of those students who need special help or are at risk of failure may occur, or some learning tools can be recommended, appropriate to the students' needs, or further suggestions for any decisions needed to be taken may be made (Kagklis et al., 2015). As given in Kagklis et.al. (2015), the use of social media and microblogging, virtual worlds, chat rooms, online discussion fora, blogs, and other web-based tools, synchronous or asynchronous, are emerging as useful and supportive tools to the educational process (Groves & O'Donoghue, 2009; Carsten et al., 2010). These tools can increase students' motivation and participation by making them able to determine the content of their discussions and define their educational needs (Choi et al., 2005; Bradley & McDonald, 2011).

Some studies use questionnaires to collect and analyze students' opinions about the ODE system (Aydin & Ozturk, 2017; Gurbuz, 2014; Kan Kilic et al., 2020). Generally, various evaluation questionnaires are applied to students and educators in order to conduct an internal evaluation in educational institutions. These surveys contain questions about faculty, courses, exams, and institutional infrastructure. However, with surveys' help, users' feelings and thoughts about the system may not be fully obtained. Based on the questionnaires' questions, the importance of the analysis of the texts is revealed regarding the subjective answers required for making decision-making data mining. Moreover, social media-based data can be collected faster and inexpensively than traditional questionnaires. Therefore, it is obviously important to benefit not only from surveys but also from social media platforms in which students express their feelings and thoughts. Based on these social media and SA aspects, in this study to address our first research question "How can we automatically classify the sentiment of the students' Turkish tweets about the ODE system for understanding the students' real sentiments about the system?", the flowchart of the proposed methodology was presented as a roadmap to classify the sentiments of the students' Turkish tweets about the ODE system.

With respect to our second research question, "Can different vector space models increase the success of sentiment classification?", using different space models gives different sentiment classification success as observed from Table 2. While SVM, KNN, and ANN gave better classification success with the BoW vector space model than the TF-IDF vector space model, LR gave better classification success with the TF-IDF vector space model than the BoW vector space.

In the literature review section, when the sentiment analysis for education-related studies is examined, it has been seen that there are not many studies related to ODE. Especially, when the sentiment analysis for ODE studies are considered, this study has a novelty for Turkish SA for ODE in Turkey. This study collected more social media data and used different vector space models and classification algorithms, and sentiment classification success increased from 56% (Kamisli Ozturk et al., 2017) to 75%. This result means that the students' opinions and sentiments can understand more accurately by the ODE administrators. This provides administrators with a decision-making environment that can benefit from distance education quality activities. Social media's important role in receiving feedback on the quality of education service provided by distance education institutions has been considered and emphasized.

Notwithstanding these significant results were obtained in the present study, this research has two limitations that should be mentioned. This study is limited by using a single data source, Twitter. Some students can share their opinions about the ODE system on social media platforms other than Twitter. Also, the lack of a comprehensive polarity lexicon in Turkish limits the methods used in the study. Lexicon-based SA cannot be performed in this study because of this limitation.

Besides SA studies, there are a limited number of studies using social media data about ODE in Turkey. One of these studies is presented by Firat et al. (2017) to use holistic social network analysis on Facebook to reveal social media use trends in ODE in Turkey. They focused on Facebook groups and pages about the ODE and used like counts of these groups/pages for social network analysis.

CONCLUSIONS

Good decisions about ODE require good information and datasets. Since Twitter is a platform where people can freely share their thoughts, with this study, it was provided to reveal the real opinions of students about the open and distance education system. With the application of SA to students' tweets about the open and distance education system, it is aimed to reveal the students' perceptions, opinions, and complaints about the ODE system using machine learning algorithms. Throughout this work, we presented several SA models to extract an ODE institution's students' opinions in Turkey. The most critical problem we encountered in this study is the lack of a comprehensive polarity lexicon in Turkish. To overcome this problem, sentence-level SA with BoW and TF-IDF vector models and SVM, KNN, LR, and ANN machine learning algorithms were considered. As reported in the computational results, the LR classifier outperformed the other classifiers for both of the two vector space models in F-scores for the considered dataset.

Considering the comparison of different SA models can be a guiding study for open and distance institutions. As it is given in the literature, SA studies in the Turkish language have not been considered in the literature intensively. From this point of view, this study will present a roadmap for researchers to study SA in Turkish. Our findings are encouraging researchers to focus on different vector space models for imbalanced textual data on the technical contribution side.

As a result of the presented SA models, ODE managers can develop strategies that will increase student satisfaction, based on the tweets whose feelings for the Open and Distance Education System are negative and positive. Based on the positive sentiments, strategies can be developed to reinforce ODE's positive transactions and ensure its sustainability. Besides, negative sentiments can be used in decision making, allowing an understanding of student dissatisfaction and how the institutions adopt actions to improve the quality of teaching and examination processes used. The presented SA models within the scope of the study can be utilized at any time. Thus, the reflection of managerially changing conditions to the system users can be continuously monitored.

As future work, we are planning to develop a comprehensive Turkish lexicon for performing lexicon-based SA. We are also planning to diversify our data sources by collecting data from different social media platforms such as Facebook and Instagram. In this manner, limitations of the presented work can overcome with these strategies.

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VIETNAMESE STUDENTS' ACCEPTANCE OF USING VIDEO CONFERENCING TOOLS IN DISTANCE LEARNING IN COVID-19 PANDEMIC

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ABSTRACT

The outbreak of the COVID-19 pandemic has strongly influenced teaching and learning in Vietnam's higher education institutions. Social distancing – the health care practice of increasing the physical space between people to avoid spreading illness due to COVID-19 has required schools to employ distance learning. As such, video conferencing tools (VCTs) have been used nationwide to ensure effective responses to the requirement. Although teaching and learning with VCTs have been proven effective by many researchers, it is not clear what benefits and challenges they bring to higher education in Vietnam, especially with respect to students' acceptance to the classroom uses of technology in the time of unexpected events. This study aims to address this gap by examining external factors that affected students' acceptance of VCTs during the COVID pandemic. Data were collected online from university students between April 14, 2020 and April 23, 2020. After this period, the research group received 294 records, in which 227 were analyzed using an extended Technology Acceptance Model (TAM) and Structural Equation Modeling (SEM). The result indicated that external factors such as subject norm and computer playfulness had a significant impact on most TAM constructs. Furthermore, output quality was found to have a positive influence on students' perceived usefulness in the acceptance of VCTs in distance learning.

Keywords: Distance learning, video conferencing, students' acceptance, TAM, COVID-19

INTRODUCTION

COVID-19, which belongs to SARS-CoV-2 family (Gorbalenya et al., 2020), broke out from Wuhan, Hubei province, China at the end of December 2019 (Kraemer et al., 2020; Sun et al., 2020; Weston and Frieman, 2020), caused World Health Organization (WHO) to disclose a public health emergency of international concern (World Health Organization, 2020). Only two months after the announcement, on

March 11 2020, WHO officially declared COVID-19 a pandemic. Vietnam shares the border with China, but it was not until two months after the outbreak of COVID-19 in China did Vietnam have some first few cases related to Wuhan (Vietnam Ministry of Health, 2020). The Vietnamese Government publicly announced the disease on February 01, 2020 (Vietnamese Government, 2020) to halt and prevent the disease from spreading. Since then, they have been taking some firm actions such as closing down the border, putting passengers from overseas in quarantine, social distancing, putting on hold all schooling systems, and stopping unnecessary activities.

The above events have led to Vietnam's education sector's decision to work with a new motto: no schooling, but still learning, and distance learning, the access for geographically distant students (Moore et al., 2011) via the Internet and television, among others, is a contemporary solution that can digitally transform education (Online Newspaper of The Goverment Vietnam, 2020). At the higher education level, Vietnam Ministry of Education and Training (MOET) officially granted institutions the right to study at home, as long as they could maintain the quality of learning (Tran, 2020). At the same time, MOET formally requested Higher Education Institutes (HEIs) to operate distance learning as a temporary plan during COVID-19 (Vietnam Ministry of Education and Training, 2020), and the result of this training method will be officially recognized (Ha Anh, 2020). HEIs actively adapted information technology into their curriculum (Tran, 2020). Distance learning was operated in two main ways: streaming videos of recorded lessons on HEIs' official websites or fan pages, or employing VCTs like Zoom, Teams, Google Classroom, Facebook groups, etc. (Vietnam National University Media, 2020). Between the two, VCTs were more favored as a substitution for traditional face-to-face classrooms, and thus, has been widely used in global education, especially during COVID-19.

The increasing popularity of information and communication technology (ICT) encourages a wide use of technologies in training, with a goal of enhancing the teaching and learning quality. Learning with VCTs is preferred as they sufficiently connect the teacher with the learner or one learner to another when they have to distance learn instead of going to their classrooms (Al-Samarraie, 2019; Mader & Ming, 2015; Willis, 1996; Zare & Yazdanparast, 2013). At the same time, more researchers are getting interested in technology acceptance in education (Al-Emran et al., 2018; Imtiaz & Maarop, 2014; Teo et al., 2011) and the essential incorporation of technology in such context (Granic & Marangunic, 2019; Scherer et al., 2019). Students' acceptance is a well-researched concept in distance learning, which can certify the acceptance of technology uses in supporting learning (Al-Maroof & Al-Emran, 2018; El-Gayar et al., 2011; Nassuora, 2013). The use of technology may positively influence the successful implementation of students (Martins & Kellermanns, 2004).

The unexpected impacts of COVID-19 strongly required the adoption of VCTs to teach and learn. As a result, there is a need to study the use of VCTs, as well as their pros and cons, especially in relation to students' acceptance of the tools. According to our limited experience, there are a few studies on VCTs, but they do not focus on the same subject as ours. To fill this research gap, this study aims at (1) empirically examining the TAM constructs concerning Vietnamese students' acceptance of VCTs in distance learning during the social distancing period caused by the COVID-19, and (2) through the literature review, determining the external factors which influenced Vietnamese students' acceptance of VCTs in distance learning during the social distancing period caused by the COVID-19.

Expectedly through this research, other researchers' competence in VCTs will be enhanced. At the same time, by providing a better insight into the social, and technical factors that facilitate VCTs, it is hoped that the frequency and effectiveness of VCTs adoption in distance learning will be improved. Furthermore, the understanding of these factors may help managers, instructors, and service providers determine the advantages and disadvantages of VCTs in distance learning, and in turn, have better policies for technology infrastructures and assistance services to facilitate higher level achievement of technology acceptance and students' performances.

This study identifies five periods of disease outbreak in Vietnam, namely (i) pre-January 23, (ii) between January 23 and February 26 when the first batch of sixteen patients were tested and treated till their discharge, (iii) between February 27 and March 5 when there was no new case, and (iv) post-March 6 when the 17th patient was detected, leading a new wave of infections from incoming tourists and returning travelers into Vietnam, causing the country to implement the social distancing nationwide. This study focused on the 2nd phase to 4th phase where students were studied at home by distance learning through VCTs.

LITERATURE REVIEW

Learning in COVID-19 Context

The outbreak of COVID-19 in the beginning of 2020 has resulted in a total or semi lockdown in many countries all over the world. Education is one among the sectors which have received heavy impacts from the pandemic. A survey carried out by United Nations Educational Scientific and Cultural Organization (UNESCO) Institute for Statistics Data (UNESCO, 2020a) reports 1,198,530,172 learners affected, which accounts for 70% of the student population worldwide. Educational institutions must cease their usual face-to-face lessons and find a substitution to ensure the quality of teaching and learning. Schools and universities have resorted to distance learning, and they have a wide variety of platforms to choose from. UNESCO and The World Bank offer systems specially built for distance learning, many of which are telephone or computer based with synchronous communication (UNESCO, 2020b; World Bank, 2020). With distance learning technology, learners are able to download online lectures, interact with one another on the Internet, and take distance exams, which tremendously changes the face of education (Jones, 2020). This solution can be applied into various contexts but with more personalization (Chesbrough, 2020).

In such a crisis, the use of video calling as a communication tool in work and study widely spreads and rockets in popularity. One example of this tendency is an increase in the number of Zoom user who uses it for online meetings from 10 million before the outbreak of COVID-19 to 300 million by April 2020, about 4 months after it started (Nash, 2020). This issue, however, caused a phenomenon called "Zoom fatigue" as users have to work on the platform too frequently (Wiederhold, 2020). Although this term is rooted in social media and has just recently been used, many have been searching for it on Google, proving its intensity and prevailing power (Fosslien & Duffy, 2020). The symptom of the so-called "Zoom fatigue" are weariness, exhaustion, or restlessness after continuous use of tools whose basis are CMC platforms with the support from AVTs and VCTs (J. Lee, 2020; Nadler, 2020; Oerther & Shattell, 2020). As universities are interrupted, students have to switch to distance learning through VCTs, leading to a higher amount of time spent in front of smart devices' screens. This issue may lead to the widespread of "Zoom fatigue" among students and affect their motivation, as well as the quality of learning.

Distance Learning

About one century ago, learning and teaching were compulsory a face-to-face experience. It would have been impossible to imagine a classroom not bounded by walls, with all learners and teachers present. However, distance education came as a new concept among learners and teachers. In fact, it is far from a priority of the highly developed 21st century, but has existed since the time of postal service. A description of Lawson et al., (2010) takes us back to the time when learning materials were sent via mails to distance learners who could not present in the classroom. Learners could then send back their work to be assessed, maintaining the communication between them and teachers. It is flexible and cost-effective, especially with the assistance of advanced technology (Lawson et al., 2010; Kerka, 1996; Salmon, 2000). Other values of distance learning include different experiences of teaching and learning, and student's autonomy (Mader & Ming, 2015).

When technologies are adopted into the distance learning process, the learner does not wait until they receive their post to start learning, but can do it almost immediately after the teacher delivers the lessons. Lawson and Mader name the advantages of both synchronous and asynchronous communication when such tools as emails, chat boxes, or video conferences are engaged. Most notably, when distance learners reach each other or the teacher synchronously, they receive immediate responses (Offir & Lev, 1999). Since the Internet has reached many corners of the world and its users are used to video calling, distance learning is now more feasible than ever.

With the medical urgency caused by COVID-19, world education is facing a challenge related to a shift in teaching and learning because learners cannot physically present in the classroom (A. Bozkurt et al., 2020). Distance learning and teaching, therefore, emerge as a crucial solution if the fluency of education and training in HEIs are to be ensured. Although there are various practices of teaching and learning across countries during the COVID-19 pandemic, for instance, distance learning or homeschooling, the terms used to address the practices have not been able to depict the problem as well as "emergency remote education" (ERE) (A. Bozkurt

et al., 2020; Hodges et al., 2020). According to A. Bozkurt et al (2020), ERE can be counted as one division of distance education, along with the previously mentioned forms. However, distance education and ERE have certain distinctions. While the former is planned and draws the attention of users to the theory and practice of a field, the latter focuses on the physical distance and puts its stress on the endurance and resilience with what is accessible both online and/or offline (Bozkurt & Sharma, 2020). ERE should be the provisional answer to an urgent situation (Golden, 2020). To improve its effectiveness, it should be taken into consideration in diverse fields such as psychology, sociology, or therapy (Bozkurt & Sharma, 2020).

Video Conferencing as Tools Distance Learning

Video-conferencing is defined as a means of communication between people from geographically different places, which can be in the form of audio calls on the telephone, or video calls on the computer (Cole et al., 2009; Lawson et al., 2010; Mader & Ming, 2015). With the help of video-conferencing tools, most significantly the computer, users are able to see and hear one another at the same time. A video-conference may include two devices (point-to-point), or more than two (multi-point). Lawson also points out that the differences between desktop-conferencing and studio-based-conferencing lie in their focus. While the former often involves individual uses, the latter is for more formal meetings. The cost and quality of them are not the same for that matter.

Moody and Wieland (2010) summarize video-conferencing origin, which is related to the need to communicate in different ways with the aid of technology. They trace it back to Bell Telephone Laboratory's introduction of two television screens connected to the telephones in the late 1920s. Four decades after this event, video-conferencing tools were exhibited at New York's world fair as an innovation that could take over the traditional telephone's role. According to them, it was not until the end of the 20th century that video-conferencing became widespread. The Internet Protocol and other inventions such as the PC-based system, or the video with colors, gave it a powerful push as it provided more cost-efficient assets. At the beginning of the 21st century, a wide Internet access brought video-conferencing to a wide variety of users, from individuals to companies and institutions. Moody and Wieland (2010) predict that video-conferencing does not stop here, but will develop even further in the future.

A study by Al-Samarraie (2019) divides video-conferencing into three types as following:

- Desktop video-conferencing (DVC) allows participants to use more than one channel to learn. This method can connect one person with another, one group with another, or one person with one group. Its advantages benefit university students because they can use the institution's system that is installed into their devices.
- Interactive video-conferencing (IVC) allows the speaker, or in the case of education, the teacher, to deliver a live lecture to the student being together in one environment. To improve the effectiveness of this method, advanced configuration and aids from other media should be available.
- Web video-conferencing (WVC) offers the learner one priority, which is the flexibility of their whereabouts. Individuals can be at different places but are able to take part in the lesson. The interaction between the leaner and the teacher, and between learners themselves is also high. Furthermore, users of WVC do not need a software or a hardware because the meeting takes part on a website.

In teaching and learning, the role of video conferencing is getting more important. Along with the development of the World Wide Web, Internet users are now offered a chance to be wherever they are and still participate in a lesson effectively. As long as there is an interaction with the teacher and other learners, one can find their way through "zones of proximal development" (Vygotsky, 1978). According to Nesi (2004), this sociocultural theory of Vygotsky was adapted to some computer-mediated communication research (Debski, 1997; Levy, 1998; Warschauer, 1997), which provides the bases to a more thorough insight of VCTs in learning and teaching.

The role of video conferencing in learning may vary according to the requirements and the needs of teachers and learners. Mader and Ming (2015) provides a list of several significant roles that it plays in learning. Beside allowing HEIs to reach their farway students (Gillies, 2008), creating learner-centered courses (Beldarrain, 2006), varying learning styles (Greenberg & Colbert, 2004), it can also trigger leadership skills and responsibility of the students (Gillies, 2008), among other benefits.

In higher education, the role of video-conferencing started to be recognized in the early 21st century (Wilkerson, 2004). HEIs use it to support distance classes, ensuring the amount and quality of interaction in the virtual classroom. Moody and Wieland (2010)finds that WiredRed Software Company's introduction of video-conferences which involved more than ten people in 2004 took it to another level. Two years after the event, more than half the number of U.S. higher institutions allowed the student to study online courses. Among them, three fourths reported using VCTs to assist teaching and learning (Parsad & Lewis, 2008).

This form of education requires a good preparation from the teacher, the student, the institution, and its facility. Coventry (1995) raised the idea that ideally, the learner should be the core, and that technologies are fundamental but they should be adapted to the needs and the situations of the learner. He also suggests that a good insight of VCTs helps institutions make the most of them, so they must thoroughly comprehend the use of the tools. This in turn makes it a more complicated way of learning as the learner center must go alongside effective uses of the technologies.

While there have been studies of VCTs' effectiveness in education, they either focus on the impact of environmental or individual aspects on learning (Debski, 1997; Levy, 1998; Malinovski et al., 2012). Those studies, however, have not been able to adequately answer the questions of what chances and obstacles ICTs bring to higher education in order to stimulate the sharing of experiences in using them (Al-Samarraie, 2019). Additionally, there is a demand for a better perception of the qualifications and different situations in which lie the learners' acceptance, purpose, and use of VCTs among other technological learning tools (Estriegana et al., 2019; Granic & Marangunic, 2019), as well as an inadequate number of references of contemporary use of VCTs in developed and developing countries' higher education (Al-Samarraie, 2019) and users' attitude towards VCTs during COVID-19 (Granic & Marangunic, 2019).

Technology Acceptance Model

First proposed by Davis (1989), TAM has been a popular and useful model for studying users' acceptance of information technology (Estriegana et al., 2019; Legris et al., 2003). There were successive developments of TAM, namely, TAM2, UTAUT, and finally TAM3. TAM was built and developed based on the theory of reasoned action (TRA), which was proposed by Fishbein and Ajzen (1975), and emerged along at the same time of the Theory of Planned Behavior (TPB) (Abdullah and Ward, 2016; Chen et al., 2013; Chuttur, 2009; Wu, 2009). TAM was used to anticipate factual practices of particular activities based on a theory that they are in fact performances, so they can be analyzed and predicted with the aid from TRA model (Granic and Marangunic, 2019; Wu, 2009). TAM have been applied in diverse areas and in different ways, for instance, health care (Holden et al., 2010), online shopping (Singh et al., 2018), e-commerce (Fedorko et al., 2018), social media (Rauniar et al., 2014), and mobile banking (Sharma, 2019). The combination of TAM 2 (Venkatesh & Davis, 2000) and Venkatesh's own model of perceived ease of use's most crucial factors (V.Venkatesh, 2000) provides a more advanced version of the acceptance of technology, TAM 3 mode (Venkatesh & Bala, 2008).

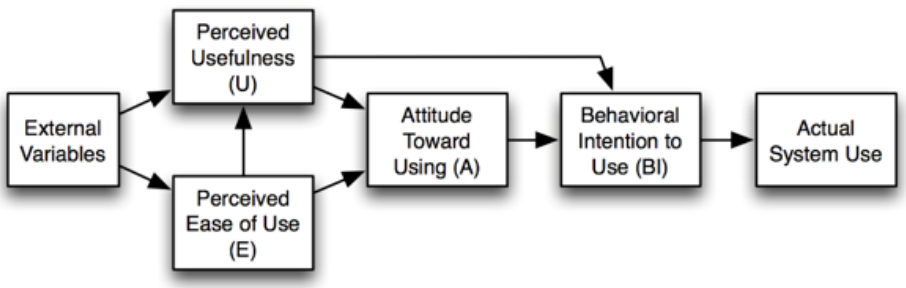

Figure 1. Technology acceptance model (Davis, 1989)

For more than thirty years, TAM's validity, extension, and application have been widely researched in different contexts. Originally, TAM consists of crucial elements of user motivation (perceived usefulness, perceived ease of use, and attitude toward use) and outcomes (behavioral intentions, technology use or actual system use) (Scherer et al., 2019) (Figure 1). After a period of trials, researchers have come up with new factors and made adjustments to the link between already existing variables of TAM. They continually found new elements of important impacts on the model's core variables. This has helped TAM to enhance its role in expecting possible human's acceptance of reflection of technology (Granic and Marangunic, 2019). Venkatesh and Davis (2000) broaden out TAM 2 from TAM, using more theoretical conceptual elements related to practices like social impacts (subjective norms, voluntariness, image), and cognitive instruments (job relevance, output quality, result demonstrability, and perceived ease of use). TAM2 helps them explain more profoundly the factors connected to users and it is proved to be more effective in both contexts of voluntary or compulsory uses of technology. Nonetheless, Chuttur (2009) finds that users in voluntary environments are not influenced by subjective norms, while mandatory environments prove the opposite.

Research Model and Hypotheses

Subject Norm

Subjective norm (SN) is a direct determinant of behavioral intention in TRA (Fishbein and Ajzen,1975) and the subsequent TPB (Icek Ajzen, 1991). It is defined as "the degree to which an individual perceives that most people who are important to him think he should or should not use the system" (Fishbein and Ajzen,1975; Venkatesh and Davis, 2000). Davis (1989) express his opinion that people may have the decision prioritize a system or others' norms over their opinions. This factor is of interest to the TAM researcher as they concern the user's acceptance of new technologies.

Using TAM 2, Venkatesh and Davis (2000) indicated that subjective norm is the determinant of perceived usefulness (PU) that represent the social influence processes. Abdullah and Ward, (2016) analyze frequently employed external factors in previous research to study the development of a general extended TAM for e-learning. Their result demonstrates that out of 22 studies, 19 of them (86%) point out a strong relation between SN and PU, which indicates that users' perceived utility is influenced by SN. Results of some study about TAM indicated that SN affected users' perceived ease of use (PEU) (Lemay et al., 2018; Revythi and Tselios, 2019).

Another research on engineering students' acceptance of an academic administrative information system in private universities in Lima, Peru found a substantial link between SN and attitude toward use new technologies (Jan & Contreras, 2011). Research on direct impacts of SN on intention displays different outcomes. Some like Taylor and Todd's (1995) find particular influences, while some others show none (Davis, 1989; Lee, 2006; Mathieson, 1991). Nonetheless, some recent empirical studies on the adaption of new technology in teaching and learning point out SN influences behavioral intention to use (BI) most significantly (Al-gahtani, 2016; Al-harbi, 2011). Therefore, the following hypotheses were formulated:

H1a. Subject norm has a positive effect on perceived usefulness.

H1b. Subject norm has a positive effect on perceived ease of use.

H1c. Subject norm has a positive effect on attitude towards use.

H1d. Subject norm has a positive effect on behavioral intention to use.

Output Quality

According to Venkatesh and Davis (2000), output quality (OQ) is "the degree to which an individual believes that the system performs his or her job tasks well". This wellness is considered output quality. In this study, they also state that a profitability test is shown as viewpoints on output quality "in which, given a choice set containing multiple relevant systems, one would be inclined to choose a system that delivers the highest output quality".

In the empirically study about extrinsic and intrinsic motivation to use computers, Davis et al. (1992) indicated that output quality had significant effects on perceived usefulness. Less developed graded tests imply indirect impact of perceived ease of use and output quality on intentions through enjoyment and

perceived usefulness (L. Li, 2010). Venkatesh and Bala (2008) suggest an increase of a system's job relevance, an improvement of output quality, and a lower concern of system use through adjustments and improvement activities. However, the previous study of Venkatesh and Davis (2000) deny the likeliness of judgments of output quality use in removing choices from the deliberation. These judgments are more likely to appear as effectiveness tests which lead to the choice of a system with the best output among various proper systems. As for the reasoning and prediction of perceived usefulness in TAM 3, Venkatesh and Bala (2008) found that output quality had an interactive effect on perceived usefulness such that with increasing output quality, the effect of job relevance on perceived usefulness was stronger. Hence, this hypothesis was proposed:

H2. Output quality has a positive effect on perceived usefulness.

Computer Playfulness

Venkatesh & Davis (2000) point to anchors and adjustments as two prior factors to the perceived ease of use in order to determine TAM 2 perceived ease of use variables. They proposes that anchors are responsible for judgements of perceived ease of use, but those judgments may change as each user adopts new computer systems, related to which is computer playfulness represented by microcomputer playfulness (Viswanath Venkatesh & Bala, 2008). Webster et al. (1992) described computer playfulness (CP) as "the degree of cognitive spontaneity in microcomputer interaction, where a high level of cognitive spontaneity indicates a high degree of playfulness and a low level of cognitive spontaneity indicates a low degree of playfulness".

Previous studies on users' new technology acceptance, especially students' acceptance, have identified and examined the links between CP and TAM's constructs. Venkatesh (2000) found that there is not a meaningful relationship between CP and PEU. However, many other studies show the opposite (Shen & Eder, 2009; Sun & Zhang, 2008; Zare & Yazdanparast, 2013). Several previous studies suggest a clear link between users' positive ATT and CP (Moon & Kim, 2001;Webster et al., 1990). Additionally, there is an opinion that perceived or computer playfulness is tightly related to PEU and PU. Sun and Zhang (2008) find an important relationship between CP and behavioral intention in technology use in their research on computer playfulness and perceived enjoyment. Therefore, the following hypotheses were developed:

H3a. Computer playfulness has a positive effect on perceived ease of use.

H3b. Computer playfulness has a positive effect on attitude toward using.

H3c. Computer playfulness has a positive effect on behavioral intention to use.

Perceived Ease of Use

Perceived ease of use (PEU) refers to "the degree to which a person believes that using a particular system would be free of effort (Davis, 1989). According to Davis (1989) and many study later, PEU is a direct determinant of PU (Dasgupta et al., 2002; W. H. Lee et al., 2018; Revythi & Tselios, 2019). Additionally, technology acceptance in teaching and learning in previous studies implies a positive interaction between PEU and users' attitude (Bazelais et al., 2018; Calisir et al., 2014; Cheng, 2011; Masrom, 2007; Salloum et al., 2019).

For over three-decade, since Davis (1989) proposed the first TAM model, the relationship between PEU and BI or ASU has been analyzed in a number of empirical projects concerning PEU and its link to actual use of BI with mixed results (N. Park et al., 2014). In the period, several studies supported a relationship between PEU and BI or ASU (Park et al., 2009; Salloum et al., 2019; Venkatesh & Davis, 2000), but others point to the less positive path (Dasgupta et al., 2002; Davis, 1989; S. Y. Park, 2009; Revythi & Tselios, 2019).

In this research, we are going to examine the relationship between PEU and BI or ASU to determine how PEU influences students' attitude towards the use of VC tools, employing Hsu and Chang's (2013) result in Taiwan that PU affected ATT. The assumptions that we came up with were:

H4a. Perceived Ease of Use has a positive effect on perceived usefulness.

H4b. Perceived Ease of Use has a positive effect on attitude toward using.

H4c. Perceived Ease of Use has a positive effect on behavioral intention to use.

H4d. Perceived Ease of Use has a positive effect on actual system use.

Perceived Usefulness

Perceived usefulness (PU) is a variable that plays the most important role in TAM. It is defined here as "the degree to which a person believes that using a particular system would enhance his or her job performance" (Davis, 1989). Some previous empirical studies point to PU as the most significant construct in TAM (Ayodele et al., 2016; Tan et al., 2012; Tarhini et al., 2017; Teng, 2014).

Other research demonstrates firm evidence for the link between users' attitude and PU (Akman & Turhan, 2017; Al-Adwan et al., 2013; Wong, 2016). Significantly, Teo et al. (2008) suggest a close relationship between the high perceived usefulness and the more positive attitude.

In TAM 3, Venkatesh & Bala (2008) find that perceived usefulness was the strongest predictor of behavioral intention at all time periods. Later on, some studies on e-learning in higher education imply a constructive relation between PU and the BI (Haryanto & Kultsum, 2016; Hsia et al., 2014;Mahmodi, 2017).

H5a. Perceived usefulness has a positive effect on attitude toward using.

H5b. Perceived usefulness has a positive effect on behavioral intention to use.

Attitude towards Use

Fishbein and Ajzen's (1975) TRA model which introduces the first version of TAM suggests that a person's reaction to a certain behavior can be described as his/her perception on the performance of that behavior (Chuttur, 2009). Based on this definition, Davis, 1989 puts forward the idea of "an individual's overall affective reaction to use of the system" as an attitude towards the use of a new system. Moreover, the attitude towards the use can foretell behavioral intentions of information technology use among undergraduates and postgraduates students, among others (Cheng, 2019). Many studies about TAM in e-learning also showed that ATT has a direct impact on BI (Deshpande et al., 2012; Revythi & Tselios, 2019; Sanchez-Franco et al., 2009; Stoel & Lee, 2003; Vidanagama, 2016). Hence, the following hypothesis was developed:

H6. Attitude toward using has a positive effect on behavioral intention to use.

Behavioral Intention to Use

According to the theory of reasoned action (TRA), most behaviors are under volitional control and are predictable from behavioral intentions (Fishbein & Ajzen, 1975). Venkatesh et al. (2003) defined behavioral intention to use a system (BI) as "the degree of an individual's belief that he or she will continue to use the system". Behavioral intentions refer to the belief that an individual will in fact perform a certain behavior (Ajzen & Fishbein, 2005). In terms of the uses of technologies in learning, the behavioral intention (BI) refers to the intention of the learners to employ technologies and involves persistent use from the present to the future (Liao & Lu, 2008). It has been shown by various studies that the behavioral intention directly and significantly influences the actual system use (ASU) (Al-gahtani, 2016; Mou et al., 2017; Teng, 2014). Hence, the following hypothesis is put forward:

H7. Behavioral intention to use has a positive effect on actual system use.

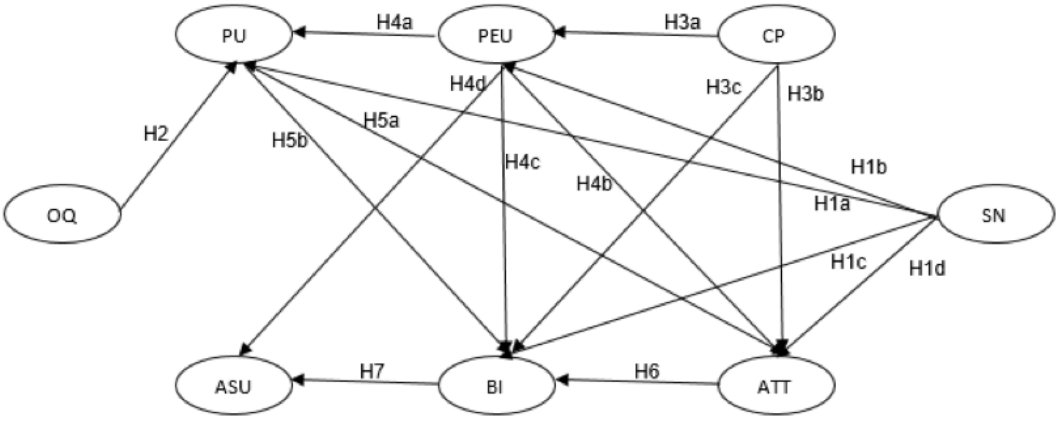

Figure 2. Research model

METHOD

Participants

The participants of the research were students from universities in Hanoi who could not continue their traditional face-to-face learning because of COVID-19. To avoid the disruption, they were encouraged to adopt as e-learning oriented by their institutions. With the exception of a few universities which had already designed their own e-learning systems, VCTs were used by the majority of students in other universities to connect with their teachers. There was no limitation to the background of students, because this study was conducted to explore the level of acceptance of all participants in using VCTs. Its results could be biased if some specialized training related ICT were focused on. They could have been from any faculties and academic year, used any devices (desktops, laptops, smart phones, or tablets), been at any places to learn (cities or the countryside), and using any video conferencing applications. According to the collected data, 294 volunteer students have completed the questionnaire. After the screening of the data, 277 valid records of participants were used for the analysis. Detailed information of respondents was shown in Table 1 below.

Table 1. Demographics of respondents

Variable	Number	Ratio
Academic year (N = 277)		
1	74	26.71
2	132	47.65
3	47	16.97
4	22	7.94
5	2	0.72
Device (N = 277)		
Smartphone	218	78.70
Tablet	9	3.24
Laptop	194	70.03
Desktop	25	9.02
Area (N = 277)		
Rural	128	46.21
Urban	149	53.79

Instrument

Table 2 below presented the instrument of the research. According to this table, eight latent variables with 24 items were adopted, including OQ, CP, SN, PU, PEU, ATT, BI, and ASU. For all the measures, a five-point Likert type scale was used to gather all participants' perceptions, ranging from strongly disagree (1) to strongly agree (5). The structural equation modelling (SEM), which is the quantitative analysis method was applied to the survey data. The results were detailed in the Findings section

Measurement

The scales were designed based on the adjustment of Venkatesh and Davis' (2000) and Salloum's (2019) scales to match our research purposes. Table 2 below describes the scales and their reliability. All the subscales' reliability, Output Quality (alpha = 0.84), Perceived Usefulness (alpha = 0.93), Perceived Ease of Use (alpha = 0.86), Attitude towards Use (alpha = 0.91), Behavioral Intention to Use (alpha = 0.89), Actual System Use (alpha = 0.82), Computer playfulness (alpha = 0.83), Subjective Norm (alpha = 0.87), were higher than 0.80 (N = 277). The scales were designed using the research model presented in Figure 1.

Table 2. Summary of measurement scales

Construct	Measure	Mean (S.D.)	Loading	Source
Output Quality (OQ) (composite reliability = 0.84)				
OQ1	The quality of the output I get from VCT is high.	3.03 (0.95)	0.91	(Venkatesh & Davis, 2000)
OQ2	I have no problem with the quality of VCTs output.	3.04 (1.08)	0.81	
Computer playfulness (CP) (composite reliability = 0.83)				
CP2	I feel that VCT is enjoyable no matter what the usage purposes are.	3.13 (0.88)	0.91	(Salloum et al., 2019)
CP4	I feel that VCT helps me to improve my imagination by obtaining information.	2.94 (0.91)	0.84	
CP5	I feel that I can have a variety of experiences without any interference.	3.04 (0.91)	0.83	
Subjective Norm (SN) (composite reliability = 0.87)				
SN1	I should have participation in the VCT activities, as per my instructors.	3.58 (0.92)	0.93	(Salloum et al., 2019)
SN2	I should have participation in the VCT activities, according to other students.	3.48 (0.86)	0.83	
Perceived Usefulness (PU) (composite reliability = 0.93)				
PU1	VCT enhances my learning performance.	2.81 (0.99)	0.89	(Salloum et al., 2019)
PU2	My productivity is elevated through the utilization of VCT in my study.	2.80 (0.99)	0.93	
PU3	Using VCT enhances my learning effectiveness.	2.75 (0.97)	0.91	
PU4	I find VCT to be useful in my learning.	3.07 (0.93)	0.84	
Perceived Ease of Use (PEU) (composite reliability = 0.86)				
PEU1	I find it easy to get VCT to do what I want it to do.	3.19 (0.87)	0.78	(Venkatesh & Bala, 2008)
PEU2	VCT is easy to use for me.	3.62 (0.91)	0.82	
PEU3	Interacting with VCT does not require a lot of my mental effort.	3.31 (1.00)	0.76	
PEU4	My interaction with VCT is clear and understandable.	3.45 (0.87)	0.86	
Attitude Towards Use (ATT) (composite reliability = 0.91)				
ATT1	I feel positive regarding the utilization of VCT.	3.20 (0.87)	0.87	(Salloum et al., 2019)
ATT2	In general, I admire the utilization of VCT.	2.97 (0.95)	0.90	
ATT3	VCT provides an attractive learning environment.	2.96 (0.93)	0.89	
Behavioral Intention to Use (BI) (composite reliability = 0.89)				
BI1	I will make use of VCT regularly in the forthcoming time.	3.23 (0.95)	0.80	(Salloum et al., 2019)
BI2	I intend to make use of functions of VCT for providing assistance to my academic activities.	3.34 (0.89)	0.85	
BI3	I will give out my recommendation to others to use VCT.	3.20 (0.90)	0.80	
BI4	I will use VCT on a regular basis in the future.	3.10 (0.91)	0.86	
Actual System Use (ASU) (composite reliability = 0.82)				
ASU1	I use VCT frequently.	3.11 (0.97)	0.99	(Salloum et al., 2019)
ASU2	I use the VCT on a daily basis.	2.98 (1.00)	0.71	

Online Survey

During the social distancing period, an online survey was the most effective method to collect data. A questionnaire was designed on Google Forms and was distributed to the participants using the snowball data collection method. In the first step, the questionnaire was sent to the managerial staff and lecturers of different universities to make sure the questions were simple enough to understand before it reached the students via email. The students were encouraged to spend 15 to 20 minutes on the questionnaire, although

they were to decide whether they would do it or not. Those who had completed the survey were encouraged to invite their peers who also used VCTs in distance learning to do the questionnaire. Data were collected in 10 days, from April 14, 2020 to April 23, 2020, and no more data was accepted after that day. The initial set of data consisted of 294 records. After a general observation, 17 records were discarded because the participants only provided a constant value for all questions. The last data set of 277 records were analyzed on the SPSS 20 statistical analysis software, and the research model and hypotheses were tested on the AMOS 23 structural analysis software.

Confidentiality

All the information in this survey, including the research purpose, the amount of time to fill all items, the contact of the research group, and the guarantee of information confidentiality were provided to participants at the beginning of the questionnaire. There were notified volunteers who answered all the questions, thus they joined the survey on a voluntary basis. The questionnaire just collected information to support this research whose data were analyzed by members of the research team. There was no funding for the gathering and analysis of the data. All the information of respondents were used for research purposes, and personal information and responses from the students were kept confidential by the whole team.

FINDINGS

Measurement Model

To exemplify the competence of the measurement model with AMOS 23, we adopted the confirmatory factor analysis (CFA). The model fit, convergent validity, and discriminant validity were used to assess the measurement models' sufficiency. A good model fit's minimum input is illustrated in Table 3. The maximum level of the Chi-square value multiplied by the freedom value (x2/d.f.) is 3 (Vandenberg, 2006), of adjusted goodness of fit index (AGFI) is 0.80 (Forza & Filippini, 1998), of comparative fit index (CFI) is 0.9 (F. Hair et al., 2010), of non-normed fit index (NNFI) and root mean square error of approximation (RMSEA) is 0.08 (Awang, 2012). Our research's result implied a sufficient model fit, with x2/d.f. in CFA model being 1.674 (x2 - 363.270; d.f. = 217), AGFI being 0.866, NFI being 0.933. CFI being 0.972, and RMSEA being 0.049. The composite reliability value presented in Table 1 was adopted to measure the reliability, which showed the result of over 0.80. This suggests a generally accepted degree of confirmatory research. Fornell and Larcker's (1981) criteria were used to determine the convergent validity. They propose that every indicator factor loadings ought to be notable and be no higher than 0.70, and that each item's average variance extracted (AVE) ought to be higher than 0.50, which is the variance owing to the glitch of measurement. Among all items in the study, most of them were measured over 0.70 on their individual construct. These figures were able to verify the adequate item convergence on the intended construct. However, the third item of both computer self-efficacy and social influence were lower than 0.70. Because of some glitches in measurement, AVE level was higher than the variances, fluctuating between 0.643 and 0.797 (Table 3). All of the above figures led to our conclusion that the convergent validity conditions were satisfied. Fornell and Larcker also state that AVE's square root from a construct ought to be higher than the shared value between itself and others in the model in order to reach an adequate discriminant validity. This discriminant validity was sufficient because the inter-construct correlations' level was lower than that of the diagonal values. From these points, we were able to disclose a relatively high construct validity of the measurement.

Table 3. Squared correlations of latent variables

Construct	CR	AVE	ATT	PEU	PU	BI	ASU	OQ	CP	SN
ATT	0.918	0.789	**0.888**							
PEU	0.878	0.643	0.760	**0.802**						
PU	0.940	0.797	0.813	0.594	**0.893**					
BI	0.895	0.681	0.757	0.629	0.667	**0.825**				
ASU	0.851	0.745	0.520	0.455	0.508	0.752	**0.863**			
OQ	0.849	0.738	0.604	0.567	0.593	0.550	0.437	**0.859**		
CP	0.900	0.751	0.694	0.603	0.625	0.713	0.535	0.575	**0.866**	
SN	0.878	0.783	0.496	0.589	0.385	0.534	0.261	0.475	0.481	**0.885**

Diagonal elements (in bold) are the square root of the average variance extracted (AVE). Off-diagonal elements are the correlations among constructs. Diagonal elements must be larger than off-diagonal elements for discriminant validity. PEU = Perceived Ease of Use; PU = Perceived Usefulness; ATT = Attitude towards Use; BI = Behavioral Intention to Use; ASU = Actual System Use; SN = Subjective Norm; OQ = Output Quality; CP = Computer playfulness.

Model Testing Results

This research tested the general fit and advantages of the assumptions. Table 4 presented the fit indices were 1.665 (x2 = 374.746; d.f. - 225) and AGFI = 0.876, NFI = 0.931, CFI = 0.971, and RMSEA = 0.049 which were in the right range. This result indicated a legitimate fit of the model into the data. The hypotheses are presented in Figure 3 and generalized in Table 5, with 11 out of 16 items' p-value lower than 0.05. The descriptive strength of the model were also exhibited.

Table 4. Overall model fit indices for the research model

Model fit indices	Results	Recommended value	Source
Chi-square statistic	1.665 (374.746/225)	≤ 3	Vandenberg (2006)
AGFI	0.867	≥ 0.80	Forza & Filippini (1998)
CFI	0.971	≥ 0.90	F. Hair et al. (2010)
NFI	0.931	≥ 0.90	Awang (2012)
RMSEA	0.049	< 0.08	Awang (2012)

Hypothesis Testing Results

Regarding path analyses, eleven hypotheses in this study are supported by our empirical analysis of SEM; nonetheless, the other five not. Specifically, OQ had a direct effect on PU (β = 0.43, t = 6.43). Therefore, Hypotheses 2 are supported. Regarding the role of SN, there is a considerable variation concerning influence on PEU, PU, ATT, BI. Two of four paths starting from SN and ending at PEU and BI showed significant results: SN - PEU (β = 0.40, t = 6.18); SN - BI (β = 0.12, t = 2.20). Two of four paths starting from SN and ending at PU and ATT showed insignificant results: SN - PU (β = 0.06, t = 0.89); SN - BI (β = 0.01, t = 0.27). Thus, hypotheses 1b, 1c are supported; Hypotheses 1a, 1d are not supported. Regarding the role of CP, a significant impact on PEU, ATT, and BI was observed. All three paths starting from CP and ending at PEU, ATT, BI showed significant results: CP - PEU (β = 0.40, t = 6.26), CP - ATT (β = 0.16, t = 3.08), CP - BI (β = 0.33, t = 4.75). Therefore, Hypotheses 3a, 3b, 3c are supported.

Regarding the latent variable PEU, the dependent variables, PU, ATT, BI, and ASU were greatly influenced. Two paths starting from SN and ending at PU and ATT have significant results: PEU - PU (β = 0.21, t = 2.92), PEU - ATT (β = 0.34, t = 6.05). Other paths starting from SN and ending at BI and ASU have insignificant results: PEU - BI (β = 0.03, t = 0.40), PEU - ASU (β = -0.46, t = -0.73). Thus, hypotheses 4a, 4b are supported; hypotheses 4c, 4d are not supported. The examination of hypotheses which stem from the latent variable PU and included dependent variables ATT and BI showed that the path starting from PU and ending at ATT showed significant result: PU - ATT (β = 0.51, t = 9.41): the path starting from PU and ending at BI showed insignificant result: PU - BI (β = 0.11, t =1.43). Thus, hypotheses 5a is supported and hypotheses 5b is not supported. The significant result of testing the path starting from ATT and ending at BI: ATT - BI (β = 0.33, t = 2.93) shows the influence of ATT on BI. Consequently, there is the significant result of testing the path starting from BI and ending at ASU: BI - ASU (β = 0.78, t = 10.78). Therefore, hypotheses 6, 7 are supported.

Table 5. Results of all hypothesis testing

Variable	Path Coefficient (β)	t	Hypotheses	Result
Dependent Variable: PU				
SN	0.06	0.89	H1a	Not supported
OQ	0.43	6.34***	H2	Supported
PEU	0.21	2.92**	H4a	Supported
R^2: 39.2% of the variance of PU are explained by OQ and PEU				
Dependent Variable: PEU				
SN	0.40	6.18***	H1b	Supported
CP	0.40	6.26***	H3a	Supported
R^2: 39.2% of the variance of PEU are explained by CP and SN				
Dependent Variable: ATT				
SN	0.01	0.27	H1d	Not supported
CP	0.16	3.08**	H3b	Supported
PEU	0.34	6.05***	H4b	Supported
PU	0.51	9.41***	H5a	Supported
R^2: 71.2% of the variance of ATT are explained by PU, PEU, and CP				
Dependent Variable: BI				
SN	0.12	2.20*	H1c	Supported
CP	0.33	4.75***	H3c	Supported
PEU	0.03	0.40	H4c	Not supported
PU	0.11	1.43	H5c	Not supported
ATT	0.33	2.93**	H6	Supported
R^2: 57.7% of the variance of BI are explained by ATT, SN, and CP				
Dependent Variable: ASU				
PEU	-0.46	-0.73	H4d	Not supported
BI	0.78	10.78***	H7	Supported
R^2: 43.3% of the variance of ASU are explained by BI				

Note: PEU = Perceived Ease of Use; PU = Perceived Usefulness; ATT = Attitude towards Use; BI = Behavioral Intention to Use; ASU = Actual System Use; SN = Subjective Norm; OQ = Output Quality; CP = Computer playfulness.

*Note: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$*

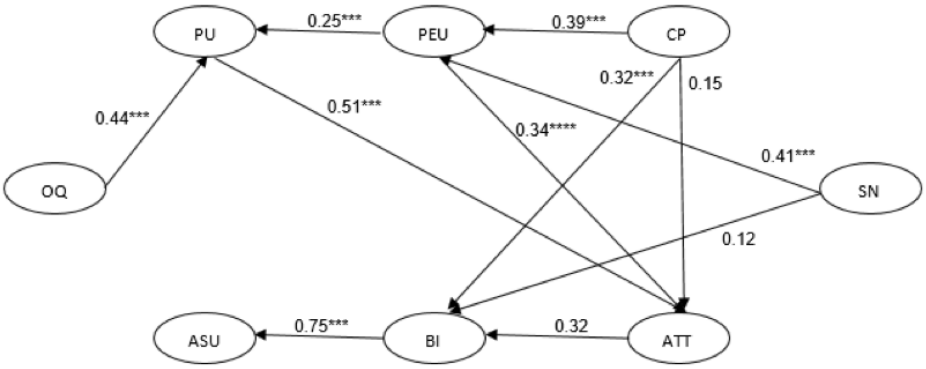

Figure 3. Result of testing model (* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$)

DISCUSSION

Through the review of literature on distance learning and VCTs, we developed the extension of TAM with three external factors: subject norm, output quality, computer playfulness, to understand students' acceptance of VCTs as tools to support their distance learning during the stay-at-home period caused by COVID-19 pandemic. The results were discussed from the spectacles of TAM constructs and the external factors.

Regarding TAM constructs, our research matches both TAM uses and previous studies' results of technology acceptance among students of higher-education level. PU and ATT of VCTs in distance learning are proven to be highly and positively influenced by PEU, which conform to the theoretical base of TAM proposed by David and the previous studies (Al-Rahmi et al., 2019; Dumpit and Fernandez, 2017; Chang et al., 2017; Hanif et al., 2018; Moon and Kim, 2001). The result also corresponds to the hypothesis that a perception of VCTs as user-friendly and easy to use leads to an increase in its usefulness and attitudes (Salloum et al., 2019).

Also pointed out from the result is a considerably positive impact of PU on how students reacted to VCTs. Their attitudes also emphatically affected the behavioral intention, which is strongly related to VCTs' actual use in distance learning. These results also match with the original hypotheses of TAM (Davis, 1989; Hsu & Chang, 2013; Revythi & Tselios, 2019). Students' attitude towards VCTs use in COVID-19 would be improved as they deem them to be useful. The findings can be traced back to the idea that students' behavioral intention would level up as their positive attitudes towards VCTs in distance education are shown. This in turn leads to a better actual use (Salloum et al., 2019). In Vietnam, distance and online learning are not yet popular and thus, Vietnamese students are not used to these ways of learning. Nonetheless, in such a period of social distancing, the results from the empirical examination of TAM constructs show that the students could adapt to the VCTs and use them rather easily, as well as seeing that VCTs are helpful tools to ensure the continuity of education. As a result, they had a positive attitude towards the use of VCTs in distance learning. In terms of the external factors, and the adoption of VCTs in distance learning, first, the results are able to certify the positive effects of SN on PEU (Abdullah & Ward, 2016; Revythi & Tselios, 2019) and BI (Al-gahtani, 2016; S. Y. Park, 2009; Tarhini et al., 2017; Taylor & Todd, 1995), which corresponds to previous studies and TAM 2. Nonetheless, it is shown that SN does not significantly influenced to PU and ATT, while a number of the previous studies point to the former's impact on PU (Rejón-Guardia et al., 2013) and ATT (Jan and Contreras, 2011). The above mentioned outcomes suggest that their universities, their instructors, and their peers neither make students deem VCTs as effective in distance learning, nor improve their attitudes on the encouragement to use them. Meanwhile, students' awareness on the ease of use depends on those who think they can adopt the tools easily in distance learning. During COVID-19's social distancing period, the external factors resulting from the guarantee of teaching and learning quality played an important role in students' intention to use and their actual use of VCTs in distance learning.

Secondly, these results of the research postulated that OQ has a significant positive impact on PU. The higher the output quality, the better students are aware of VCTs' helpfulness in distance learning. This outcome supports W. H. Lee et al. (2018) on output quality's impact on the customer's acceptance of use of

restaurant service robots in ordering and delivering food. This suggests that the PU of the new technology can be built up through the high output quality. As a result, high output quality indirectly but positively affects actual system use through underdeveloped variables like ATT and BI.

Thirdly, concerning students' adoption of VCTs in distance learning, CP substantially and positively affects PEU, ATT, and BI. As students' cognitive spontaneity in computer interaction improves, they have better awareness of the ease of use, better attitude, and higher intention to use VCTs. All CP-related results can be explained using the theory of intrinsic motivation, specifically, the self-determination theory (V. Venkatesh, 2000). Deci and Ryan (1985) propose that intrinsic motivation in learning is based on one's autonomy to make choices, the challenges in the activity, and the ability to obtain it. The users who are more playful with computers have better interaction with IS than those who are less. They also consider the challenges in a technology positive, considering it as a chance to savor rather than an obstacle to overcome. In the context of almost compulsory distance learning during COVID-19, students' awareness and attitude towards VCTs may effectively be shaped by their perceived playfulness.

The empirical results show that the external factors OQ, SN, and CP had positive influences on the Vietnamese student's acceptance of VCTs as a tool to interact with the lecturer in distance learning, and that those factors were the participants' advantages in distance learning. The research, however, does not find any elements that hindered or caused difficulties to the participants when they adapt this learning style in Vietnam.

In a nutshell, because both sensitive situations and various factors have influences on TAM's core (Al-Emran et al., 2018), some of the factors were not supported in COVID-19 pandemic context in Vietnam. This disadvantage calls for further studies on external factors related to the acceptance of VCTs in distance learning. The recognition of these factors will provide a better background on students' awareness and attitude towards VCTs as distance learning tools in COVID-19 context, thus, improve the future acceptance rates of these tools in learning.

Practical Implications and Recommendations

Global education seems to change forever in the context of COVID-19. The adoption of technology in higher education is of higher speed than ever before in order to ensure the quality of distance teaching and learning (Credit Suisse, 2020; Li & Lalani, 2020; World Bank, 2020). In such a situation, this research examined the relationship between TAM constructs and external factors to emphasize the appliance of TAM model. An insight of the external factors was also provided, and practical implications about VCTs use in distance education are made for the research community about distance learning, managers, instructors, and service providers.

The research's results may serve as a helpful reference for the research community if they want to go further into the comparison between distance learning issues among countries with diverse contexts, or different stages of the COVID-19 pandemic. At the same time, they could be a constructive source of information for policy makers in building strategies for distance learning.

Decision makers and managers in Vietnam's HEIs need to employ VCTs to guarantee students' learning when they cannot come to class, and at the same time consider it a tool for the future of blended learning, the form which combine face-to-face and computer-based instruction (Garrison and Kanuka, 2004; Graham, 2006). Decisive elements in improving students' acceptance, teaching performances and students' competence should be the focal point of those models. Institutions should therefore organize VCTs training courses to encourage and raise students' awareness on their efficiency and ease of use in both traditional and distance education. This will in turn lead to the extrinsic and intrinsic motivations among students.

Moreover, the instructor has influences the student on many aspects of learning, including their acceptance of technology use and communication (Abu-al-aish & Love, 2013; Igbaria et al., 1994; Karahanna et al., 1999; Leonard-Barton & Deschamps, 1998). Therefore, the instructor ought to support the student more effectively when they have obstacles in using the technologies, as well as creating a friendlier VCTs-based learning environment for the student.

Furthermore, external factors related to students' acceptance of VCTs use in distance learning were proved to be important. As a result, the Internet and video conferencing service suppliers need to provide and develop VCTs' functions with the aim of a user-friendly environment for students' interaction, creating the cognitive spontaneity between users and the tools to encourage intrinsic motivation. At the same time, institutions ought to enhance the quality of the Internet connection to ensure a high quality of teaching and learning.

Limitation

Although the study revealed interesting results that essentially contribute to the description of students' acceptance of e-learning systems, it also posits some limitations. The outcomes of the research are constructive for future projects concerning a shift from the traditional form of education to e-learning, or learning supported by online systems in those regions with the same economic context as Vietnam. Nonetheless, the limitations should be further discussed. Firstly, the snowball sampling technique adopted in this research is not able to be applied on every student. If other sampling techniques are to be applied in future studies, a more general outcome might be expected. Secondly, because this research focused on public universities in Vietnam, the result only showed a pattern of public but not private universities. Thirdly, elements of COVID-19 context were not a part of the research model to evaluate the direct influences of students' attitude and behavior. The indirect impacts from COVID-19 in the study, which were related to the use of VCTs, lie beneath obvious outcomes.

CONCLUSION

After the examination of the Vietnamese students' acceptance of using VCTs in distance learning during the COVID-19 pandemic, we concluded that most TAM constructs received notable impacts from external factors. In particular, the result shows that:

- The subject norm had a positive effect on the perceived ease of use and the attitude towards use
- The output quality had a positive effect on the perceived usefulness
- The computer playfulness had a positive effect on the perceived ease of use, the attitude towards using, and the behavioral intention to use
- The perceived ease of use had a positive effect on the perceived usefulness and the attitude toward using
- The perceived usefulness had a positive effect on the attitude towards using
- The attitude towards using had a positive effect on the behavioral intention to use
- The behavioral intention to use had a positive effect on the actual system use.

As mentioned earlier, the face of global education is going to change forever after the COVID-19 pandemic. This is a chance for HEIs to test various forms of teaching and learning and see what can be adopted into their curricula. The assistance of technologies, especially VCTs, plays an important role in shaping the future of blended- learning in Vietnam. As long as the VCTs are able to motivate students both extrinsically and intrinsically, a positive attitude from the students can be expected. From the result of this research, the managers, instructors, and service providers can find ways to make more effective decisions to increase the students' acceptance of VCTs, especially in the context of unexpected changes.

To reach this goal, the function of VCTs should be developed and adjusted to fit the context in Vietnam and to attract more users. Further research may investigate both public and private educational institutions of all levels using a wider range of sampling techniques to a better understanding of VCTs in Vietnam. If this is to be achieved, a new age of education will soon be opened.

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ONLINE INFORMATION SEARCHING STRATEGIES OF OPEN AND DISTANCE LEARNERS: ANADOLU UNIVERSITY SAMPLE

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ABSTRACT

Although there are questions about the validity, reliability and accuracy of the information on the internet, Internet is an important tool to enrich students' learning habits and experiences. It is emphasized that individuals should have advanced strategies for searching online information. These strategies have critical importance especially in the field of open and distance learning. This study aims to determine the online information searching strategies of open and distance learners. "Online Information Searching Inventory" developed by Tsai (2009) was used for data collection. The population consists of 925.058 students enrolled in Anadolu University Open Education System in the 2017-2018 academic year. The research sample consists of 3.357 students who voluntarily responded questionnaire. Determining whether these strategies differ according to gender, age and enrollment type constitute the sub-objectives of the study. When examining these strategies according to gender variable, t-test was used; then One-way ANOVA analysis was used for age and enrollment type variables. Finally, it is seen that there are significant differences between online information searching strategies and age, gender, enrollment type. The age and enrollment type are taken in the consideration within the scope of experience and it is seen that the experience is more decisive than the gender for open and distance learners.

Keywords: Online information searching strategies, open and distance learning, university students.

INTRODUCTION

Today, the development and spread of information and communication technologies has contributed to the diversification of information access. Internet has become the primary source of information by ensuring information accessible and editable by everyone (Askar and Mazman, 2013). According to Boldt, Gustafson and Johnson (1995), although there are questions about the validity, reliability and accuracy of the information accessed on the internet; Internet is an important tool that can be used to enrich students' learning habits and experiences. It offers a variety of advantages such as providing rich and flexible learning

environments, providing cheap and easy access to information, and using different environments such as animation, video, sound and text. Nevertheless, it is almost impossible to control or monitor what is being published. Yolal and Kozak (2008) touched upon the difficulties encountered in reaching accurate and useful information, and expressed their concerns about the reliability of the information provided on the web. The development of Web 2.0 technologies has raised concerns about the validity and reliability of online information. In particular, Web 2.0's ability to change the information on the Internet has made the quality and adequacy of information more questionable. In this regard, Debowski (2001) stated that it is a difficult and complex process to use the Internet for information search purposes and emphasized that individuals should have advanced strategies for searching online information.

Online information search is defined as a complex process involving a series of cognitive and metacognitive strategies (Hofer, 2004; Tsai and Tsai, 2003; Cevik, 2015). Tsai (2003) examined students' online information searching processes in depth and mentioned that individuals have three main areas: behavioral, procedural and metacognitive. The behavioral domain includes control and routing strategies that define internet searching applications and navigation skills throughout the search process. The procedural area consists of trial-and-error and problem-solving strategies that include different search approaches and the ability to overcome problems in the search process. Finally, the metacognitive field includes the basic skills and strategies necessary for goal-oriented thinking, monitoring the search process, identifying key information, and interpreting and evaluating information (Cevik, 2015, p.54). Tsai (2009) also mentions seven different strategies for these three areas. These strategies: Control, Disorientation; Trial and Error, Problem Solving, Purposeful Thinking, Select Main Ideas and Evaluation. A diagram showing main key areas and the online information searching strategies is given in Figure 1.

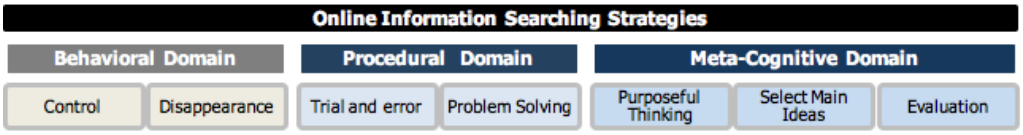

Figure 1. Online Information Searching Strategies

These online information-searching strategies have critical importance in the field of education, especially in open and distance learning where the internet is considered as an effective and essential tool. For individuals who take responsibility for learning in open and distance learning, the Internet is both a learning resource and a communication/ interaction mean. The right use of the Internet provides students great advantages. Wu and Tsai (2005) suggest that students' online search strategies in open and distance learning process are one of the most important factors affect student performance. Similarly, Wagner (2008) states that one of the most important skills that 21st-century students will need is choosing the right information that can provide personal benefit or find solutions to their own problem; also making connections between the information and making inferences. In this context, it is important for open and distance learners to benefit from information searching strategies in reaching and using accurate and reliable information. Here, finding the information needed and analyzing them means information literacy. In this sense, information literacy is defined as "access to information" and "the ability to use information effectively" (ALA, 1989). It is possible to say that the correct beginning for each skill -information access, information analysis and information literacy- is the effective use of information searching strategies. Individuals who use such information searching strategies effectively will have access to accurate and useful information and will be able to analyze this information and work within the scope of information literacy.

PURPOSE OF THE STUDY

The aim of this study is to determine online information searching strategies of students at Anadolu University Open Education System. Determining whether these strategies differ according to gender, age and enrollment type constitute the sub-objectives of the study. The following questions are have been sought to answer:

- What information searching strategies do open and distance learners use?
- Do the information searching strategies differ significantly according to the gender of the students?
- Do the information searching strategies differ significantly according to the age of the students?
- Do the information searching strategies differ significantly according to the enrolment type of the students?

Studies that focuses on information searching strategies conducted in formal education in general. However, it is noteworthy that there are limited surveys conducted in the field of open and distance learning. It is thought that information searching strategies of open and distance learners may be different from formal education students. Distance learners interact much more with online contents and have more individual responsibilities in the learning process. Considering differentiated information searching strategies of distance learners can have positive effects on the learning outcomes of ODL. This study has a great importance in terms of contributing to fill this gap in the ODL.

RELATED RESEARCHES

There is a wide range of research in the literature dealing with information searching strategies. Information searching strategies, which have been taken into consideration in terms of different variables with different sample groups, have become an important research area.

In this area, Meng-Jung Tsai has prominent and varied works. Tsai and Tsai (2003) examined students' information searching strategies in web based learning environments and demonstrated the effect of Internet self-efficacy on information searching strategies. As a result of the study, it was seen that students with high self-efficacy had better and more effective information searching strategies. Wu and Tsai (2005) also found that information-searching strategies were a significant variable in evaluating web materials. In another study conducted by Wu and Tsai (2007), the views of 1220 undergraduate and graduate students using online media in Taiwan were received. As a result of this study, it was found that students' information searching strategies differed significantly according to gender and class level. It was determined that male students use the matching strategy -which is a less sophisticated strategy- more frequently. In addition, it has been determined that graduate students are more oriented towards real resources than undergraduate students are. According to Tsai (2009)'s study related to the information searching strategies in terms of gender and web search experience, there is no difference between male and females in the use of metacognitive strategies. Similarly, he mentioned that there is no correlation between web search experience and metacognitive strategies. However, Kammerer, Bråten, Gerjets and Strømsø (2013) found a positive relationship between students' web search experiences and the status of evaluating the sought information. In other words, experienced web researchers tend to evaluate the reliability of information and choose resources that are more suitable. In another study, Tabatabai and Shore (2005) examined the impact of experience on information searching strategies and found that experience was an important factor in searching information. In addition, Thatcher (2008) (in Turan, Reisoglu, Ozcelik and Goktas, 2015) stated that inexperienced individuals use less procedural and metacognitive strategies than experienced individuals do.

On the other hand, Cevik (2015) points out there are various researches revealing that individual characteristics such as gender and web search experience affect searching strategies. For example, males have better behavioral and procedural strategies than females do (Maghferat & Stock, 2010; Roy and Chi, 2003; Tsai, 2009). In other words, males can better control Internet search applications and seems to be more successful about navigating within the search results, using different search techniques and solving problems related to searching process. However, Maghferat and Stock (2010) argue that females are searching more extensively and trying to gather information from various sources.

Ay and Seferoglu (2017) also examined graduate students' information searching strategies according to different variables and found that gender, internet experience and computer usage level make a significant difference in online information searching strategies. Caka, Dogan and Sahin (2016), who examined the information searching strategies of social network users, determined that the strategies differ according to age, education level and daily internet usage period. Similarly, the results of the research conducted by the Kurulgan and Argan (2007) also show that gender, academic department and competence level have a statistically significant effect on online information searching strategies.

It can be seen that the studies conducted in this field vary and focuses on information searching behaviors in general. However, it is noteworthy that there are limited surveys conducted in the field of open and distance learning. It is thought that information search strategies of open and distance learners may be different from formal education students. It should be taken into consideration that considering these differences in design and management of the services offered may also make a difference on the learning outcomes of distance education. In this context, it is expected that this study, aiming to determine information search strategies of open and distance learners, will contribute to the field.

THEORETICAL FRAMEWORK

Nowadays, the diversification of information access possibilities and the changes in the educational paradigms have made the education learner centered within the framework of the constructivist approach. Arslan (2007) states that theoretical basis of active learning, which places the learner at the center, are based on constructivism and cognitive approach. From a philosophical perspective, Arslan (2007) stated that constructivism is a concept related to epistemology and tries to explain the source of knowledge. He also indicates that accessing way to existing information is an important issue. Constructivism and information searching strategies can be associated in this context.

Arslan (2007) summarized the views of constructivist philosophers as follows: For example, Immanuel Kant supports this idea by saying that people are not passive recipients of information. According to Kant, learners take information actively, associate them with their past knowledge, and add them to their own interpretations. Also Piaget's constructivism is based on cognitive theory, and the basis for learning is discovery. The way in which new information is discovered is important. Bruner's views on learning also shed light on the constructivism approach. According to Bruner, learning is a process in which students base their new concepts on existing knowledge. The learner selects the information, creates the hypothesis and makes decisions in order to integrate the new experiences with the existing mental structures. To summarize, the common point that all thinkers express in different ways is the active role of the individual in accessing or discovering the information. In this context, it will not be wrong to say that access to information is an important subject, which has been emphasized in both the educational and the philosophical terms. In today's world, where information is growing day by day and access routes are varied, access to information strategies is increasingly critical.

In the researches related with the information searching strategies, it is seen that the relationship between the strategy and experience is frequently questioned. It is possible to explain this by emphasizing the tight relationship between making sense in constructivism and experience. Learners are only rearranging their cognitive structures by establishing a relationship between their predecessors and new knowledge/experience. Therefore, their experience with the information searching strategies can affect the results of searching and interpretation processes. Based on the theoretical framework of constructivism, it is appropriate to consider information searching strategies in terms of experience variable. The ages of learners and the types of enrollment can be considered as variables that give insight into experience.

METHODOLOGY

This research, which aims to determine online information searching strategies of open and distance learners, is designed according to general and relational survey models. Determining whether these strategies differ according to gender, age and enrollment type constitute the sub-objectives of the study. The determination of online information searching strategies is covered in the general survey model; and revealing the relationship between online information searching strategies and the determined variables is considered within the context of relational survey model. In survey models, the subject of the study is tried to be defined as it is in its own conditions. The important thing is to reveal the existing ones without any changing (Karasar, 1994). Because many of the educational problems are identifiable, survey model contributes significantly to the theory and practice in understanding knowledge (Balci, 2001).

Data Collection Tool and Process

Quantitative research techniques have been used to achieve the research objectives. In this context, "Online Information Searching Inventory" which was developed by Tsai (2009) and adapted to Turkish by Askar and Mazman (2013) was used as data collection tool. The data collection tool consists of two parts. First part consist of demographic information such as gender, age and enrollment type. In the second part, Inventory of Online Information Search Strategies takes part. It consists of 25 items and 7 factors (disorientation, evaluation, purposeful thinking, differentiation of basic ideas, trial and error, control and problem solving). The cronbach alpha reliability coefficient of the 6-point Likert-type scale was .91. The internal consistency coefficients of the sub-factors were 0.88, 0.79, 0.79, 0.82, 0.75, 0.74 and 0.64, respectively. The lowest score that can be obtained from the scale is 25 and the highest score is 150. The high score obtained represents advanced online information searching strategies. The high score related to the sub-factors indicates that the strategy for that factor is improved.

The data collection tool was transferred to the electronic platform by using Google Forms. Access given to the questionnaire via student automation system between the dates of 15.12.2017-15.04.2018. The student automation system is a platform that enables students to access the information about their courses and exams.

Population and Research Sample

The research population consists of 925.058 students (403.005 associate and 522.053 undergraduate students) enrolled in Anadolu University Open Education System in the 2017-2018 academic year. The research sample consists of 3.357 students who voluntarily responded questionnaire published in student automation system. As a result of the controls, 3 questionnaires were found to be invalid and the number of samples was updated as 3.354. The demographic characteristics of the sample group is given in Table 1.

Table 1. Characteristics of Sample Group

Enrollment Type	**f**	**%**
SSPE*	672	20,0
Second university	1711	51,0
Vertical transmission	852	25,4
Horizontal transition	119	3,5
Gender	**f**	**%**
Female	1292	38,5
Male	2062	61,5
Age Groups	**f**	**%**
18-24	1332	39,7
25-30	1037	30,9
31-35	366	10,9
36-40	283	8,4
41 ≤	336	10

* Student selection and placement examination

There are different types of registration in the open and distance education system. Students can enroll in the same program with different enrollment types. Even if they go through the same processes and are exposed to the same content, they may have different features as they register according to different criteria. Enabling registration opportunity for different audiences is important in ensuring equality opportunities; however, it brings a heterogeneous student population. For example, a 23-year-old or 40-year-old university graduate and a 17-year-old student who graduated from high school can enroll in the same program at the same period. Students, whose individual characteristics differ, can also differ about the online information searching strategies. In this context, the enrolment type has been accepted as a variable that can make a difference in the research results.

Data Analyses

In the analysis of the data, firstly it has been checked whether the data meet the parametric test conditions. In this context, the conditions of providing the assumption of normal distribution are examined. The kurtosis and skewness values of the data were calculated and given in Table 2.

Table 2. Normality Assumption Test Kurtosis and Skewness Values

	Skewness	Kurtosis
Disorientation	1,016	,674
Evaluation	-,452	-1,085
Purposeful thinking	-,435	-1,080
Trial and error	-,434	-1,095
Basic ideas differentiation	-,435	-1,147
Control	-,497	-1,084
Problem solving	-,279	-,640

Kline (1998) states that for multivariate normality, the distribution is normal when the kurtosis value is <2. When interpreting the kurtosis and skewness, Tabachnick and Fidell (2013) consider +1.5 -1.5, George and Mallery (2010) consider +2.0 -2.0 as the starting point. The kurtosis and skewness coefficient are considered differently by different authors, but between -3 and +3 can be considered as normal distribution (Kalayci, 2010). In this study, the coefficients for each sub-factor were between -3 (-2 /-1.5) and +3 (+2 / +1.5), and this indicates that the data were distributed normally. In this context, it is appropriate to use parametric tests to question the relationship between variables and online information searching strategies. In order to determine whether the information searching strategies differ according to gender, t-test was applied. In addition, One-way ANOVA analysis was applied to determine whether it varies according to age and enrollment type. Following the ANOVA analysis, Post-hoc comparisons were performed to determine which group was the cause of the difference. The data of the study were analyzed by using SPSS program and the significance level was accepted as .05 in all analyzes.

FINDINGS

Findings for Online Information Searching Strategies Used by Open and Distance Learners

The usage levels of information searching strategies was determined in accordance with the average scores of sub-factors -such as disorientation, evaluation, purposeful thinking, basic ideas differentiation, trial and error, control and problem solving-. The descriptive findings related to the participants' online information searching strategies are given in Table 3.

Table 3. Descriptive Findings of the Participants' Online Information Searching Strategies

Sub-Factors	N	Minimum	Maximum	Mean	Std. Deviation
Disorientation	3354	1,00	6,00	2,26	1,18
Evaluation	3354	1,00	6,00	4,09	1,61
Basic ideas differentiation	3354	1,00	6,00	4,10	1,67
Purposeful thinking	3354	1,00	6,00	4,07	1,61
Problem solving	3354	1,00	6,00	3,67	1,35
Control	3354	1,00	6,00	4,15	1,63
Trial and error	3354	1,00	6,00	4,12	1,63

When the descriptive values in Table 3 are analyzed, the highest average represents the most adopted strategy. In this context, the averages of "disorientation strategy" are low; the mean of the "control strategy" appears to be at high level. Then, the averages for evaluation, purposeful thinking, trial-and-error, basic ideas differentiation and problem-solving strategies are at the middle level.

Relationship between Online Information Searching Strategies of Distance Learners and Age Groups

One-way ANOVA was applied to determine whether the average scores of factors related to online information searching strategies differ significantly according to the ages. Table 4 shows the results of the ANOVA analysis.

Table 4. Relationship between Online Information Searching Strategies and Age Groups

	Age Group	N	X	Sd	F	p	Test of Homogeneity of Variances (Sig.)		
Disorientation	18-24	1332	2,2789	1,21261	1,713	,144	,358		---------
	25-30	1037	2,2565	1,16497					
	31-35	366	2,1250	1,17257					
	36-40	283	2,3207	1,21451					
	41 ≤	336	2,3274	1,16316					
Evaluation	18-24	1332	4,0049	1,63415	5,972	,000*	,008*	36-40	18-24
	25-30	1037	4,0521	1,60809					25-30
	31-35	366	4,1633	1,67899					
	36-40	283	4,4788	1,49719					
	41 ≤	336	4,2292	1,55830					
Purposeful thinking	18-24	1332	3,9747	1,64191	7,107	,000*	,000*	36-40	18-24
	25-30	1037	4,0258	1,61298					25-30
	31-35	366	4,1141	1,65939					31-35
	36-40	283	4,5018	1,46441					
	41 ≤	336	4,2039	1,52250					
Trail and Error	18-24	1332	4,0100	1,65344	6,530	,000*	,000*	36-40	18-24
	25-30	1037	4,1041	1,62023					25-30
	31-35	366	4,1612	1,73349				41≤	18-24
	36-40	283	4,5135	1,50495					
	41 ≤	336	4,2808	1,55119					
Basic Ideas Differencation	18-24	1332	4,0118	1,71062	5,553	,000*	,000*	36-40	18-24
	25-30	1037	4,0598	1,66385					25-30
	31-35	366	4,1157	1,77475					31-35
	36-40	283	4,4817	1,48301					
	41 ≤	336	4,2609	1,56825					
Control	18-24	1332	4,0672	1,65743	5,083	,000*	,000*	36-40	18-24
	25-30	1037	4,1097	1,63142					25-30
	31-35	366	4,2398	1,71158					
	36-40	283	4,5097	1,50108					
	41 ≤	336	4,2597	1,57182					
Problem solving	18-24	1332	3,6126	1,38556	6,123	,000*	,000*	36-40	18-24
	25-30	1037	3,6397	1,35144					25-30
	31-35	366	3,6785	1,38952					31-35
	36-40	283	4,0294	1,26584					
	41 ≤	336	3,7669	1,25182					

When the level of online information searching strategies are examined according to the age variable, it is seen that the highest average belongs to the 36-40 age range, for evaluation (X = 4,4788), purposive thinking (X = 4,5018), trial-and-error (X = 4,5135), basic ideas differencation (X = 4,4817), control (X = 4,5097) and problem solving (X = 4,0294) strategies. In addition, the lowest averages belong to the 18-24 age range in all strategies.

Table 4 shows that, except the disorientation strategy, there is a statistically significant difference between the age of participants and their searching strategies (p =, 000 <0.05). In order to find out which groups this variance was caused by, the Tamhane T2 Post-Hoc test was applied for the online information searching strategies whose variances were found to be not homogeneous -evaluation, purposeful thinking, trial and error, basic ideas, control, problem solving-(p =, 014 /, 000 <0.05). Since the sig value for the disorientation strategy is greater than 0.05, the post-hoc test has not been performed.

According to the results of the Tamhane test, it was determined that there was a significant relationship between the 36-40 age range and 18-24/25-30 ages for all information searching strategies (p <0.05). Table 4 shows that 36-40 age range students have higher levels of disorientation, evaluation, purposeful thinking, trial and error, basic ideas differentiation, control, problem solving strategies than students aged 18-24 and 25-30. There is also a meaningful relationship between 36-40 and 31-35 age groups in the strategies of purposeful thinking, differentiating basic ideas and problem solving. Parallel to the above-mentioned relationship, it is understood that the use of these strategies in the 36-40 age group is higher than the 31-35 age group. On the other hand, a significant difference was observed among the age range of 41 years and over and 18-24 about the level of using the trial and error strategy. As a result, it is observed that as the students' ages increase, the level of using online information searching strategies also increases.

Relationship between Online Information Searching Strategies of Distance Learners and Gender

One-sample t=test was applied to determine whether the average scores of factors related to online information searching strategies differ significantly according to the gender. Table 5 shows the results of the t-test analysis.

Table 5. Relationship between Online Information Searching Strategies and Gender

Strategies	Group Statistics				Levene's Test for Equality of Variances		t-test
	Gender	N	X	Sd	t	Sig.	Sig. (2-tailed)
Disorientation	Female	1292	2,1151	1,09256			
	Male	2062	2,3566	1,23756	17,500	,000*	,000**
Evaluation	Female	1292	4,0209	1,64775			
	Male	2062	4,1483	1,59633	5,576	,018*	,026**
Purposeful thinking	Female	1292	3,9807	1,64933			
	Male	2062	4,1311	1,59049	6,971	,008*	,009**
Trial and error	Female	1292	4,0431	1,66497			
	Male	2062	4,1767	1,61513	5,935	,015*	,021**
Basic ideas differentiation	Female	1292	4,0137	1,70878			
	Male	2062	4,1583	1,65314	4,117	,043*	,015**
Control	Female	1292	4,0430	1,66574			
	Male	2062	4,2265	1,61739	5,743	,017*	,002**
Problem solving	Female	1292	3,5841	1,37499			
	Male	2062	3,7381	1,34243	4,654	,031*	,001**

* p<.05 variances are homogeneous ** Sig. (2-tailed) indicates whether there is a difference between the groups.

According to these results, the homogeneity of the variance was tested by Levene test; and variances were found to be homogeneous. (p<.05). Sig.(2-tailed) is the value that indicates whether there is a difference between the groups by gender. Sig.(2-tailed) values less than 0.05 for all strategies indicate a significant difference between the groups. In this context, when the averages of the groups are compared, it is noteworthy that the averages of males in all categories are higher.

Relationship between Online Information Searching Strategies of Distance Learners and Enrollment Type

One-way ANOVA was applied to determine whether the average scores of factors related to online information searching strategies differ significantly according to the enrollment type. Table 6 shows the results of the ANOVA analysis. When the level of online information searching strategies levels are examined according to the enrollment type, except disorientation strategy, it is seen that the highest average belongs to the second university for evaluation (X = 4,2288), purposive thinking (X = 4,1563), trial-and-error (X = 4,2145), basic ideas differentiation (X = 4,2032), control (X = 4,2526) and problem solving (X = 3,7276) strategies. In addition, the lowest averages belong to the vertical transmission in evaluation (X = 3,9187), purposeful thinking (X = 3,9366), trial and error (X = 3,9980), basic ideas differentiation (X = 3,9425), and control (X = 4,0241) strategies. Unlike the others, the highest average in the disorientation category belongs to the horizontal transition (X = 2,4706) and the lowest average belongs to the second university (X = 2,1929).

Table 6. Relationship between Online Information Searching Strategies and Enrollment Type

Strategies	Enrollment Type	N	X	Sd	F	p	Test of Homogeneity of Variances (Sig.)	
Disorientation	SSPE*	672	2,2969	1,21621				
	Second university	1711	2,1929	1,13032				Second university-Vertical transmission
	Vertical transmission	852	2,3504	1,27074	4,921	,002*	,002*	
	Horizontal transition	119	2,4706	1,20608				
Evaluation	SSPE	672	4,0186	1,64274				
	Second university	1711	4,2288	1,57041				Second university-SSPE / Vertical transmission
	Vertical transmission	852	3,9187	1,67376	8,010	,000*	,003*	
	Horizontal transition	119	3,9832	1,58272				
Purposeful thinking	SSPE	672	4,0554	1,64647				
	Second university	1711	4,1563	1,55868				Second university-Vertical transmission
	Vertical transmission	852	3,9366	1,69110	3,797	,010*	,000*	
	Horizontal transition	119	3,9538	1,61231				
Trial and error	SSPE	672	4,0635	1,67255				
	Second university	1711	4,2145	1,58843				Second university-Vertical transmission
	Vertical transmission	852	3,9980	1,68668	3,753	,010	,019*	
	Horizontal transition	119	4,1008	1,66415				
Basic ideas differentiation	SSPE	672	4,0709	1,68826				
	Second university	1711	4,2032	1,62628				Second university-Vertical transmission
	Vertical transmission	852	3,9425	1,75372	4,955	,002*	,001*	
	Horizontal transition	119	3,9804	1,65891				

Control	SSPE	672	4,0863	1,67957				
	Second university	1711	4,2526	1,57530				Second university-Vertical transmission
	Vertical transmission	852	4,0241	1,71295	4,292	,005*	,000*	
	Horizontal transition	119	4,0987	1,67870				
Problem solving	SSPE	672	3,6781	1,41949				
	Second university	1711	3,7276	1,28210				
	Vertical transmission	852	3,5935	1,43547	2,029	,108	,000*	----------
	Horizontal transition	119	3,5910	1,44415				

* Student selection and placement examination

Table 6 shows that, except the problem solving strategy, there is a statistically significant difference between the enrollment type and their searching strategies (p =, 000 <0.05). In order to find out which groups this variance was caused by, the Tamhane T2 Post-Hoc test was applied for all online information searching strategies whose variances were found to be not homogeneous. Since the sig value for the program solving strategy (p=,108) is greater than 0.05, the post-hoc test has not been performed for this strategy.

According to the results of the Tamhane test, it was determined that there was a significant relationship between second university and vertical transmission for all information searching strategies. Table 6 shows that students enrolled in the second university have higher levels of evaluation, purposeful thinking, trial and error, basic ideas differentiation, control strategies than students enrolled in vertical transmission. There is also a meaningful relationship between second university and SSPE in the evaluation strategy.

DISCUSSION, CONCLUSION AND SUGGESTIONS

When students' online information searching processes are considered within the behavioral, procedural and metacognitive domains, both the highest and the lowest averages were observed in the behavioral domain. Procedural and metacognitive domains were observed in medium average. Considering the relationship between online information search strategies and age variable, it was revealed that the behavioral, procedural and mega-cognitive domain skills of the 36-40 age group were more than the other groups. This may be related to the fact that students in the 36-40 age group may have enrolled in the second university. The students in this group are more experienced in educational processes and more open-minded in personal development. Therefore, it is normal for them to be better equipped in online information searching strategies and development areas. These findings support the studies that question the relationship between age / experience and information searching strategies in the literature. Ay and Seferoglu (2017); Caka, Dogan and Sahin (2016) and Kurulgan and Argan (2007) found that experience/competence in internet or computer usage make a significant difference in online information searching strategies.

There is also a significant difference between the groups by gender for all strategies. This is parallel to Wu and Tsai (2007)'s study. In this context, the averages of males in all categories are higher. Therefore, it can be said that men use all the online information-searching strategies more effectively than femles do. In other words, males's behavioral, procedural and metacognitive skills are more developed than females. Cevik (2015) also mentions various researches (Maghferat & Stock, 2010; Roy and Chi, 2003; Tsai, 2009) that men have better behavioral and procedural strategies than females do. Regarding the findings related to the enrollment type, except problem solving strategy, there is statistically significant difference between the enrollment type and searching strategies. In this context, it is seen that the highest means in the procedural and metacognitive domain, where significant relationship is determined, belong to the second university enrollment type. The low average of the second university in the disorientation strategy supports that the students in this category have advanced online information searching strategies. On the other hand, the significant relationship between second university and vertical transmission for all information searching strategies can be explained by the age and qualification difference between two groups. Vertical transfer refers to the transition from associate degree programs to undergraduate programs. Associate degree students can

register to the system with lower scores. This difference can be taken into account in explaining the difference between the two groups. Also associate degree students' experiences in the education system are also less than the students enrolled in second university. Students enrolled with the second university are individuals who have successfully completed their bachelor degree studies. Therefore, it can be said that they are better equipped. This can be the starting point for explaining the quality difference between the two groups. In other words, the difference between the second university and vertical transition student profiles is an explanatory feature. This inference can be said to be compatible with the findings of Caka, Dogan and Sahin (2016)'s study that it has been observed that students have more advanced search strategies as the education level increase.

When the findings are evaluated in general, it is seen that there are significant differences between online information searching strategies and age, gender, enrollment type. The findings related to gender and experience variables are parallel to other research findings in the literature. The findings regarding the age and type of enrollment are taken in the consideration within the scope of the experience variable. Finally, it is seen that the experience is more decisive than the gender for open and distance learners.

Finally, in order to provide more detailed information about online information searching strategies, it is thought that the interpretation of relation between internet usage purposes/time and strategies will also contribute to the field. Supporting the findings of the studies with qualitative research findings is another suggestion (Karaoglan Yilmaz, F , Kilic Cakmak, E.,2016). In addition, the comparing formal and distance learners in the same institution and determining online information search strategies of the students in the same enrollment or program type are among the topics that can be addressed within the further researches. In particular, information on how individual characteristics affect online information searching strategies is important in terms of organizing existing platforms considering these features and preparing new and realistic applications. As Kabakci, Firat, Izmirli and Kuzu stated, training on Internet searching skills and strategies should be provided to students.

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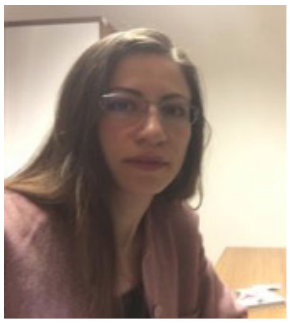

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DEVELOPING MEASURES FOR THE EFFECTIVENESS OF DISTANCE EDUCATION AS REGARDS SUSTAINABILITY: THE MIXED METHOD APPROACH

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ABSTRACT

Distance education has been acknowledged as a mechanism through which sustainable development can be achieved. The objective of the study is to develop the instrument that measures the effectiveness of distance education in inculcating sustainability among distance learners as the researchers have observed the absence of comprehensive and contextually appropriate measures for the effectiveness of distance education in nurturing sustainability. A mixed method research design was employed by following the six-phase sequential exploratory instrument development process. The quantitative validation of the instrument was done via a survey on 663 learners from the selected public universities in Malaysia. The SmartPLS 3 used by the researchers, produced a new 61-item measure of the effectiveness of distance education as regards sustainability. The findings have enabled the establishment of a comprehensive and contextually appropriate measurement tool applicable to a larger population of distance learners. It also provides an evaluation tool for practitioners in determining the effectiveness of distance education programs and courses that have led to the attainment of sustainability outcome among learners. Future studies may pursue further processes to improve the rigor and construct validation of the instrument besides uncovering other areas which are necessary to be incorporated in the scope of the measures.

Keywords: Distance education, distance learning, effectiveness, instrument development, Partial Least Squares - structural equation modelling, sustainability.

INTRODUCTION

Sustainability has become an important item for the agenda in institutions of higher education. Universities and other tertiary education providers have played a major role in knowledge creation and transforming decision-makers, policymakers, leaders, entrepreneurs and academics in finding solutions regarding sustainability in various aspects (Cortese, 2003). The United Nations decade for Education for Sustainable Development (DESD) 2005-2014 has encouraged innovative approaches in education (Buckler and Creech, 2014) so that meaningful contributions can be crafted to assist society in making the transition towards sustainability through both the formal education system and non-formal and informal learning settings. The Industrial Revolution 4.0 has propelled distance education programs to meet the need of learners over

conventional learning whether in local or international settings by creating various learning opportunities. The Internet has transformed the way knowledge is communicated which has enlightened practitioners as regards the further potential of distance education in nurturing sustainability.

The recent outbreak of Covid-19 has also witnessed the resurgence and flexibility of distance education in delivering lessons to students (Castaman and Rodriguez, 2020; Gulseven et al., 2020). The potential of distance education to be the main educational mode can be further unleashed (Castaman and Rodriguez, 2020) following the outbreak. A silver lining in this pandemic is that governments have begun to realize their shortcomings in their educational policies and are offering updated distance education delivery systems extensively (Gulseven et al., 2020; Zhu and Liu, 2020). This has created an opportunity for distance education to be implemented in such a way that it is no longer a mere supplementary system but is a cogent, effective and distinctive solution. Since distance educations has had to serve this digital generation for their survival needs, its essence in nurturing sustainability has become unequivocally significant.

As far as past studies on sustainability in higher education are concerned, research has been carried out from several main perspectives. The first perspective has focused on management issues in sustainability of higher education which consists of topics such as sustainability assessment tools (Findler et al., 2018; Drahein, De Lima and Da Costa, 2019; Caeiro et al., 2020), sustainability reporting (Ana, Laura and Garcia-Benau, 2018; Coco, Remmer and Elisa, 2019; Sahar, Udo and Hossein, 2019), and challenges in managing sustainability in higher education (Molthan-Hill, Dharmasasmita and Winfield, 2016; Aleixo, Leal and Azeiteiro, 2018; Tormo-Carbo, Seguí-Mas and Oltra, 2018). The second perspective centers on the definition and elaboration of sustainable development competencies comprising those required by the university faculty in teaching the sustainability content and necessary competencies for student achievement (Grant, Lips-Wiersma and Soebagio, 2017; Foster and Stagl, 2018; Lavey, 2019) The third perspective is related to the implementation of higher education for sustainable development which addresses the purposes, scopes, and challenges of sustainable development associated with teaching and learning (Leal Filho and Dahms, 2018; Molderez and Fonseca, 2018; Michel, 2019). Although there was no bias towards a particular type of research methodology in past studies (Hallinger & Chatpinyakoop, 2019), it is suggested that further research be done on the effectiveness of the different approaches in understanding the notion of higher education for sustainable development.

PURPOSE OF THE STUDY

Although distance education has been acknowledged in previous studies as a mechanism through which sustainable development can be achieved (Aleixo et al., 2018; Ramos et al., 2015), the learners' grasp of knowledge and practice regarding the concept of sustainability have been below expectation (Azeiteiro et al., 2015). This has made the assessment of the sustainability nurtured through distance education programs/courses, a complex issue (Md Harizan & Hilmi, 2019) and lacking, particularly in achieving the intended outcome of the sustainability agenda among students. New technologies on which modern distance education is based, are insufficient because they did not encourage the development of key learning skills, attitudes and values towards environmental conservation and sustainable development to the same level as face-to-face fieldwork (Oliveira, 2012; Oliveira et al., 2017). This situation has triggered a need to incorporate factors which would enhance the evaluation criteria underlying the effectiveness of distance education in nurturing awareness regarding sustainability and positive behaviors among learners.

To date, only a few studies which addressed the notion (Bacelar-Nicolau et al., 2009; Azeiteiro et al., 2015). While Bacelar-Nicolau et al. (2009) evaluated the extent towards which the Master's program, which comprised environmental and social sciences contents succeeded in expanding students' awareness and knowledge through e-learning, Azeiteiro et al. (2015) have conducted a descriptive analysis to assess the effectiveness of e-learning in delivering education related to sustainable development using a case study approach. However, the dimensions proposed by the findings of the study require further elaborations in terms of its indicators. Therefore, further investigation which enriches and transforms the dimensions into the form of items which provide operational definitions of the mentioned construct, to enable generalizability of findings in the future are required. Based on the identified gaps, the absence of a comprehensive, yet contextually appropriate measures of the effectiveness of distance education in nurturing sustainability has

strongly motivated this study. The objectives of the study are to develop an instrument which measures the effectiveness of distance education as regards sustainability, and to validate the developed instruments among the distance learner population.

LITERATURE REVIEW

Distance Education and Sustainability

Distance education is an education system within which the teaching and learning actions are performed via communication technologies and mailing services by the teachers with the students being in different environments (Isman, 2005). It focuses on the pedagogy, technology, and instructional system designs that aim to deliver education to students who are not physically on site in a traditional classroom or campus (Tavukcu, Arap and Ozcan, 2011). The 'separateness' between teaching and learning forms a distinctive attribute of distance education which is deemed to be unique from the conventional face-to-face classroom setting, which requires the presence of instructor and students in the physical classroom setting. Such unique attributes enable distance education to overcome certain obstacles posed by conventional methods of lesson delivery by overcoming the problems of the dearth of qualified instructors, the geographical barriers between instructors, institutions, and student, and flexible time management (Of, Kahraman and Kudu, 2018).

Distance education is regarded as vital to sustainable education (Bourke and Simpson, 2009; May et al., 2011). The use of online technology can have an important role within education for sustainable development, namely for knowledge about sustainability, assessment practices competencies and outcomes assessment (Azeiteiro et al., 2015). Through distance education, universities can embrace sustainability in its different ways and domains and university graduates who have been confronted with ways to make our world more sustainable are able to tackle issues of sustainability and translate sustainable development declarations into real actions while reducing the carbon footprint in the higher education sector. (Bell et al., 2017). Distance education is more environmentally-sustainable than conventional forms of higher education (Roy, Potter and Smith, 2001; Herring and Roy, 2002; Roy, Potter and Yarrow, 2008). Distance-taught courses reported 90 percent less energy consumption and CO2 emissions than campus courses, although electronic delivery did not result in a reduction in energy or CO2 emissions compared to print-based distance learning (Herring and Roy, 2002). In another study of distance education in the UK, Roy, Potter, & Yarrow (2008) found that the distance learning delivery method consumed 87% less energy and emitted 85% less CO2 than traditional brick and mortar classes. In Malaysia, it was found that distance education enables environmental preservation and facilitates sustainability particularly in reducing travel needs and thus, the carbon emission of the vehicles to/from campus can be lowered dramatically (Md Harizan et al., 2015; 2016; 2017). The sustainability criteria of distance education are remarkable during the Covid-19 pandemic, and have been found to be integrated satisfactorily with distance learning (Trung et al., 2020).

As distance education could ensure that sustainability is achieved to a great measure, the advances in technology are important for the future of distance education (Rovai and Downey, 2010; Venkatesh et al., 2013). By providing the appropriate tools and techniques for individuals to access and organize information, the existing distance education practices that maximize learner independence can be sustained (Swan, Garrison and Richardson, 2009).

Effectiveness of Distance Education as regards Sustainability

The concepts of sustainability affect the way educational providers in higher learning institutions operate, design the curricula and the method of delivering learning across different disciplines, and prepare the students to incorporate sustainable values, attitudes, and behaviors into their lives (Stephens, Hernandez, Roman, Graham, & Scholz, 2008). The evaluation of the effectiveness of distance education in delivering lessons was made by researchers in comparison to the conventional face-to-face instruction where both methods resulted in relatively the same learning outcomes and similar or higher student satisfaction levels. In addition, a negligible effect was noted between the degree of student-teacher interactions and the number of lessons learned (Shee and Wang, 2008; Campbell and Campbell, 2009, 2011; Salimi and Kornelus, 2018; Filipovska, Filipovska and Petreski, 2019). Although new technologies on which modern distance education is based on are important, they are not

sufficient because they did not encourage the development of key learning skills, attitudes and values towards environmental conservation and sustainable development to the same level as face-to-face fieldwork (Oliveira, 2012; Oliveira et al., 2017). Such inconclusive findings have prompted the study to delve into the factors which would enhance the evaluation criteria underlying the effectiveness of distance education in nurturing awareness regarding sustainability and behavior among learners.

Studies have modelled the evaluation of the effectiveness of distance education in nurturing awareness regarding sustainability and behavior through several factors, some of which consisted of the distance learning experience of its learners (Wessel et al., 2019). Martinho et al. (2010) and Ana Pinto de Moura et al. (2010) found that an extremely high level of learners' motivation and satisfaction with the online programs changed their attitudes about the environmental domains and contributed to others' changing their attitudes and behaviors. Besides, the study also found that online students are equally satisfied with their courses and revealed the same confirmed general expectations and acquired competencies which indicated that online education is as effective as face-to-face education. Figueiro and Raufflet (2015) reviewed several aspects which contribute toward the effectiveness of sustainability in education namely the pedagogical challenges, teaching techniques and curriculum orientation. Student's motivation, satisfaction, and issues pertaining to quality were also found to be strongly linked to the effectiveness of distance education in delivering the sustainability message (Goulimaris, 2015; Harris & Martin, 2012; Markova et al., 2017). In order to gauge the effectiveness of distance education programs and courses with regards sustainability, a comprehensive and contextually appropriate measure is required by encapsulating the important and relevant indicators and items.

METHOD

The study used the mixed method research design by employing a sequential exploratory instrument development process. The process started with three main phases namely a series of qualitative interviews done with a small number of distance learners, followed by measurement instrument item generation, and the validation of the developed instruments via a quantitative survey done on the larger population of distance learners. The item development process was done according to the first six phases suggested by Onwuegbuzie, Bustamante and Nelson (2010) (refer to figure 1), recommendations and empirical validation (Rowan and Wulff, 2007; Imran and Yusoff, 2015) and exemplars from mixed methods studies (Rossiter, 2012; Witry et al., 2016).

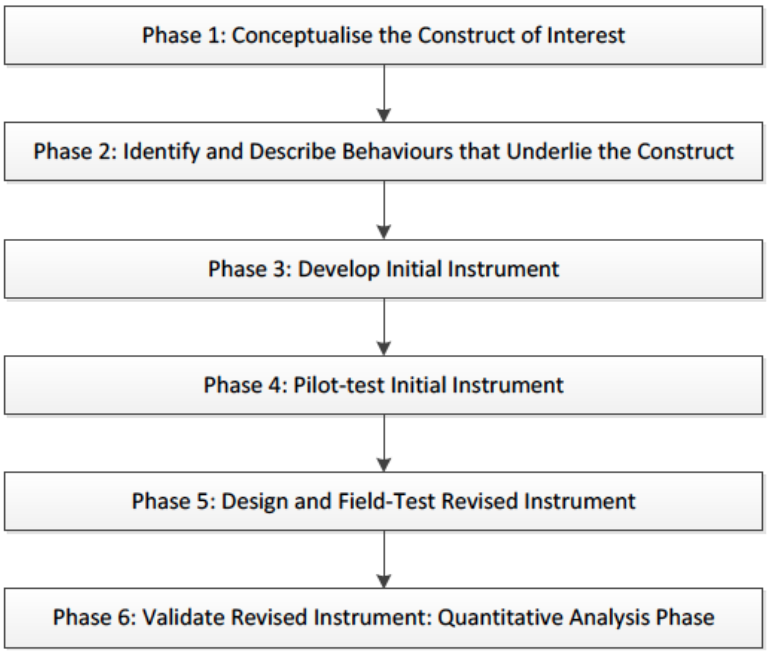

Figure 1. Instrument development and construct validation (IDVC) process (adapted from Onwuegbuzie, Bustamante and Nelson (2010)

Phase 1 – Conceptualisation of the Construct of Interest

Phase 1 involved the development of the construct of interest i.e. the effectiveness of distance education as regards sustainability based on the extensive review of the literature. The initial dimensions of the construct were derived from Azeiteiro et al., (2015), which examined the effectiveness of education for sustainable development through e-learning in higher educational institutions based on several aspects namely the motivation of learners, expectations of their studies, satisfaction towards their studies, learning quality, and sustainability acquired competencies. Besides, the components raised by Bacelar-Nicolau et al., (2009) in evaluating course performance namely student motivation, student-content interaction, student-student interaction, student-teacher interaction, learning activities, type of evaluation, students' environmental citizenship attitudes and behaviors were also considered during the identification of the dimensions of the construct. The construct was then modified and contextually defined by incorporating attributes pertaining to distance education. Field experts were also consulted in establishing face validity for the construct.

Phase 2 – Identify and Describe Behaviours that Underlie the Construct Using Qualitative Interviews

Phase 2 dealt with the identification of items for the construct. This was done by performing qualitative interviews with a selected number of distance learners. A series of 72 semi–structured interviews, each lasting between 15 to 30 minutes was conducted among distance learners who were enrolled in a Bachelor's degree program of management studies delivered via distance education mode in a public university between January and February 2019. The objective was to locate factors that are important in determining the effectiveness of distance education in nurturing awareness regarding sustainability among learners. Participants were prompted to express their feelings, satisfactions, and expectations about their studies based on their experiences as the distance learners. Interviews were recorded, transcribed and coded using the NVivo software. The identification of items for the constructs was made by going through the interview transcripts and the coding by looking for statements underlying the earlier mentioned dimensions which define the effectiveness of distance education as regards sustainability namely expectations of distance education programs, learning quality, assessment, sustainability acquired competencies, satisfaction towards distance education programs, and motivation. Learning quality was further coded into seven sub-themes namely quality of online activities, quality of instructors, quality of teaching materials, quality of collaborative work, learning strategy, acquired competencies, and quality of the e-learning/Learning Management System. The reliability of procedure was ensured by having other researchers to perform the interview coding independently before an uninterrupted comparison was made until the final consensus was obtained.

Phase 3 – Develop Initial Instrument

Phase 3 consisted the generation of developed items for each construct. Initially, a total of 70 items were generated, comprising expectations of distance education programs (9 items), learning quality (35 items), assessment (3 items), sustainability acquired competencies (8 items), satisfaction towards distance education programs (4 items), and motivation (10 items). Seven initial sub-themes which constituted learning quality consisted of quality of online activities (6 items), quality of instructors (5 items), quality of teaching materials (5 items), quality of collaborative work (4 items), learning strategies (5 items), acquired competencies (5 items), and quality of e-learning/Learning Management System (5 items).

Phase 4 – Pilot Test the Initial Instrument

Phase 4 involved receiving feedback on the initial instrument. The items were arranged and checked by other researchers. The initial instrument also underwent a pilot test among a few distance learners in a campus. Ambiguous, leading, unclear, double-barreled, and duplicated items were either deleted or modified. Two items, motif3 (which focuses on job promotion) and expectation3 (which focuses on career advancement) which initially represented motivation and expectation respectively were found to be almost similar in meaning and thus, modified.

Phase 5 – Designing and Field Testing the Revised Instrument

Phase 5 required researchers to refine and discard problematic items. This phase saw the distribution of a field test of the revised instrument to 600 randomly selected distance learners in a public university in Malaysia. The collected data was analyzed in an exploratory factor analysis with Promax rotation, which can be calculated more quickly than a direct oblimin rotation for large datasets (IBM, 2019). The results of the exploratory factor analysis showed that the KMO measure of sampling adequacy was 0.957 indicating sufficient inter-correlations while the Bartlett test of sphericity was significant (Chi-square=27392.600, $p<0.01$). Eigenvalues were greater than 1.0 and the total variance explained was 72.937% of total variance, which established the construct validity of items (Hair et al., 2006). Several initially coded items which formed learning quality were removed due to low communalities (learning_strategy4) and cross-loadings (quality_eportal2, quality_eportal3).

Eleven factors were generated comprising the initially coded themes; expectations of distance education programs (11 items), learning quality (32 items), assessment (3 items), sustainability acquired competencies (8 items), satisfaction towards distance education programs (4 items), and motivation (8 items). Learning quality constituted six factors namely quality of online learning activities (including e-learning / Learning Management System) (9 items), quality of instructors (6 items), quality of teaching materials (5 items), quality of collaborative work (4 items), acquired competencies (6 items), and quality of network connections (2 items). None of the earlier coded items of the learning strategy section was loaded into a distinct factor as they formed part of the items for other factors. The percent of variance explained by each factor were based on expectations of distance education programs (41.616%), quality of online activities (6.968%), sustainability acquired competencies (5.070%), quality of instructors (3.210%), quality of teaching materials (2.849%), motivation (2.733%), quality of collaborative work (2.595%), satisfaction towards distance education programs (2.504%), acquired competencies (2.080%), assessment (1.780%), and quality of network connection (1.532%).

Phase 6 – Quantitative Validation of the Revised Instrument

Phase 6 required the quantitative validation of the instrument via a survey analysis. The measurement scales were operationalized using the 4-points Likert scale: 1 = "Strongly disagree", 2 = "Disagree", 3 = "Agree", 4 = "Strongly agree". Besides, the age, gender, marital status, monthly income, past education level, religion, race, occupation type, and field of study were included as items in the demographic profiles of the sample. A total of 1000 invitations to participate the online survey were sent via emails to undergraduate students who are currently enrolled in the off-campus or distance education programs offered by a selected number of Malaysian public universities. Permission to conduct the survey was granted by respective administrators of the programs before obtaining access to students' emails. The survey was done from August 2019 to November 2019. Data were coded into the Statistical Software for Analysis (SPSS) software. Analysis of frequency was done to examine the demographic profile of the respondents. The goodness of measures was further examined using SmartPLS3 software.

FINDINGS

A total of 1000 email invitations were sent to the students. 663 students responded, which constituted a response rate of 66.2%. Most of the respondents were between 25 to 34 years old (54.9%), female (60.5%), married (58.5%), having personal monthly income between RM2,000.00 to RM2,999.00 (37.9%), and had previously obtained Diploma (55.5%). The respondents were predominantly Muslims (87.5%) from the Malay ethnic group (85.4%), working in the government sector (57.0%), and pursuing management studies (58.4%).

The 'goodness of measures' was evaluated based on several criteria which comprise internal consistency reliability, convergent validity, and discriminant validity. Using the Smart-Partial Least Squares 3 software, the first criterion to be assessed was the internal consistency reliability. The Cronbach alpha, composite reliability, and coefficient Rho for all latent constructs exceeded 0.80 (see table 1 in Appendix). This indicated that the measures were internally consistent (Nunnally, 1978). Besides internal consistency

reliability, both convergent and discriminant validity are also required to establish a good measurement model. Convergent validity can be evaluated by considering the outer loadings of the indicators and the average variance extracted (AVE) (Hair et al., 2017). Discriminant validity can be assessed based on two-approaches namely the Fornell-Larcker criterion (Fornell & Larcker, 1981) and cross-loadings (Chin, 1998). The Fornell-Larcker (1981) test for discriminant validity (see table 2 in Appendix) showed that the square root of each construct's AVE was greater than its highest correlation with any other construct, which was an indication of discriminant validity for the developed measurement items. In cross-loading (see table 1 in Appendix), each indicator loaded highest on the construct it is intended to measure (values higher than 0.70) and thus, concluding a discriminant validity of the developed measures (Chin, 1998). Several items were deleted due to low loading such as motif4 ("To increase one's competitiveness in the job") from the expectations of distance education programs construct, sac3 ("Since following a distance education program, I have always been involved in activities related to sustainability") from the sustainability acquired competencies construct, and motif8 ("I would like to improve my skills via distance education") from the motivation construct. A total of 61 items were finally derived in forming the measures for the effectiveness of distance education as regards sustainability. These items comprise the expectations of distance education programs (10 items), learning quality (30 items), assessment (3 items), sustainability acquired competencies (7 items), satisfaction (4 items), and motivation (7 items). Learning quality was generated by the quality of online learning activities (including e-learning / Learning Management System) (9 items), quality of instructors (6 items), quality of teaching methods (5 items), quality of collaborative work (4 items), and acquired competencies (6 items).

The Standardized Root Mean Square Residual (SRMR) and the Normed Fit Index (NFI) were used to measure the estimated model fit namely. For SRMR, a value less than 0.10 or of 0.08 is considered a good fit (Hu and Bentler, 1998). The closer the NFI to 1, the better the fit (Bentler & Bonett, 1980). The table 3 (see Appendix) shows that this study's model's SRMR was 0.04, while the NFI was 0.787 which is almost closed to 1, indicating a good model fit.

DISCUSSIONS AND CONCLUSION

In summary, the objectives of the study are to develop an instrument which measures the effectiveness of distance education as regards sustainability and to validate the developed instruments among the distance learner population. The mixed method research design was employed by undertaking a sequential exploratory instrument development process based on phases as suggested by Onwuegbuzie, Bustamante and Nelson (2010). The mixed method item development combined both qualitative and quantitative approaches in generating the measurement items as extended from the earlier conceptualization of the education for sustainable development effectiveness through e-learning in higher education. The analysis produced a reliable and valid measurement instrument which comprised a total of 61-items for measuring the effectiveness of distance education as regards sustainability. The evidence from the study also shows that distance education is deemed to be effective in delivering sustainable development agendas to the learners via courses offered at institutions of higher education particularly in Malaysia as supported by earlier studies (Azeiteiro et al., 2015; Harris and Martin, 2012; Figueiro and Raufflet, 2015; Goulimaris, 2015; Md Harizan, Hilmi, & Atan, 2015; 2016; 2017; Markova, Glazkova and Zaborova, 2017). Such enthusiasm must be backed by curriculum of the highest calibre, infrastructure, and support systems which will facilitate the students' learning process. This may in turn, enhance their motivation, expectations, and satisfaction towards distance education particularly in preparing them to be the agents of sustainability for the sake of national well-being. The outcome of the study has produced a measurement instrument that functions as a platform from which the extent of distance education's effectiveness in nurturing sustainability awareness and desired sustainability behaviors among learners can be assessed.

Theoretical implications comprise the contribution of the study in analyzing the effectiveness of distance education as regards sustainability from learners' perspectives. The study also has a methodological contribution as it has developed and validated the measurement scales for the mentioned constructs by expanding the earlier works of Azeiteiro et al. (2015). By incorporating inputs from distance learners, the mixed method approach enables the establishment of a newly developed measurement tools which is more

comprehensive and contextually appropriate ensuring the generalizability of items to a larger population of study. The findings of the study will enable university administrators to acknowledge the significance of distance education not only as a delivery mode which embraces sustainability itself, but also as a mode through which the sustainability curriculum can be delivered effectively to the learners. The findings may also produce an evaluation tool which will benefit academic assessors and auditors in determining the viability of courses delivered via distance education.

The outcome of having sustainable distance education programs will be the ability to develop the competencies necessary to live sustainable lifestyles and create sustainable livelihoods among learners. It also prepares the institutions to survive the fourth industrial revolution by embarking on the technological-based learning to help individuals, particularly those who have missed out on their tertiary education early in life, thus, supporting the country's aims in attaining the United Nation's Sustainable Development Goal 4, by promoting lifelong learning opportunities for all. The national agenda of building a knowledge-based society and a nation of lifelong learners while nurturing skills and values that promote sustainable economic progress and development may also be achieved. Distance education will also pave the nation towards the betterment of the world through the attainment of the United Nation's Sustainable Development Goal 13, having been acknowledged as an environmentally friendly learning option by taking urgent action to combat climate change and its impact.

This study has a limitation. It only employed the first six phases of instrument development and construct validation suggested by Onwuegbuzie, Bustamante and Nelson (2010) in establishing sufficient validity required for a quantitative instrument. Further evaluations of instrument development are strongly suggested to improve the rigor and construct validation of the revised instrument as well as to uncover other areas for further growth of the instrument. This can be done by validating the revised instruments via the qualitative analysis phase, performing mixed analysis (which comprise the qualitative-dominant crossover analyses followed by quantitative-dominant crossover analyses), and instrument development evaluation. Besides, the measurement instrument was developed based on the perspective of distance learners within the Malaysian educational setting. Future research may incorporate other countries' educational settings and learning cultures to increase its operational generalizability.

In conclusion, distance education has been deemed to be effective in transforming sustainability agenda via courses taught at higher educational institutions. However, studies pertaining specifically to the effectiveness in transforming sustainable development agenda through courses and programs via distance education mode have been lacking, particularly in achieving the intended outcome of the agenda among students. Moreover, the extent to which the notion can be defined is still unclear and vague which may be caused by the prevailing usage of existing heterogeneity of measurement scales. A comprehensive, yet contextually appropriate measure is required to provide a concrete operational definition for the above-mentioned notion. Using a mixed method approach, this study has proposed a validated 61-items measurement instrument for measuring the effectiveness of distance education as regards sustainability. The study contributes theoretically by transforming the existing descriptive definition of the construct into the empirically based operational definition to enhance the generalizability of future studies to a larger population. The study has strengthened the significance of distance education, not only as a delivery mode which embraces sustainability itself, but also as a mode through which the sustainability curriculum can be delivered effectively to the learners. The developed measures may also serve as an evaluation tool to facilitate academic assessors and auditors in determining the sustainability impact of courses/programs delivered via distance education. Future development may pursue further processes to improve the rigor and construct validation of the instrument besides uncovering other areas which are necessary to be incorporated in the scope of the measures. Future studies may also enhance the operational generalizability of the measures by incorporating other countries' educational settings and learning cultures.

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Table 1. Convergent validity of the measurement items

Latent constructs	Items	Factor loading	Number of items	Factor loading range	Reliability			
					Cronbach alpha	Composite reliability	Coefficient Rho	AVE
Expectations of distance education programmes	To enjoy improved work performance.	0.909	10	0.768 - 0.909	0.963	0.968	0.965	0.751
	To apply aspects of knowledge in life.	0.909						
	To benefit the individual and the community at large.	0.894						
	To be knowledgeable compared to graduates of other universities.	0.891						
	To be the catalyst/role model for the success of other family members.	0.889						
	To enhance career advancement.	0.86						
	To master the areas of knowledge learned.	0.857						
	To increase the socio-economic status of self / family.	0.862						
	To continue studies to a higher level.	0.817						
	To improve self-education.	0.768						
Learning Quality: Quality of online learning activities	Online learning activities facilitate the preparation of assignments / projects.	0.838	9	0.746 - 0.852	0.936	0.946	0.943	0.661
	The contents of online learning materials are systematic.	0.82						
	Online learning activities have enhanced my achievement in the courses I studied.	0.831						
	Online learning is interesting.	0.812						
	Online learning activities save time.	0.852						
	Online learning activities make it easy for me to interaction with the instructors.	0.791						
	Online learning activities have increased my comprehension of the course.	0.805						
	Online learning activities are flexible with my working hours.	0.821						
	Self-learning is ideal for part-time students.	0.746						

Latent constructs	Items	Factor loading	Number of items	Factor loading range	Reliability			
					Cronbach alpha	Composite reliability	Coefficient Rho	AVE
Learning Quality: Quality of instructors	The instructors are innovative.	0.915	6	0.751 - 0.915	0.938	0.952	0.941	0.768
	The instructors have in-depth experience in teaching the subject matter.	0.911						
	The instructors provide valuable feedback to students.	0.889						
	The instructors are knowledgeable in the fields of study taught.	0.898						
	The instructors are able to explain a particular topic in an interesting way.	0.883						
	It is easy for me to communicate with the members of the faculty	0.751						
Learning Quality: Quality of teaching materials	The learning materials provided are comprehensive.	0.866	5	0.804 - 0.878	0.906	0.929	0.925	0.725
	The learning materials provided are easy to understand.	0.878						
	The learning materials provided are compact.	0.804						
	The contents of the given learning materials are up to date.	0.836						
	The learning materials provided are useful.	0.87						
Learning Quality: Quality of collaborative work	Working in a group facilitated the preparation of assignment.	0.897	4	0.839 - 0.897	0.899	0.929	0.915	0.765
	Group assignments can still be carried out even when group members are in different locations.	0.886						
	Group assignments eased my workload.	0.839						
	Group assignments nurtured a spirit of teamwork.	0.876						
Learning Quality: Acquired competencies	Distance education makes me more independent.	0.887	6	0.748 - 0.887	0.903	0.926	0.91	0.676
	My confidence levels have increased since I enrolled in distance education.	0.826						
	I have become more responsible since I enrolled in a distance education course.	0.861						

Latent constructs	Items	Factor loading	Number of items	Factor loading range	Reliability			
					Cronbach alpha	Composite reliability	Coefficient Rho	AVE
	I am better at using computer related apps since I enrolled in distance education.	0.833						
	I experienced unique learning strategies through distance education.	0.768						
Assessment	My time management skills are improving since I enrolled in distance education.	0.748	3	0.832 - 0.918	0.869	0.918	0.908	0.79
	Course evaluation methods are appropriate (examples: continuous exams, quizzes, presentations, final year projects to name a few.)	0.918						
	The composition of the assessment items for the course work and final examination are appropriate.	0.913						
	The level of complexity of the course assessment is appropriate.	0.832						
Sustainability Acquired Competencies	Distance education has made me a more responsible citizen as regards social welfare.	0.871	7	0.751 - 0.871	0.911	0.929	0.914	0.654
	Distance education has made me more concerned about the environment.	0.813						
	Distance education has nurtured my awareness towards the goals of sustainability.	0.87						
	Since enrolling in the distance education programme, I have developed the keenness towards joining public programme related to sustainability.	0.789						
	Courses offered via distance education provide knowledge and integrated skills in the field of sustainability.	0.773						
	Distance education has made me more aware of and sensitive towards multicultural and religious communities.	0.786						
	Distance education has increased my professional competency in the topic of sustainable development.	0.751						
Satisfaction	Through distance education, I am able to achieve the same efficiency as obtained through full time learning.	0.789	4	0.789 - 0.869	0.858	0.903	0.872	0.701
	My study environment has provided a good learning experience.	0.83						
	The learning opportunities I have experienced have resulted in a good learning outcome.	0.857						
	I am satisfied with learning via distance education.	0.869						

Latent constructs	Items	Factor loading	Number of items	Factor loading range	Reliability			
					Cronbach alpha	Composite reliability	Coefficient Rho	AVE
Motivation	My friends encouraged me to pursue distance education.	0.739	7	0.739 - 0.854	0.911	0.929	0.915	0.653
	I would like to acquire a campus-like learning experience.	0.853						
	My family encouraged me to pursue distance education.	0.802						
	The reputation of the university where I am studying is outstanding in the field of sustainability.	0.854						
	The university milieu is attractive.	0.827						
	I would like to enjoy flexibility in my learning experience.	0.829						
	I would like to improve my skills via distance education.	0.743						
AVE: Average variance extracted								

Table 2. Fornell-Larcker criterion – Inter-construct correlations and squared AVE (in bold)

	AVE	Acquired competencies	Assessment	Expectations of distance education programmes	Motivation	Quality of collaborative work	Quality of instructors	Quality of online learning activities	Quality of teaching materials	Satisfaction	Sustainability Acquired Competencies
Acquired competencies	0.676	**0.822**									
Assessment	0.79	0.632	**0.889**								
Expectations of distance education programmes	0.751	0.655	0.464	**0.867**							
Motivation	0.653	0.672	0.508	0.792	**0.808**						
Quality of collaborative work	0.765	0.496	0.467	0.35	0.355	**0.875**					
Quality of instructors	0.768	0.698	0.542	0.601	0.59	0.487	**0.876**				
Quality of online learning activities	0.661	0.698	0.589	0.547	0.569	0.468	0.676	**0.813**			
Quality of teaching materials	0.725	0.641	0.512	0.514	0.548	0.478	0.612	0.621	**0.851**		
Satisfaction	0.701	0.657	0.651	0.433	0.525	0.464	0.59	0.593	0.539	**0.837**	
Sustainability Acquired Competencies	0.654	0.507	0.398	0.425	0.526	0.333	0.423	0.407	0.443	0.444	**0.809**

Table 3. Model fit summary

Criteria	Achieved values
SRMR	0.04
NFI	0.787

EDUCATIONAL CRISIS MANAGEMENT REQUIREMENTS AND ITS RELATION TO USING DISTANCE LEARNING APPROACH: A CROSS-SECTIONAL SURVEY SECONDARY STAGE SCHOOLS IN AL-BALQA'A GOVERNORATE DURING COVID-19 OUTBREAK FROM THE PERSPECTIVES OF TEACHERS

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ABSTRACT

The current study aimed at investigating the educational crisis management and its relation to using distance learning approach in secondary stage schools in Al-Balqaa governorate during COVID-`19 outbreak from the perspectives of teachers. A random study sample consisted of 10 male and female teachers from 30 different secondary stage schools was recruited in this study. A researcher developed questionnaire consisted of 54 items was adopted in this study. The questionnaire items were examining the educational crisis management requirements (36 items) and the distance learning (18items). Data processing was performed using the Statistical Package of Social Sciences (SPSS). The results indicated that the educational crisis management requirements ranged between (3.72-3.93) that are at high levels, where the planning domain was ranked first with the highest mean score of (3.93), followed by leadership skills with a mean score of (3.78) And in the third rank was the information domain with a mean score of (3.75), and in the fourth rank was the communication domain with a mean score of (3.73), finally in the last rank was the team work with a mean score of (3.72). the results related to distance learning indicated that the mean scores ranged between (3.56-3.64) at moderate levels, so that the rationale for distance learning method domain got the highest mean score (3.64), followed by the importance of distance learning method with a mean score of (3.62), and in the third and last rank was the obstacles of the distance learning method with a mean score of (3.58). The total mean score for the distance learning method was (3.59) and a standard deviation (.687), and with moderate level. Finally, the results showed the positive and significant role of the requirements of educational crisis management in its five domains (planning, information, communications, leadership skills, team work) in raising the level of use of the distance learning method in its three domains (the importance of distance learning, the rationale for distance learning, and the obstacles to distance learning) among male and female teachers of secondary schools in Al Balqaa governorate.

Keywords: Secondary stage, educational crisis management, distance learning, crisis management.

INTRODUCTION

Crises, whatever their severity, they awaken humans from their negligence and generate new business models that they would not have moved to if they continued to practice their lives with the usual routine. Today, in the midst of the horrific and mysterious talk about the fate of the world in light of the spread of the COVID-19 outbreak, there is no doubt that it represents a crisis like any crisis that shakes the world and Its results will be are distinctive innovations and methods, and it will change the mindsets that would not have passed from one stage to another without the necessity of the crisis. Among the precautionary measures to control the emerging COVID-19 outbreak and limit its spread, some countries of the world, including Jordan, announced the suspension of the study for a specified period, or indefinitely, and here began to

increase Talking about the distance e-learning as one of the crisis management practices, the extent of its effectiveness and the necessary preparations to implement it in a way that guarantees its efficiency, continuity and positive interaction of students with it.

The science of crisis management is considered one of the modern sciences whose importance has increased in the present day and which witnessed many overlapping variables, whether at the international, regional, national or local level, it is one of the future sciences, the science of adapting to changes, the science of kinetics and the forces of action in all human fields, Whether it is economic, social, cultural or other. Thus, it is an independent science in itself, which - at the same time - is connected to all other humanities and takes from and adds to it the new that it needs (Al-Khudairi, 2003).

The crisis is a clear indication of the existence of a defect in society, and it needs to be faced with scientific methods in order to restore society to its natural balance. The crisis is related to terms such as: according to Bandy and Cole and Coombs (2017):

Crisis: a critical period or unstable condition awaiting a critical change, which is pain or dysfunction.

Crisis Management: A special management process that will produce a strategic response, to crisis situations, through a group of pre-selected and well-trained managers, who use special skills and procedures to reduce losses.

The crisis includes several stages within it, which are, as Kamei (2019) pointed out:

The first stage: It is the stage of birth and emergence of the crisis, and it needs the expertise of the decision-maker to get to know the crisis and find solutions to it.

The second stage: the stage of expansion and growth of the crisis: a stage that begins when the decision-maker fails to face the crisis and includes the presence of internal and external nutrients that increase the strength of the crisis.

The third stage: the summit stage of the maturity of the crisis: This stage is rare, but it is increasingly underestimated and inexperienced, as the crisis becomes highly destructive.

The fourth stage: the decline and shrinkage stage: It is not a final stage, but within the procedures followed, the crisis begins with regression and contraction.

Fifth stage: the disappearance of the crisis: the crisis loses all manifestations of strength and momentum, begins to fade, and society begins to recover.

School administration needs a methodology for diagnosing crises, through knowledge, practice, and experience, the most important of which is the abundance of information and data for decision makers, as the diagnosis process is the real key to dealing with the crisis, and without it, dealing with crises becomes only an improvisational process (Hilali and Dabbous, 2011).

In view of the seriousness of the results that come out from crises of all kinds, educational institutions strive to utilize different strategies, emphasizing involvement with personnel in the educational facility or schools, and shared leadership to think, implement, follow-up and evaluate, and activate this via the formation of boards and work groups and organization of data about crises, besides to prepare and train employees on confronting them (Al-Zamili et al., 2007).

Dealing with crises requires the presence of a special type of managers, teachers and administrators who are adequately trained, to refine their skills, talents and natural readiness, as dealing with crises has a special character that derives its specificity from the effect of future momentary factors with their confrontational dimensions, as well as the possibilities of deteriorating conditions in a very strong way (Hamdouneh, 2006).

To confront crises, modern methods are varied and appropriate to the spirit of the times and are compatible with the nature of its variables such as the method of confronting the crisis in an organized scientific way (Al-Mahdi and Wahiba, 2002), and the method of the team work where everyone cooperates in facing the crisis, and each member has his tasks that he performs, and the method of containing the crisis is done through the restricting of the crisis and Freezing it at the stage it has reached, and working to absorb the pressures that generate it, and then losing its destructive power (Ahmed, 2002).

The educational crisis is an unusual turning point, which is the situations that the school is exposed to suddenly and events happen quickly and causes are intertwined with results. In addition, it results in a threat to property, values and possibly for lives, and also results in anxiety and stress for all members of the school, which leads the school administration to control on these situations and rational decision-making (Abu Khalil, 2001).

The educational crisis is defined as a critical period in which various events are intertwined, which creates a state of imbalance among decision makers, causing an imbalance in thinking as a result of the accumulated pressures, resulting in a misuse of available alternatives and the failure to invest powers and capabilities, which leads to undesirable outcomes in the educational institution (Hamdouna, 2006)

While educational crisis management is defined as the unceasing administrative processes that are concerned with predicting possible crises, keeping an eye on both internally or externally sourced variables creating the crisis and exploiting the accessible resources and capabilities to mitigate or deal with the crisis at the greatest degree of effectiveness and professionalism, in a manner that achieves the least damage to the educational institution, the environment, and workers, while ensuring return To normalcy as soon as possible, and at the lowest possible cost, as well as studying the forces and factors behind the crisis to prevent it from happening again (Mustafa, 2005).

The educational crisis passes through several stages, which are the core of the educational crisis, which represents the focus of the educational crisis as its internal and external source. The stage of creating a climate or its availability, as the forces that create the educational crisis are working to create a favorable climate that encourages the growth, exacerbation, and intensification of the temporal pressure, the use of catalysts, the stage of overlooking the signs of the educational crisis forces, the stage of the prevalence of tensions and anxiety, the occurrence of the prospective factor, and the explosion of the educational crisis (Ghunaimah, 2014)

The approach to educational crisis management is based on a scientific method, requiring the leader of the educational crisis or the director of the educational institution to follow the administrative processes of planning for managing educational crises, organization in the management of educational crises, guidance in educational crises, follow-up of educational crises, the information system in educational crises, system Communication in educational crises, and the availability of leadership skills in managing educational crises (Elewah, 2004; Abu Khalil, 2001; Al-Taweel, 2006; Al-Omar, 2003; Hamdona, 2006).

The significance of crisis management emerges through the provision of the methodological capabilities for extrapolation and prediction of the real and possible threats source, and optimize the available resources and skills to minimize the consequences of the crisis, in addition to provide practical skills and substantial abilities in preparing and confronting, and working to go back to the normal situation via a group of recovery actions and procedural activities (Al-Sheikh, 2008).

The Jordanian Ministry of Education had previously introduced computers and the Internet and used them in Jordanian schools as one of the necessities to keep abreast of developments and innovations, and to create an interactive teaching-learning environment, containing curricula in addition to many other tasks (Salem, 2007). It began to establish an e-learning system in cooperation with the Integrated Technology Group Company; to be the first step to take advantage of the Internet in the educational process, so that this project serves more than 3,200 schools, including more than one million six hundred thousand students from all levels of education (Integrated Technology Group, 2006).

The term distance learning has generally achieved wide popularity; especially since the beginning of the late sixties of the twentieth century, when UNESCO began to take interest in adopting new formulas in the field of adult education and continuous education, and the names of distance learning are multiple, so we find that its multiple names as Distance Learning, and in other cases Distance Teaching, and Distance Education in other areas (Shery, 2004).

Distance education is one of the manifestations of educational development and renewal, whose features began to take shape from the end of the sixties, and this pattern of school education imposed its presence in the educational circles as one of the effective solutions capable of providing more educational opportunities for large sectors of individuals who could not - for one reason or another. - benefit from these opportunities

through traditional universities, and this has been demonstrated by UNESCO studies on distance education as one of the most developed fields in the recent period, as a result of the rapid development of information and communications technology and its implications in the field of education, as well as in the field of design and delivery of education systems through the Internet, in addition to the increasing social demand for school education in response to the demands of development plans (Al-Sunbul, 2001).

In general, the spread of distance learning is due to three basic factors represented in the increased demand for this type of education, the need to reduce the economic costs of education, as it does not require a large number of employees and needs less educational equipment than traditional school education, and the invasion of modern media and communication technology in various areas of life Including education, through which many social strata could be reached that would not have been able to study in the familiar traditional style (Tony, 1991).

Distance learning is defined as an attempt to deliver an educational service to the individual where he resides or works, and it is specifically directed to groups that are willing and able to learn (Ismail, 2003), while the United States Distance Learning Association (USDLA (2004) defines it as the process of acquiring knowledge and Skills through a medium to transfer education and information, including all types of technology and different forms of learning for distance learning.

Distance education is a method of self-education, which is an advanced education compared to the traditional or school education - led to the strengthening of the open education system, and it is considered a development of the correspondence learning system, and an effective method in providing learning opportunities and enriching experiences for workers who cannot stop work and devote to learning, who were denied from formal education (Al-Kloob, 1993).

The distance learning system is considered a systematic and organized educational system, in which the educational process is accomplished without an actual meeting between the teacher and the learner, that is, the educational body (university, school, teacher) accredits the learner (within) a specific curriculum and special conditions (and gives him a certificate if he fulfills their requirements). As for why we said that it is a formal education, because the learner keeps in constant contact with the educational institution through its study / educational centers, and is subject to continuous follow-up and evaluation by it (Hassaneen, 2004).

Sherry (2001) emphasizes that distance learning is a set of teaching and educational strategies (or teaching methods) to overcome spatial or temporal separation between faculty members and learners, and also affirmed that all of them share the separation between the learner and the teacher, whether spatially, temporally or both together, controlling education is through the learner more than the teacher, and the communication between the student and the teacher via printed materials or other forms of technology.

Simpson puts some types of abilities necessary for the learner to succeed as a distance-learning learner including intelligence, motivation, the ability to seek help, self-confidence, anxiety about tests, the ability to deal with work stress, the ability to do family responsibilities during the study, the ability to Provide a good academic environment, ability to classify study priorities according to importance, and the ability to accept constructive criticism (Al-Saadat, 2002).

Abdel Aziz (2008) mentioned a number of features that distinguish the method of distance education from other types, including: it provides learning at any time and in any place, helps students to rely on themselves; this encourages their independence, gives them the freedom and the boldness to express themselves compared to traditional education, and students can browse educational content and their curricula anywhere and anytime, and they can communicate with their teachers through multiple communication methods such as e-mail, and the student gets immediate feedback where the process of self-constructive and final evaluation is available, and learning resources vary through links with other educational sites.

Despite the importance of distance education, and the initial results that proved its success, this type of education, like other methods of education, faces some obstacles and challenges in its utilization. Al-Oraifi (2003) indicated that the low educational quality, the cost of development, the lack of national plan, the limited content in the market, and the absence of human interaction are of the most important barriers to distance learning.

As for the obstacles and challenges facing educational institutions in Jordan and limit the utilization of e-learning as viewed by Bani Doumi and Al-Shannaq (2006) and Khazaleh and Jawarneh (2007) are represented in the weakness of the effectiveness of teacher training programs in the field of information technology, and the lack of school students' acquisition of Basic information technology skills and competencies, technical problems that appear in computers and the Internet, the computer lab not being equipped with the necessary printers, headphones and printing paper, and the student does not have a computer at home.

The procedures for planning distance learning programs are represented by inclusiveness, cooperation, commitment, and continuity, as well as knowing the social values surrounding the learners, setting goals, means and methods of application, educational means, the teaching staff, and providing appropriate funding and facilities to assist the learning process, evaluation methods, and continuous access to feedback (Picciano, 2001).

Academic and non-academic support comes from providing advice and guidance, clarifying concepts and goals, following the progress of the learner, providing practical assistance to advance the learning process, assisting in social and employment activities, and providing educational support services to achieve feedback to those who are responsible of distance education, and this is achieved mainly through bilateral communication between the learner and the educational institution (Simpson, 2000).

Accordingly, distance learning has special benefits and importance for school learning, as it is necessary to identify the characteristics of the target audience, determine the goals of the programs, define teaching methods and appropriate educational methods, choose qualified teachers and administrators, and appropriate evaluation methods. So, this study sought to explore the perspectives of secondary stage school students in Al Balqa'a governorate regarding their ability to identify the requirements of educational crisis management during COVID-19 outbreak and its relation to utilizing distance-learning approach.

Previous Studies

Adams & Kritsonis (2006) conducted a study aimed at analyzing crises for secondary schools. The study targeted crisis management plans in schools that have experienced crisis situations in the past. The researchers used the descriptive approach, and administered a questionnaire to (23) schools in Houston. The most significant outcome of this study was providing schools with Extensive roles in crisis management, planning more effectively when schools are in crisis, and assessing school level through preparedness stage.

Ryan (2007) study aimed to measure the impact of social networks on achievement and cognitive perception towards cooperation at the middle school level, and used the quasi-experimental approach, over a random sample of 400 students, divided into four groups (50 per group), two experimental groups and two control groups. The study found that there were no differences in achievement between groups, with a statistically significant difference in cognitive perception towards cooperative work in favor of experimental group referred to the gender variable in favor of females, and there were no significant differences in use referred to the class variable.

The study of Al-Hersh, Mufleh, and Al-Dahoon (2010) aimed to explore the obstacles to using the distance learning system from the viewpoint of secondary school teachers in the district of Koura. The results indicated that the obstacles related to the teachers were ranked first, followed by the obstacles related to management, then the obstacles related to the infrastructure and the basic equipment, and the obstacles related to the students were in the last rank, whereas there were no differences referred to the effect of the training courses in all domains.

Hilali and Dabbous (2011) conducted a study aimed at identifying educational crises in public secondary schools in Palestine and how to manage them from the perspectives of principals. The qualitative approach was used by interviewing the sample (50) male and female principals in the governorates of northern Palestine, as they are suitable for this study. The study found that educational crises in public secondary schools in Palestine are divided into two parts, the first of which is general crises, which are the occupation crisis, the curriculum crisis, the teachers crisis, the students crisis, the relationship crisis with the local community,

the school building crisis, on the other hand, the second section is special crises, related to each principal separately, the principals of public secondary schools adopt traditional methods and situational leadership in their management of crises by trying to control the crisis as much as possible.

Ghunaima (2014) conducted a study aimed at identifying the requirements of educational crisis management (material, administrative, and human) in secondary schools in the city of Damascus, and the most important crises facing them, using the descriptive analytical approach. The study sample consisted of (55) male and female principals, and a questionnaire consisted of (70) items was developed. The questionnaire items were distributed on five domains: (planning domain, information domain, communication systems domain, leadership skills domain, team work domain). The study reached the great significance of the availability of educational crisis management requirements in secondary schools in the city of Damascus with high and close degrees.

Khubrani (2014) conducted a study aimed at identifying the methods of managing school crises in the stages of public education, and the obstacles to their use in the city of Makkah Al-Mukarramah from the point of view of school principals. The descriptive approach was used, the study sample consisted of (21) principals from secondary schools, and (38)) principals of middle schools, and (70) principals of primary schools. The study revealed that the most important methods of crisis management are the scientific followed by the team work method and that the most prominent obstacles facing the use of crisis management methods are: the large number of tasks assigned by the school principal and the routine nature related to it. In addition to the lack of a comprehensive database in the field of school crisis management.

Al-Sharhan (2014) conducted a study to shed light on the areas of open learning and distance learning in the Arab world, and to determine the extent of the need for it towards development and creativity. The study presented some experiences in the Arab countries and a review of the difficulties and challenges facing them, and the study presented a scientific model for building and developing it in the Arab world, a model for developing teaching skills, and a model for the comprehensive quality management of open and distance learning.

Al-Hajri (2016) conducted a study that addressed the attitudes of the faculty staff and students in the secondary education stage in the State of Kuwait towards their awareness of the importance of applying the e-learning method as a tool for developing education, the availability of the competencies of e-learning for them, and used the descriptive analytical approach. the sample consisted of (423) male and female school principals, and (463) male and female students, and the study concluded that there are positive attitudes for both the faculty members and students towards their awareness of the importance of applying the e-learning method as a tool for developing education, and that there is a positive correlation between the competencies of e-learning for each of the faculty members and students and their awareness of the method of e-learning as a tool for Education development.

Sabbah (2020) assessed the e-learning and information and communication technology in primary and secondary education in Palestine in the light of the initiatives that schools pursue in e-learning curricula. The results showed a shift in teachers and students' behavior, and active learning strategies made education more effective and enjoyable. The teachers indicated that they still need more training in the skills of the twenty-first century, and that educational policies should encourage the implementation and generalization of these skills at the national level and work to reform educational curricula and provide motivation, support and training for teachers.

Statement of Problem

Sometimes, the circumstances and crises that we face lead us to invest the available tools and enhance them to reach the desired goals. In light of the global attempts to limit the spread of the COVID-19 outbreak, for example, we find that specific countries, including Jordan, have taken many preventive measures in the face of the outbreak by closing schools and universities and places of gathering of students all over the country, and for the continuation of the educational process, it has been announced by educational institutions that they provide distance e-learning platforms as an effective tool for easy access to them from anywhere, which allows students to complete their studies via the Internet, as an opportunity to experience this new

feature, and invest it to raise the awareness of the exploitation of tools available across various e-learning platforms, and to enhance the skill of research and access to knowledge easily. In spite of the multiplicity and variability of crises and the characteristics of each of them with their distinctive features, they need material, administrative and human requirements to manage them in line with their nature, so the success of educational crisis management depends on them. All these crises are subjected to a scientific collaborative methodology in their management in order to avoid and reduce their negative complications.

As neither the students nor teachers imagined that distance education would become part of their diaries, which was not until recently common or preferred by many in the world, and therefore government and private schools have resorted to the technology of "distance education" through educational sites on the Internet and Social media applications, as a necessary step taken by the Ministry of Education to continue the march despite the current circumstances. The idea of distance learning is based on several methods, including explaining lessons via video conversation between the teacher and students at certain time points, and through voice communication technology only, or by communicating lessons to students through social media applications such as "WhatsApp" in pdf or word files.

The educational crisis appears when there is an inconsistency between the educational crisis and the external environment, at a time when the local community is keeping pace with the technical and technological changes and developments and the era of knowledge and communications and in various fields of life, we find that the educational system stands helpless at times or may not be fully prepared In order to face the crises striking the country, which is represented in our study by the COVID-19 outbreak, which causes crises that hinder the progress of the educational process.

The issue of crisis management in educational institutions has received great attention from researchers and authors in the western environment, and the many studies that addressed it. These studies stressed the necessity of the existence of a working team qualified to encounter, manage, and analyze the plans of the crises management and their interactions. A study conducted by Keung (2008) focused on the domains assisting the school principals in involving the school teachers in decision making process and dealing with crises, and Adams & Kritsonis (2006) study emphasized the analysis of crisis management plans within schools that have faced crises in the past, while Arab studies in crisis management are constantly increasing as Saqr (2009) study, Hamdouna (2006) and Al-Mousa, (2007) study, all of which aimed to uncover the crises facing school principals and ways to solve them, and to train principals on successful patterns of crisis management.

In spite of the efforts exerted by the Jordanian Ministry of Education to develop the educational process in the Kingdom's schools, and by virtue of the researcher's work in the educational field and his expertise in many issues related to the educational field, especially during this difficult period that the countries of the world, especially Jordan, are going through in encountering COVID-19 outbreak and its effects in the educational field In particular, this study came to explore their perspectives regarding the requirements of educational crisis management and its role in raising the level of use of the e-learning method remotely, the problems faced by high schools in such circumstances and the extent of their ability to manage them, as the researcher believes that there are difficulties and obstacles facing the process of crisis management Including, but not limited to, the low level of awareness among the principals and elements of the educational process of the significance of crisis management within the educational institution, the lack of their skills in crisis management, or the absence of crisis management plans, methods and mechanisms necessary to deal with educational crises, and to address important issues that are summarized by the following study questions:

1. What are the requirements of educational crisis management and its association to adopting distance learning method at secondary schools in Al Balqa'a governorate from the teachers' point of view?
2. What is the level of applying the distance learning method by the secondary schools in Al Balqa governorate during the COVID-19 outbreak from the teachers' point of view?
3. Is there a correlation between the requirements of educational crisis management and the method of distance learning during the COVID-19 outbreak from the teachers' point of view?

Research Significance

The importance of the study is to shed light on the concept of educational crisis management during COVID-19 outbreak and explain its role in raising the level of distance learning for public and private high schools from the teachers point of view, because of their importance and specificity in the field of educational management, and raising their levels and strengthening them, and giving them the skills and methods that develop these aspects, and therefore the study acquires its importance from two aspects:

First: Theoretical significance

The importance of the subject of the study and the variables of the study given the distinction of this type of studies in terms of scarcity in dealing with the study variables combined, the fact that the results of the current study are reflected in an important category, which are high school students, and contribute to increasing the awareness of school leaders and secondary school teachers of the importance of planning to manage the crises of our time as a science that has special origins and rules in the field of education and specifically in our schools, and its importance is gained in that the educational system if it does not break into the difficulties and crises that society encounters or approaches study and application, then this leads to serious negatives, and opens the way for researchers studying future studies in this field are dependent on the results of the current study and the recommendations it will provide.

Second: The practical significance

Providing the Arab library with this diverse scientific knowledge, and applied models; So that specialists and researchers can refer to and employ them in educational preparation programs in the Arab world, and contribute to enriching one of the important fields in the field of educational and administrative studies, namely, the management of educational crises and distance learning, and the principles of educational crisis management and the method of distance learning contribute to providing methodological and procedural frameworks that help In setting training programs for high school leaders in various educational regions, and to draw the attention of officials and policy makers in the Jordanian Ministry of Education to the importance of disclosure and direct their administrative practices in this context.

Research Aims

Clarifying the concept of both educational crisis management and distance learning, and clarify the requirements of educational crisis management during COVID-19 outbreak in secondary schools in Al Balqa'a governorate, and determine the level of secondary schools' application of the method of distance learning during COVID-19 outbreak as a method for managing educational crises, and determine the relationship between the educational crisis management requirements and the distance learning method among the participants in the study sample.

Conceptual and Operational Definitions

Educational crisis management: a state of imbalance and turmoil leading to a disruption in the daily educational system, hinders the attention of its employees from performing their work, and threatens its continuity in the ability to achieve educational goals and requires immediate measures to prevent their exacerbation, and works to return matters to their normal position (Ghunaima, 2014). procedurally defined: it is the degree to which the study sample gets through their response on the scale of educational crisis management, which includes (36) items distributed on the following domains: planning (7) items, information (7) items, communications (7) items, Leadership skills (8) items, and team work (7) items.

Distance learning: It is a teaching process that is related to the scientific content and its electronic submission to the learner via multimedia on computers and the information network, so that meaningful and active interaction with the course takes place at any place and time the learners chooses and at a speed that is commensurate with his capabilities, and it is an organizational administrative process related to employing a mix of educational media and Work teams on running a course management system (Zeiton, 2005). Procedurally, It is defined as the degree which the study sample participants obtain through their response to the distance learning scale that includes (18) items distributed over the following three domains: the

importance of using the distance learning method (5 items), and the justifications for using the method of distance education (8 items), and the obstacles to using the method of distance learning (5 items). This scale was developed by the researcher.

Research Limitations

The human, spatial and temporal study limits are represented by the following: secondary school teachers Al-Balqa Governorate, for the second semester of the academic year 2019/2020

The findings of the study are limited to the psychometric properties of the research tool, and the seriousness of the study sample in response to the study tools.

RESEARCH METHODOLOGY

The descriptive correlational approach was adopted in the current study. Correlational research seeks to discover if two variables are associated or related in some way. A variable is a characteristic that everyone has but different people have different values. So, for example everyone has an age but different people have different ages. If two variables are correlated, then that means knowing one allows to take an educated guess about what the other one is likely to be. In this study, the requirements of the educational crisis management and using distance learning were studied using the descriptive correlational approach.

Research Population and Sample

The study population consisted of all male and female secondary school teachers, either in public or private schools, in Al Balqa governorate, which numbered (30) schools distributed by districts (Al-Salt main district, the district of Deir Alla, the district of Fuheis and Mahes, Ain al-Basha district, the central region, the southern region, the district of Southern Shouneh).

As for the study sample, a stratified sample consisting of public and private secondary schools for males and females in Al-Balqa'a Governorate districts was selected equally, as two secondary schools were chosen from each sector (public, private) in each district, i.e. (10) schools, two private schools (secondary) , two public schools (secondary), so that, the number of public secondary schools (5), and private secondary schools (5), of which (5) schools for females and (5) schools for males, to represent the study sample from schools in the governorate districts as a prelude to choosing the study sample from The teachers (male and female). the number of secondary school teachers in the study sample schools, counted (112) male and female teachers, and the questionnaires were distributed to them electronically, where the teachers' e-mails were requested from Al-Balqa'a Education Directorate for, and the questionnaire was distributed electronically to the teachers' emails during the period 10-21 / 5/2020, as the number of questionnaires that were retrieved was (109) questionnaires that are valid for the analysis process, i.e. (97%) of the original sample by (57) male teachers, (52) female teachers.

Research Instrument

With reference to many of the literature and previous studies related to the topic of the study as well as some tests for measuring educational crisis management and tests for measuring distance learning, a scale was developed based on the study of Ghunaima (2014) and Khubrani (2014) to measure the management of educational crises, and the study of both Al-Hajri (2016) and Sabbah (2020) Al-Harsh, Mufleh, Al-Dahoon (2010) and Al-Saadat (2002) to measure the level of application of distance learning method for secondary school teachers from their point of view. In its primary version, the scale consisted of 54 items distributed over two domains, as follows: the first is the domain of educational crises managements that included 36 items distributed on four domains, and the second: distance learning domain that included (18 items distributed over three domains. It was taken into consideration that the items should be as appropriate as possible and comprehensive to what is included in the concepts of the study, and it is a type of self-report answered by teachers in the light of the five-point scale: Always (5), often (4), sometimes (3), rarely (2) never

(1), knowing that all items will be positively formulated, and the following equation will be used to extract the range for each of the three levels: (upper category – lower category) / ,, i.e. (5-1) Divided by (3) equals (1.33), therefore: (1- 2.33) is a low level, (2.34-3.67) is a moderate level, and (3.68-5) is a high level.

Validity of the Research Instruments

- Content validity: The tool was presented to (5) specialists in the field of education and psychology, and their opinions were taken on the appropriateness of the domains and items, the integrity of its language, and based on their observations and their observations, the scale items were modified, or deleted.
- The validity of the internal consistency: items' correlation coefficients were extracted from the overall scale and in the domains to which they belong to extract the significance of the validity of the internal consistency of the scale through a pilot sample from outside the study sample (n=25) male and female teachers to identify whether the scale is valid and appropriate to achieve the purposes of the current study. The correlation coefficients for the domains of educational crisis management with the tool as a whole ranged between (0.372-0.801), and with the domain between (0.367-0.820), In addition, the correlation coefficients for the domains of distance learning ranged between (.695-.331) with the tool as a whole, and with the domain between (.723 - .395). Table (1) and (2) show that:

Table 1. Correlation coefficients between items, their domains and the total educational crises management scale score

Item #	Correlation to the scale	Correlation to the domain	Item #	Correlation to the scale	Correlation to the domain	Item #	Correlation to the scale	Correlation to the domain
1	.760**	.502**	13	.420**	.513**	25	.354*	.820**
2	.542**	.420*	14	.530**	.530**	26	.734*	.621**
3	.382*	.368*	15	.513**	.513**	27	.372*	.441*
4	.510**	.367*	16	.442*	.672**	28	.418*	.384*
5	.442*	.672**	17	.640**	.597**	28	.620**	.593**
6	.703**	.395*	18	.411*	.603**	30	.526**	.419*
7	.444**	.555**	19	.667**	.532**	31	.410*	.524**
8	.510**	.367*	20	.620**	.593**	32	.447**	.472**
9	.442*	.672**	21	.526**	.419*	33	.424*	.723**
10	.703**	.395*	22	.410*	.524**	34	.809**	.801**
11	.444**	.555**	23	.380*	.534**	35	.540**	.375*
12	.420**	.513**	24	.533**	.730**	36	.382*	.439**

**statistically significant at significance level (0.05) ** statistically significant at significance level (0.01)*

Table 2. Correlation coefficients between the items, their domains, and the total score of the distance learning scale

Item #	Correlation to the scale	Correlation to the domain	Item #	Correlation to the scale	Correlation to the domain	Item #	Correlation to the scale	Correlation to the domain
1	.380*	.534**	7	.419*	.593**	13	.382*	.439**
2	.533**	.730**	8	.384*	.471**	14	.510**	.521**
3	.521**	.612**	9	. 419*	.432*	15	.442*	.630**
4	.630**	.530**	10	.423*	.621**	16	.424*	.723**
5	.526**	.419*	11	.447**	.472**	17	.695**	.395*
6	.352*	.621**	12	.424*	.723**	18	.331*	.555**

**statistically significant at significance level (0.05) ** statistically significant at significance level (0.01)*

It is clear from table (1) and table (2) that the correlation coefficients of the scale items =, their domains and the total scale score were all significant at significance level (⊠=0.05) and (⊠=0.01). Therefore, no items were deleted.

Reliability of the Research Instruments

To ensure the reliability of the study scales, the reliability coefficient was calculated using the internal consistency according Cronbach's Alpha equation over a sample consisted of 15 male and female teachers that were excluded from the study sample.

The internal consistency coefficient for the domains of the educational crises management scale using Cronbach's Alpha was (0.84), where it was (0.82) using test-retest method. For the distance learning scale, the internal consistency coefficient for the scale domains using the Cronbach's Alpha was (0.86), where it was (0.84) using test-retest method (results are shown in table 3). These coefficients are acceptable for the purposes of the study and supporting the use of the scale in the current study.

Table 3. Reliability coefficients of the study scales using Cronbach's Alpha and test-retest method

Measurement domain	Domain	Test-retest reliability	Cronbach's Alpha reliability
Educational crisis management	Planning	0.84	0.86
	Data	0.80	0.81
	Communication	0.83	0.85
	Leadership skills	0.81	0.84
	Team work	0.82	0.84
	Total	0.82	0.84
Distance learning	Significance of distance learning	0.80	0.83
	Rationale of distance learning	0.83	0.86
	Barriers of distance learning	0.81	0.84
	Total	0.84	0.86

RESULTS AND DISCUSSION

Question one: What are the requirements of the educational crises management and its association to using distance learning method in the secondary stage schools in Al-Balqa'a governorate from the teachers' perspectives?

To answer the first research question, means and standard deviations for the responses on the educational crises requirements domains were calculated. Table (4) shows that.

Table 4. means and standard deviations for the educational crises requirements domains

#	Rank	Domain	M	SD	Level
	1	Planning	3.93	.582	High
	3	Data	3.75	.630	High
	4	Communication	3.73	.648	High
	2	Leadership skills	3.78	.614	High
	5	Team work	3.72	.657	High
Total (educational crisis management requirements)			3.76	.636	High

Table (4) shows that the mean scores for the domains of the educational crisis management requirements ranged between (3.72-3.93) that are at high levels, where the planning domain was ranked first with the highest mean score of (3.93), followed by leadership skills with a mean score of (3.78) And in the third rank was the information domain with a mean score of (3.75), and in the fourth rank was the communication domain with a mean score of (3.73), finally in the last rank was the team work with a mean score of (3.72). The mean score for the educational crisis management requirements scale as a whole was (3.76) with a high level and standard deviation (.636). The reason for this result is due to the fact that the availability of equipment alone is not sufficient to manage distance learning. Therefore, it is necessary to pre-plan to ensure the availability of administrative and technical equipment for work, and then provide information related to the equipment, the qualifications of the staff, the availability of electronic content, and then provide communication and leadership skills able to manage this project in light of the current outbreak, through a qualified and trained team to work from several separate places to ensure the proper progress and quality of the work. In this context, Hilali and Dabbous (2011) emphasize that educational crisis management needs a methodology for diagnosing crises, through knowledge, practice, and experience. The most important of them, are: the abundance of information and data for the decision-makers, as the diagnosis process is the real key to dealing with the crisis, and without it, dealing with crises becomes an emotional improvisation process. Thus, distance learning as a method for managing educational crises must be based on proper planning and good management of work teams. This - in my opinion - is consistent with Al-Oraifi's (2003) view that the poor educational quality, the cost of development, the absence of the national plan, the limited content in the market, and the absence of human interaction are among the most important obstacles facing distance learning. This finding was consistent with the Adams & Kritsonis (2006) study that demonstrated the necessity of giving schools broad-based roles in crisis management, and Ghunaima's study (2014) that demonstrated the great importance of fulfilling educational crisis management requirements in secondary schools.

Second question: what is the level of applying distance learning by the secondary stage schools in Al-Balqa'a governorate during the COVID-19 outbreak from the teachers' perspectives?

To answer the second research question, means and standard deviations of the teachers' responses for the domains of the distance learning scale were calculated. Results are shown in table (5)

Table 5. means and standard deviations for the domains of the distance learning scale

#	Domain	M	Rank	SD	Level
	Significance of distance learning	3.62	2	.610	Medium
	Rationale of distance learning	3.64	1	.579	Medium
	Barriers of distance learning	3.58	3	.743	Medium
Total (Distance learning)		3.59		.687	Medium

Table (5) shows that the mean scores ranged between (3.56-3.64) at moderate levels, so that the rationale for distance learning method domain got the highest mean score (3.64), followed by the importance of distance learning method with a mean score of (3.62), and in the third and last rank was the obstacles of the distance learning method with a mean score of (3.58). The total mean score for the distance learning method was (3.59) and a standard deviation (.687), and with moderate level. This result is logical; there are many educational, health and preventive justifications that Teachers consider it when justifying the application of distance learning as one of the pedagogical methods for facing and managing the current crisis; Distance learning here is the best option for the ministry to protect the students and teachers, and it is an educational pattern that provides effective solutions capable of sustaining and diversifying education, and applying effective evaluation, to ensure that students do not stop their studies, and the teachers' performance of their duty, especially if proper planning is practiced to reduce the obstacles that may hinder the application of distance learning and ensure its success to face the current crisis.

The importance of distance learning and its rationale - especially during the crisis - can be illustrated by what UNESCO studies on distance education have shown as one of the most developed fields in the recent period, as a result of the accelerated development of information and communications technology and its implications in the field of education, as well as in the design and provision of Educational systems through the Internet, in addition to the increasing social demand for school education in response to the demands of development plans (Al-Sunbul, 2001).

This result was in agreement with the study of Al-Sharhan (2014), which showed the importance of distance learning and the rationale for its application because of its great educational and social benefits, and Al-Hajri's study (2014) which showed the importance of applying the e-learning method as a tool for developing education

Third question: Is there is significant association between the requirements of the educational crises management and the distance learning method during the COVID-19 outbreak from the teachers' perspectives?

To answer this question, Pearson's correlation coefficient between the participants; responses on the requirements of the educational crises and the distance learning method, based on the responses of the study participants. Table (6) shows the results.

Table 6. Pearson's correlation coefficient for the association between the educational crises requirements and the distance learning

Correlation		Significance of distance learning	Rationale of distance learning	Barriers of distance learning	Total (Distance learning)
Planning	Correlation factor (R)	.348**	.387**	.305**	**345.
Data	Correlation factor (R)	.319**	.334**	.303**	.328**
Communication	Correlation factor (R)	.352**	.398**	.326**	.329*
Leadership skills	Correlation factor (R)	.361**	.323*	.392**	.301*
Team work	Correlation factor (R)	.327**	.346*	.331**	.315*
Total (Educational crisis management requirements)	Correlation factor (R)	.329**	.322**	.339**	.344**

**statistically significant at significance level (0.05) ** statistically significant at significance level (0.01)*

Table (6) shows the role of the requirements of educational crisis management in its five domains (planning, information, communications, leadership skills, team work) in raising the level of use of the distance learning method in its three domains (the importance of distance learning, the rationale for distance learning, and the obstacles to distance learning) among male and female teachers of secondary schools in Al Balqa'a governorate. This result is considered logical, proper planning and availability of information and logistical and technical capabilities ensure the success of the distance learning process and enables the educational sector to face the educational crisis and manage it more effectively.

In addition to the planning, information, the availability of communication channels and the formation of qualified and trained work teams, and the presence of effective leaders increases the importance of distance learning, and makes it more attractive and effective. Therefore, there are logical justifications for its application, and that the availability of these requirements will enable the Jordanian educational system to get rid of all obstacles and the problems that hinder the application of distance learning and limit its effectiveness. Consequently, the success of distance learning is linked to the availability of educational requirements to manage the educational crisis and reduce the obstacles to application.

In this context, Al-Zameli and others (2007) indicated that due to the seriousness of the results of crises of all kinds, educational institutions are keen to use various strategies, emphasizing participation with workers in the institution or school, and collective leadership in thinking, implementation, and then follow-up and evaluation, in addition to activating that by forming committees and task forces, organizing crisis data and

preparing and training individuals to face them. Dealing with crises requires the presence of a special type of managers, teachers and administrators who are adequately trained, to refine their skills, talents and natural preparedness, as dealing with crises has a special character that derives its specificity from the impact of future momentary factors with their confrontational dimensions, as well as the possibilities of deteriorating conditions in a very strong way (Hamdouneh, 2006)

This result was consistent with the study of Al-Hersh, Mufleh and Al-Dahoon (2010), which indicated the need for proper planning and implementation of e-learning success, while recommending the necessity of qualifying and training work teams. In addition, this result id in line with Khubrani's (2014) study findings, which showed that the most important methods of crisis management are the scientific method in the first rank, then the style of the team work, and that the most important obstacles facing the use of crisis management methods are: the large number of tasks assigned to the school principal and the routine nature related to it, in addition to the lack of a Comprehensive database in the field of school crisis management, and therefore it is necessary to have proper planning to ensure the success of the process and reduce its obstacles.

RECOMMENDATIONS

1. For researchers, it is recommended to perform more extended studies investigating the availability of the crisis management requirements in the educational context, and linking this availability to using distance learning in the educational process. This type of research would give a better insight into the preparedness of the educational institutions for any expected crisis and evaluate the institution preparedness for the emergency cases.
2. The current study recommends performing training workshops and courses to equip the educational practitioners with the skills required to employ the educational crisis management requirements in distance learning.
3. The necessity of enhancing the awareness of school principals and teachers of the importance of educational crisis management and its advance planning and their role in resolving crises and overcoming them in the school environment and post occurrence.
4. Conducting seminars and lectures by the Education Department for school principals about some expected crises and how to deal with them, and setting ways to avoid problems facing the educational process.
5. Develop a clear plan for the system of distance learning that includes: the definition of the system, its objectives, the means of its application and its application stages.
6. The need to pay attention to schools in terms of the necessary preparation and provide the necessary equipment and tools in light of technological developments to overcome crises and the ability to cope with them.
7. Qualifying and developing the multiple competencies that must be met by the parties of the educational system in a way that allows them to perform their various roles according to the methods of distance education.

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IMPACTS OF BLENDED LEARNING SYSTEMS ON AOU STUDENTS' SATISFACTION: AN INVESTIGATIONAL ANALYSIS OF KSA'S BRANCH

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ABSTRACT

Nowadays, blended learning represents a combination of both e-learning and Face-to-Face learning approaches, which has been considered as an emerging concept of modern education. It has been regarded as a prominent alternative learning approach compared to the conventional e-learning approach. The degree of satisfaction of students with blended learning played a crucial role in evaluating the effectiveness of adopted techniques for blended learning. Therefore, this study examines a number of key factors that affect students' satisfaction within a blended learning environment among undergraduate students involved in a private university in Saudi Arabia. In this paper, a comprehensive online questionnaire is used to assess the impact of blended learning based on seven factors of the blended learning environment. The respondents for this study are generally 221 young undergraduate students with an average age of 20-30 years old. The collected data is analysed by using SmartPLS 3. The results reveal that students are mostly satisfied with the blended learning factors, particularly, with the convergence of the Face-to-Face and Videoconferencing classes and the role of their instructors. Those students are moderately satisfied with the SIS, the online forums, and their course materials and modules, and least satisfied with the LMS and the E-library factors. Accordingly, the suggested recommendations pertaining to the future research are highlighted where this paper offers useful insights for future researchers based on different empirical evidences.

Keywords: Blended learning, online learning, students' satisfaction, learning environment.

INTRODUCTION

With the enormous improvements on specifications and technologies of computer systems, learning methods have changed in order to exploit the benefits pertaining to these developments. In earlier stages, the conventional face-to-face educational method is used to deliver the classes as a single approach that is available for supporting the educational process between face-to-face students and instructors so that this process could be available within the same location and time. Due to the current increase in the use of the Internet, modern computer systems, multimedia technologies, smart computer applications and learning methods take an advantage of these technologies by combining the face-to-face method and online learning together into a single and effective approach, known as the 'blended learning' approach. Such an approach is currently considered as a new educational paradigm that integrates online learning and conventional learning. In fact, the approach gained huge popularity by many universities, educators and academic institutes in order to support the learning process (Friesen, 2012; Ismail, 2018; Lalima & Dangwal., 2017), particularly, with the current situation due to the Coronavirus (COVID-19) pandemic.

The blended learning approach is devoted to improving the delivery of its methods by providing further effective learning environments (Giannousi et al., 2009; Kavitha & Jaisingh, 2019). Many advantages are delivered by this approach for all types of users (students, tutors and academic members). Such advantages include the location's flexibility for students to attend online classes, the cost reduction for educational institutes, online discussion groups between students and tutors, online updated materials that are available and accessible anytime and anywhere, e-library, online announcements for all students through different learning modules such as the Learning Management System (LMS), and online assessments (Eryilmaz, 2015; Khan et al., 2012; Shivam & Singh, 2015). Additionally, this approach provides multiple characteristics for all users where students and tutors have the opportunity to conduct several communications and interactive activities. These communications involve face-to-face and online tutorials, improving students' skills, experiencing through exploring and using up-to-date technologies within the academic domain, multicultural and multi-measurement methods when dealing with the learning process, and self-motivation and knowledgeable information for as many students as possible (Lalima & Dangwal, 2017).

Many researches focus on evaluating the effectiveness of blended learning by analysing a set of important factors in order to investigate the satisfaction level. In Ismail (2018) research, the main factors that affect learners' satisfaction are examined. Other studies investigate the effects of the blended learning instructions on the context of students' satisfaction (Ghaderizefreh & Hoover, 2018; Giannousi et al., 2009; Wu, Tennyson, & Hsia, 2010), including the effects on students' performance in the context of educational environments (Afacan, 2018), or the effects on providing a comparative analysis for understanding the level of students' satisfaction (Almarashdeh et al., 2018). Further, all related studies agree on the fact that students' satisfaction is the most crucial factor that directly affects the effectiveness and measures of several blended learning systems. Students' satisfaction is considered as an evaluation of several outcomes and practices in the context of students' participation (Roslina, Nur Shaminah, & Sian-Hoon, 2013). The contribution of this study examines the impact of blended learning systems on students' satisfaction (SS). A comprehensive questionnaire includes seven main factors, which comprise Instructors (INST), Modules (MOD), e-library (ELIB), Learning Management System (LMS), Student Information System (SIS), Online Discussion Forums (FORM), and Face-to-Face and Videoconferencing Classes (F2F). These factors are used to assess students' levels and the impact of blended learning systems on them. Moreover, the study is conducted at the Arab Open University (AOU), which contains six different branches among the Kingdom of Saudi Arabia. In fact, this university is represented as a leading university that adopts the bended learning system through its educational processes.

LITERATURE REVIEW

Several researchers have introduced extensive studies regarding the satisfaction of students in the blended learning approach. In fact, this approach is considered as a current and valuable educational approach that is based on merging between online learning and face-to-face conventional learning (Bahati et al., 2019; Kang & Seomun, 2018; Li et al., 2019). A number of experiments has currently been performed through several educational institutions for the aim of investigating and analysing the efficiency pertaining to many different

blended learning environments (Kavitha & Jaisingh, 2019). It is found to be proven from some studies that students gain valuable experiences and skills in dealing with various communicational technologies and information when adopting this approach into their studies (Kavitha & Jaisingh, 2019; Kavitha, Jayalakshmi, & Rassika, 2018). Furthermore, many factors have been currently affecting the satisfaction of students in a number of educational institutions in order to assist educational leaders in providing their decision makings for building an efficient strategy that can determine possible factors of students' satisfaction (Hutabarat, Hutabarat, & Hutabarat, 2020).

Due to the importance of the blended learning approach, many researchers have far been contributing to investigate the influences of such an approach through many different educational environments. For instance, the researcher by Eryilmaz (2015) measures the impact of blended learning on online learning and face-to-face learning domains. Eryilmaz (2015)'s study is applied on 110 students at the Atilim University in Istanbul, Turkey. The analytical results demonstrate that there is a significant difference based on a convergence between students' perspectives to blended learning and face-to-face online learning domains. Students' responses show that blended learning has been effectively adhered to their learning and experiences. Based on their answers, students expressed that they are able to learn more effectively within a blended learning environment. Additionally, the researchers Keskin & Yurdugul (2019) provide an analysis for different factors, which are individually taking place by influencing the mode of learners in achieving effective learning and teaching outcomes. In their research, optimal scaling analysis is used for data analysis purposes where two-dimensional centroid graphs are applied among various variable categories by demonstrating the correlations within them. As a result, it has been found that the preferences pertaining to their learning environment have proven to demonstrate correlation among them including the task value, e-learning motivation and creating self-efficacy. Similarly, Stefanic et al. (2020) conducted a study to provide investigational perceptions of students based on a cross-cultural entrepreneurial blended learning module. An investigation is also conducted for the situation of socioeconomic perception on the satisfaction of a number of participants for a particular module. Further, their research elaborates how learning is active and how current responsibilities are incurred in students and teachers through the perspective of cross-cultural setting within the eastern and western European countries' settings. At the end, it is found to be revealed from the findings that the technical side itself of a course delivery is insufficient without the observations, supports and expectations of students in the course-learning domain.

In Bouilheres et al. (2020)'s research, the valuable gains of the blended learning approach are investigated for assessing the experiences of how students are able to learn at a particular offshore campus related to an Australian university in the city of Ho Chi Minh, Vietnam. In fact, the main idea behind their research is based on its efficiency and practicality in developing collaboration and learning environments among students themselves, and between their course materials and teachers. The results indicate that these students provide different responses when achieving their learning skills through this approach and through acquiring its usefulness. In the same context, an effective involvement of students with their teachers and peers based on their high motivation in different learning methods is introduced by Collaco (2017). The findings show that this involvement comprises affective, interpersonal and behavioural elements, which should be taken into account when there is a demand for an authentic involvement within a learning environment. Moreover, the effectiveness of the blended learning approach is investigated by Kintu, Zhu, & Kagambe (2017), in order to analyse different features related to students toward this approach. In particular, these features comprise their original backgrounds, learning designs and learning outcomes. The research findings in Kintu et al. (2017) indicate that few backgrounds and learning designs of some students represent valuable predictors for their learning outcomes in the blended learning approach. Another similar study is conducted by Li et al. (2019) where they provide a meta-analysis research on the influences of the blended learning approach on the satisfaction, skills and knowledge of particular nursing students. The findings of Kintu et al. (2017) study demonstrate that an overall of eight studies achieve the meta-analysis's inclusion criteria, involving a number of 574 nursing students in comparison with the conventional teaching approach. Accordingly, they prove that this approach can positively enhance the knowledge, skills and satisfaction of these students. In fact, Sherman et al. (2012) argue that a few studies demonstrate that the blended learning approach develops the professional knowledge in nursing students. On the other hand, it is stated by Kaveevivitchai et al. (2009) that this approach can also develop the performance skills of nursing students rather than only developing their acquired knowledge.

To the best knowledge of the researchers Li et al. (2019), there are no existing methodical studies of the blended learning approach that have far been conducted for nursing students. Hence, the current paper investigates the impacts of different blended learning systems on the educational domain, particularly, on the students' satisfactions who are currently studying at the Arab Open University in Saudi Arabia. In the blended learning approach, further researches in the satisfaction of students is also introduced by Masrom, Alwi, & Asshidin (2019) where an investigational study on how learners are satisfied with the involvement of such an approach is provided. In their research, descriptive statistics are applied to analyse the satisfaction of learners along with their demographical information when proceeding towards the blended learning approach. It is found to be proven from their research that the satisfaction of a number of learners in this approach achieves effective benefits to them through their institutions. Nonetheless, few researchers like Zhai et al. (2017) and Masrom et al. (2019) mention the necessity of depending on the satisfaction of learners in this approach according to their acquired learning experiences. The importance behind this necessity refers to the fact that comprehending the 'grasp' of the satisfaction of learners in the blended learning approach plays a significant role in integrating the components of any given course. Consequently, creating a convenient and an appropriate environment for learners towards blended learning is possible and manageable (Masrom et al., 2019).

Previous researches that are devoted to enhancing learners' satisfaction mention that the blended learning approach can also increase the effectiveness of students' influences on their academic performances and on their ability to understand and learn (Anaraki, 2018). Additionally, it is assured by Botha (2018) that further assistance can be possibly provided to learners by their trainers for the aim of sustaining an efficient online platform based on the blended learning approach. An examinational study of the influence of the blended learning approach on the Community of Inquiry (CoI) pertaining to high school learners is introduced by Harrell & Wendt, (2019). A similar study is carried out by Roslina et al. (2013) where it is revealed that the satisfaction of students in the blended learning approach is based on a tertiary course held in a Malaysian university. In particular, their research aims at testing students' views in this approach based on proceeding further with this course in order to test the future paths related to the domain of this approach. Despite the fact that their findings achieve more negative responses than positive responses, Roslina et al. (2013) believe that the approach should be put for further effective implementation, which can bring many benefits to its learners. Based on the measurement of responses, a developed method, namely, the 'Moore Interaction' method is applied by Commissiong (2020) for creating a new tool that can measure learners' and faculty's self-reported responses. In fact, this method is selected and validated based on experts in the field when using different statistical approaches. It is found to be proven from the results of Commissiong (2020) 's study that the views of students' success are predicted in relation to students' satisfaction, self-regulation and engagement. Subsequently, these results cause an effective change on the social domain based on the way universities attempt to apply instructional and learning processes in many environments related to the online learning approach.

On the other hand, many other researchers focus on investigating different studies that are based on understanding the perceived learning approach along with the blended learning approach (Akyol & Garrison, 2011; Keramidas, 2012; Larson & Sung, 2009; Lim, Morris, & Kupritz, 2007). As indicated by Rovai & Baker (2005), it is supposed that the self-reported perceived learning of students can reveal their views according to the effectiveness of various educational modules. At later stages, the Cognitive, Affective, and Psychomotor (CAP) perceived learning scale is improved in Rovai & Baker (2005) research in order to provide effective measures, which are related to the perceived learning approach. According to Rovai et al., (2009), this scale provides the ability to investigate different aspects related to the educational effectiveness based on a variety of layouts, modules and teachers for comprehending the Community of Inquiry (CoI)'s effectiveness including blended and online learning domains. Additionally, it is pointed out by Askar, Altun, & Ilgaz (2008) that it is significant to test how perceived learning on students' ability to learn modules is achieved through many blended learning environments.

It is important in this paper to point out that the selected factors in the theoretical framework are derived from different studies in the literature (Almarashdeh et al., 2018; Keskin & Yurdugul, 2019; Roff, 2018; Stefanic et al., 2020). Additionally, these factors are derived from the current blended learning environment and systems conducted by the AOU in the KSA. In other words, these factors underpin the research of this paper in order to conduct the questionnaires and effectively deliver the investigational analysis and results. For example, it is indicated by Hutabarat et al. (2020) that the obtained results show that the

'academic courses' factor has positively achieved many respondents' satisfactions based on their undertaken courses. In the context of the research paper, this underpins the use of the 'module' factor for achieving students' satisfaction in the blended learning approach. Furthermore, it is contended by Askar et al. (2008) that the 'face-to-face environment' factor contributes to achieve learners' satisfaction. Similarly, the paper also underpins this factor by using the 'face-to-face videoconferencing' factor for investigating students' satisfaction in this approach. Therefore, the following hypothesis is proposed:

H1: There is a positive relationship between blended learning and students' satisfaction.

To provide a critical analysis of the literature, it is worth highlighting and summarising what the state-of-the-art research has investigated in the blended learning approach. In view of the foregoing researches, the approach is stimulating for many arising factors, which may put an impact on its effectiveness. In fact, it can be inferred from the aforementioned studies that most researchers aim to study the influence of blended learning on students' satisfaction and performances. However, many other researchers have conducted an extensive study on how perceived learning affect the level of students' understanding by either acquiring knowledge from an instructor-to-student interaction or course-to-student interaction. In conclusion, it can also be observed from the literature that further extensive investigations should be studied based on more factors other than just limited factors as students' satisfactions, effectiveness, experience, performances and some other few factors when acquiring learning from teaching within a blended learning environment.

THEORETICAL FRAMEWORK

The theoretical framework pertaining to this paper comprises three stages, which include the theoretical factors that are adopted from the Arab Open University (AOU) in the KSA, the primary research and the contribution to the body of knowledge. A number of factors are also derived from the literature (see Figure 1). Seven adopted factors create the initial stage related to this framework, which depend on the Arab Open University (AOU) of the KSA's branch. These factors comprise the Instructors, Modules, E-library, Learning Management System (LMS), Student Information System (SIS), Online Discussion Forum (on SIS), Face-to-Face and Videoconferencing Classes. In fact, they are assessed and analysed according to the primary research stage, which represents the second stage of the theoretical framework. In this stage, a comprehensive data analysis is explained in detail leading to obtaining the results of the derived analysis. The final stage introduces the contribution stage as can be seen from Figure 1 where it relates to the literature and obtained findings from the primary research stage. The contribution of this paper aims at testing the influence of the blended learning approach based on different systems on the satisfaction of students who are studying at this university.

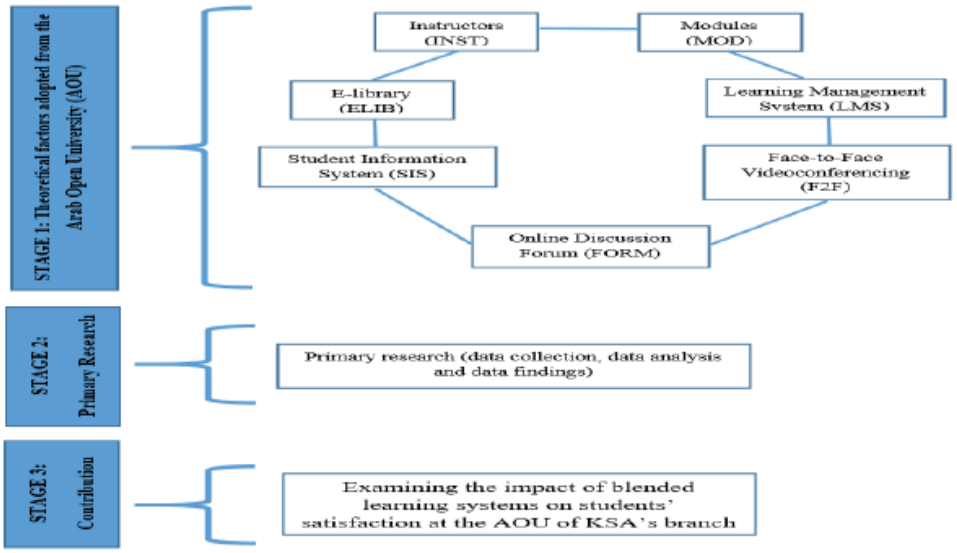

Figure 1. The produced theoretical framework.

THE FACTORS OF THE BENDED LEARNING APPROACH

In this section, seven factors of the blended learning approach are presented. The following subsections address and discuss the previously mentioned factors pertaining to the blended learning approach, and the overall students' satisfaction.

Instructors (INST)

Instructors are one of the factors that can be involved in achieving students' satisfaction. In particular, they are required to be available in order to reply to students' inquiries in an effective manner. Moreover, responses to students should not take longer periods than normally should be (Bi & Shi, 2019; Joel & Christina, 2018). Students can receive clear and adequate feedback on their works from their instructors. The interaction between instructors and students is carried out conveniently. Students have effectively learned the modules' contents from their efficient instructors. Emperically, it is found to be proven that the blended learning strategy can enhance and improve students' achievements and satisfactions with their learning (Ismail, 2018). Further, it is demonstrated by Eastman, Aviles, & Hanna (2017) that the perceived learning approach is positively related to the instructor-to-student interaction. These instructors have to understand how to use the environment, systems and tools of the blended learning approach. Thus, the following hypothesis is proposed:

H1a: There is a positive relationship between instructors' role and students' satisfaction.

Modules (MOD)

The modules in blended learning are required to be made available and accessible anytime and anywhere. This process can enable students to reach these modules anytime and anywhere without any difficulties. The materials and resources related to the modules should be sufficient and of quality (Hadullo, Omwenga, & Oboko, 2017). Moreover, Rockinson-Szapkiw et al. (2016) concluded that the perceived learning approach achieves a positive link on the course elements of students, leading to a positive link to the produced outcomes of their acquired learning. Rovai & Baker (2005) supposed that the self-reported perceived learning of students can reveal their views according to the effectiveness of various educational modules. Additionally, the assessments of the modules should cover all the learning outcomes related to these modules. Instructors should be available in modules' office and E-office hours in order to be able to reply to students' inquiries, and these modules' office and E-office hours should be sufficient and helpful. E-office hours are provided through the videoconference classes. The announcements and news of the modules should be effective, helpful and displayable to students in appropriate times. Grades are announced to students according to a scheduled timetabling, and hence, the following hypothesis is proposed:

H1b: There is a positive relationship between the courses materials, modules and students' Satisfaction.

E-Library (ELIB)

Students demand the access through to the E-library anytime and anywhere in order to obtain the benefits from it (Holley & Powell, 2004; Sherifi, 2015). This, in fact, leads to the necessity of an available E-library for students anytime and anywhere. The E-library should contain many resources in different areas that can assist students to gain the knowledge and information they need to accomplish their learning, assignments and improve their education. The resources of the E-library should be adequate, of quality and helpful to students. Furthermore, it should be effective and easily used. This enables students to utilise it in an effective manner. Technical staff members can assist in providing adequate and efficient supporting services of the E-library. To investigatestudents' satisfaction with e-services at Jerash University, Aljaraideh and Rabee (2018) conclud that students' satisfaction toward the university e-services, including E-library resources are found to be moderate. On the other hand, Kara, Tanui and Kalai (2016) conduct a study for assessing how Kenyan students are satisfied with public universities based on the quality of academic resources, which are offered to them. The results of their research demonstrate a positive relationship between students' satisfactions and teaching facilities, including e-library services. Consequently, the following hypothesis is proposed:

H1c: There is a positive relationship between the university's E-library and students' satisfaction.

Learning Management System (LMS)

The LMS is available to students at all times and it can be frequently accessed and used from any types of devices (Najmi, Jaafar, & Paiz, 2016; Umek et al., 2015). Instructors should upload all required materials, resources, announcements, and news pertaining to the modules that are made available through the LMS. This can assist students to obtain everything they need from the modules they are already registered in, and hence, the LMS should be effective and easily used by them. The supporting services of the LMS that are executed by the technical support members should be sufficiently and efficiently conducted (Islam, 2014). Moreover, information quality, service quality and the perceived ease of use acquire a significant effect on students' satisfactions (Ohliati & Abbas, 2019). In 2016, Kasim & Khalid concluded that students are satisfied with the available features on LMS if such features meet their needs and facilitate their usage by the students. Consequently, the following hypothesis is proposed:

H1d: There is a positive relationship between the university's Learning Management System (LMS) and students' satisfaction.

Student Information System (SIS)

The SIS is available to students anytime and anywhere where they can frequently access it to register for their modules, obtain their grades, prepare for their appealing applications, and raise complaints, etc. The SIS should be accessible regardless of time and place. The services that are included in the SIS should be adequate and useful for students (Gurkut & Nat, 2017). This usefulness can enable them to use SIS smoothly and effectively. Technical support members should present adequate and efficient supporting services in the SIS. Accordingly, the following hypothesis is proposed:

H1e: There is a positive relationship between the university's Student Information System (SIS) and students' satisfaction

Online Discussion Forums (FORM)

Students may frequently use online discussion forums that are made available through the LMS as this system is available and accessible by students at all times. Online discussion forums are efficient and can be smoothly used. Instructors and students can interact with each other by using online discussion forums for discussing the subjects of the prospective modules where all the discussed topics of the modules should be helpful for students (Alzahrani, 2017). Additionally, online discussion fourms can be considered as an open platform, which allows students to share their knowledge, experience, highlighted questions and shared problem-solving cases based on an open discussion between students and their instructors. Hence, this yields the students to enhance their critical thinking skills (Fu et al., 2017). From this point, the following hypothesis is proposed:

H1f: There is a positive relationship between the university's online discussion forums and students' satisfaction.

Face-to-Face and Videoconferencing Classes (F2F)

Instructors can deliver the tutorials into face-to-face meetings and through different videoconference classes. A videoconferencing system is available and accessible anytime and anywhere where using such a system should be effectively and easily used. The tutorials of face- to-face meetings and videoconference classes should be adequate and motivating to students in order to develop their learning skills in an efficient manner. The resources, software and equipment that are used by face-to-face meetings and videoconference classes should be adequate, effective and of quality. Technical support members should offer sufficient and efficient services for face-to-face meetings and videoconference classes at all times. In fact, robust and positive associations for achieving students' satisfaction of the F2F classes refer back to a research that is carried out by Tratnik, Urh, & Jereb (2019). Consequently, the results prove that the F2F classes' blended learning

approach leads to acquire further effective outcomes when students' information is communicated through various pedagogies, which allow them to proceed further along with their studies in an efficient manner (Roach & Lemasters, 2006). Similarly, Kintu et al. (2017) declared that an efficient relationship exists between students' satisfaction and F2F classes. This is based on recording the F2F classes' score of the average mean that manages students' satisfaction. Consequently, it is found to be proven that the respondents are satisfied with the variable, namely, 'F2F classes', and hence, the following hypothesis is proposed:

H1g: There is a positive relationship between the Face-to-Face and Videoconferencing Classes and students' satisfaction.

Students' Satisfaction

The overall students' satisfaction is achieved into different blended learning systems by obtaining the following requirements:

- The performance of instructors should be efficient and satisfying.
- The modules should be sufficient and of quality.
- The systems that are used in blended learning systems such as the LMS, E-Library, online discussion forums, SIS, and videoconferencing classes should have a satisfactory performance.
- Instructors need to deliver the followings in an efficient manner. These include face-to-face meetings, videoconference classes, and office and E-office hours.
- Adequate and quality blended learning environment should contribute in achieving students' satisfaction.

THE PROPOSED RESEARCH FREAMWORK

This research attempts to assess the impact of the seven blended learning factors that are explained previously in order to achieve undergraduates' satisfaction. Moreover, the research differentiates between each effect of a factor on students' satisfaction in order to shed the light on the ones that require an evaluation for attaining higher students' satisfaction. This satisfaction is based on the blended learning environment that is offered by the university. The suggested research framework is outlined in Figure 2.

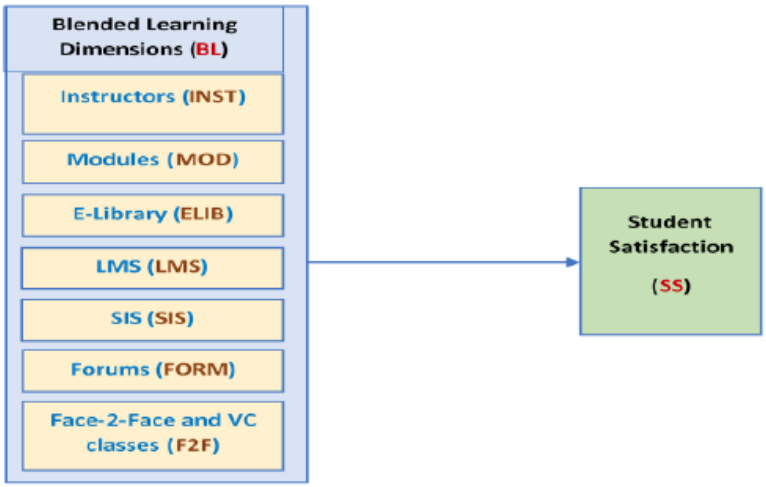

Figure 2. The research framework.

RESEARCH METHODOLOGY

In this section, the results of the data analysis are elaborated. First, the demographic factors of the respondents to the survey are given. After that, the methods and technologies that are used by the respondents are

presented. Third, appropriate data analytical techniques are described. Fourth, the obtained findings from the measurement model analysis are highlighted in detail. Finally, the findings from the structural model analysis are given, including the analysis of the hypothesis tests.

Research Design and Sample Template

This study is based on a cross-sectional survey of full-time undergraduate students that aims at examining the relationships between the use of the blended learning approach and students' satisfaction. To incorporate this approach, a mix of face-to-face teaching accompanied by technology into the classroom is used in the AOU of KSA's branch that applies such an approach that was opened back in 2003. The cross-sectional study design is adopted by conducting data collection at a single point of time (Sekaran & Bougie, 2016) that is suitable for testing the required hypotheses. The sample of 221 students that are used in the study are randomly drawn from the pool of undergraduate students who are registered at the AOU in spring semester 2019/2020.

Research Instrument

Selected respondents voluntarily complete two parts of a given online survey. The first section gathers the demographic and personal data, while the second consists of 45 items based on a 5-point Likert scale that are ranged from '1-Strongly disagree' to ' 5-Strongly agree' according to positive items, and from '1-Strongly agree' to '5-Strongly disagree' according to negative items. To ensure the inclusion of a comprehensive list of measures, several past relevant studies are reviewed to develop a self-report instrument. These measured items are adopted from various scholars that present different factors, which are central to students' satisfaction in the blended learning environments. After that, these items are adopted based on the AOU's blended learning applied strategies. To enhance the content's validity, expert members in the field who are comprised of four professors, one lecturer and five students are asked to review the involved questionnaires.

DATA ANALYSIS AND RESULTS

The SPSS (Statistical Package for the Social Sciences) (v.25) tool is used to insert students' responses and to test the normality and Common Method Variance (CMV) where biasness can be induced by the instrument rather than the respondents. Once there is no evidence of a common method variance, the Structured Equation Modelling using Partial Least Squares (PLS-SEM) through the Smart PLS tool is applied in this study in order to examine the relationship between the blended learning dimensions and UG students' satisfaction at the AOU. As suggested by Hair, Ringle, & Sarstedt (2012) and Hair, et al. (2016)Joseph F</author><author>Hult, G Tomas M</author><author>Ringle, Christian</author><author>Sarstedt, Marko</author></authors></contributors><titles><title>A primer on partial least squares structural equation modeling (PLS-SEM, the predictive measurement model is prepared based on a guideline provided by (Hair et al., 2016), while the aim of this study is to develop a predictive model by focusing on highlighting the variance of the dependent variable when accessing the model.

Descriptive Analysis

The analysis is discussed to establish a summary of the received data. A number of respondents (N), mean, standard deviation and a number of items, explain the relationship between blended learning and students' satisfaction. This section identifies the demographic profiles of the respondents who are currently studying at the AOU in KSA's branches. The questions that are provided to them are comprised of respondents' gender, age, college, level and corresponding branch.

The Demographic Profiles of Respondents

Table 1 illustrates the subject characteristics and background information, such as the gender, age, college, level, and branch that are collected from a sample of 221 undergraduate students in the university. Most

of the students who participated in the questionnaire are female students, reaching 68.8% (N=152 female students), and male students reaching 31.2% (N=69 male students). The respondents who are involved in this study are within the age group of 20 years old or less of 18.1% (N=40), 21-30 years old of 70.1% (N=155), 31-40 years old of 8.6% (N=19) and more than 40 years old of 3.2% (N=7). In terms of their colleges, the faculty of computer studies possess the highest respondents reaching 45.2% (N=100), followed by the faculty of business studies reaching 41.6% (N=92), the faculty of language studies reaching 11.8% (N=26) and the lowest percentage from the faculty of education studies reaching 1.4% (N=3). As for the respondents' levels, the majority of them are within Level 3, which reaches 36.2% (N=80) and the lowest percentage belongs to the intensive English courses, reaching 3.2% (N=7). Most of the respondents are based in Dammam's branch reaching 44.8% (N=99).

Table 1. The demographic profile

Demographic		Frequency	Percent %
Gender	Female	152	68.8
	Male	69	31.2
Age	20 years or less	40	18.1
	21 – 30 years	155	70.1
	31 – 40 years	19	8.6
	More than 40 years	7	3.2
College	Faculty of Business Studies	92	41.6
	Faculty of Computer Studies	100	45.2
	Faculty of Education Studies	3	1.4
	Faculty of Language Studies	26	11.8
Level	Expected to graduate	71	32.1
	Intensive English Courses	7	3.2
	Level 1	20	9.0
	Level 2	43	19.5
	Level3	80	36.2
Branch	Ahsa	5	2.3
	Dammam	99	44.8
	Hail	4	1.8
	Jeddah	46	20.8
	Madinah	8	3.6
	Riyadh	59	26.7

Normality

The normality test is a test that is used to measure the normal distribution of a dataset. The primary criterion of trials for assessing the normality is the Kolmogorov Smirnov and Shapiro-Wilk tests. With the large sample size (>40), the Kolmogorov-Smirnov test is used to evaluate the normality where the Shapiro-Wilk test is used for the sample size (<40). While this presents the study sample size of 14 (>40), the Kolmogorov-Smirnov test is used to determine the normality of data. To examine normalcy, a non-significant result ($p>.05$) indicates the normal distribution. In this regard, the parametric test is used for statistical analysis purposes. However, the significant values ($p<.05$) is still considered as a normal distribution where there is no high differences for the comparisons between the two mean values' differences (mean and 5% mean trimmed), and the value of the skewness and kurtosis is within the range ± 1. Table 2 indicates that the entire variables have no significant values ($p >0.05$). Although the significance value of all variables is not normally distributed, the differences of the two mean values compared do not differ, and the amount of skewness and kurtosis are within the range ± 1. For the ELIB, the two mean values reach 2.620 and 2.5944.

For the MOD, the two mean values reach 2.760 and 2.7444, and for the INST, the two mean values reach 2.885 and 2.8688. As for the LMS, the two mean values reach 2.489 and 2.4356. The two mean values for the FORM reach 2.773 and 2.7477, meanwhile, the two mean values reach 2.773 and 2.7471 for the F2F. Finally, the two mean values for the SS reach 2.752 and 2.7222. The whole variables have the same number of skewness and kurtosis within the range ± 1. In conclusion, all data variables are considered as normally distributed based on the criterion of normality.

Table 2. The Performed normality tests of variables based on the Kolmogorov-Smirnov test.

	The Kolmogorov-Smirnov Test						
	Statistic	**df**	**Sig.**	**Mean**	**5% Trimmed mean**	**Skewness**	**Kurtosis**
ELIB	0.106	221	0.000*	2.620	2.5944	0.164	0.326
MOD	0.096	221	0.000*	2.760	2.7444	0.164	0.326
INST	0.127	221	0.000*	2.885	2.8688	0.164	0.326
LMS	0.140	221	0.000*	2.489	2.4356	0.164	0.326
SIS	0.126	221	0.000*	2.686	2.6546	0.164	0.326
FORM	0.170	221	0.000*	2.773	2.7477	0.164	0.326
F2F	0.180	221	0.000*	2.773	2.7471	0.164	0.326
SS	0.134	221	0.000*	2.752	2.7222	0.164	0.326

The Comon Method Variance

The common method variance is applied by using the SPSS where Table 3 demonstrates that the difference reaches 32%, which can be seen that it could not affect the data. If the percentage exceeds 50%, it could be biased in managing the involved data.

Table 3. The common method variance.

Factor	**Initial Eigenvalues**			**Extraction Sums of Squared Loadings**		
	Total	**% of variance**	**Cumulative %**	**Total**	**% of variance**	**Cumulative %**
1	5.588	69.853	69.853	5.248	31.946	31.946
2	.535	6.694	76.546			
3	.507	6.341	82.887			
4	.392	4.894	87.781			
5	.378	4.720	92.501			
6	.243	3.037	95.538			
7	.182	2.275	97.812			
8	.175	2.188	100.000			

Assesment of the Measurement Model

Following the reflective measurement model, the convergent validity and discriminant validity are analysed as highlighted in the following subsections.

Convergent Validity

The convergent validity refers to the degree for which it constructs indicators' converge or shares some specific variances (Ramayah et al/N/., 2018) The factors that determine the convergent validity are comprised of, as suggested by (Hair et al., 2017), the factor loading, Average Extracted Variance (AVE) and Composite Reliability (CR). Bagozzi & Yi (1988)O declared that the number should be 0.5 or higher. Table 4 presents the indicator loadings, AVE and CR. No items are omitted here since all loadings exceed the 0.5 threshold

(Hair et al., 2017). Moreover, the entire definitions are at or above the CR and AVE minimum cut-off threshold values, and restrict the CRs to be greater than 0.5 and all AVEs to be greater than 0.5 (Hair et al., 2017). It can be inferred from this that the constructs in the analysis meet the criteria of reliability and convergent validity.

Table 4. Convergent Validity.

	Loadings	Composite Reliability	Average Variance Extracted (AVE)
ELIB	1.000	0.953	0.745
F2F	1.000	0.949	0.727
FORM	1.000	0.941	0.763
INST	1.000	0.944	0.706
LMS	1.000	0.956	0.757
MOD	1.000	0.923	0.632
SIS	1.000	0.944	0.708
SS	1.000	0.946	0.685

Discriminant Validity

The discriminant validity is measured based on a study that is performed by Hair et al. (2017). It refers to the degree for which the items vary across different structures or steps. In Fornell & Larcker (1981) research, a guideline claiming approach in which all measures should be highly charged on their own is proposed where the average difference that is shared between the construct should be higher than the difference shared between the constructs. The model fulfils the rule such that constructing the AVE square root is found higher than the items and the correlations with other constructs (see Table 5).

Table 5. Discriminant Validity.

	ELIB	F2F	FORM	INST	LMS	MOD	SIS	SS
ELIB	**0.849**							
F2F	0.633	**0.853**						
FORM	0.559	0.684	**0.886**					
INST	0.580	0.612	0.596	**0.871**				
LMS	0.625	0.669	0.534	0.595	**0.870**			
MOD	0.723	0.653	0.617	0.695	0.720	**0.841**		
SIS	0.598	0.643	0.610	0.584	0.813	0.688	**0.833**	
SS	0.563	0.756	0.653	0.649	0.622	0.656	0.644	**0.828**

Assessment of the Structural Model (Inner Model)

The structural model is examined after determining the suitability of the measurement model (Harun, et al., 2015) and after testing the hypothesis. The structural model indicates that there is a causal connection among the research model's latent constructs. The structural model is firstly evaluated by defining the model's predictive capacity, and secondly, possible correlations are tested among the latent constructs that are suggested in the research model (Hair et al., 2016). The discriminant validity of cross-loadings is highlighted in Table 6. The discriminant validity is further checked with the cross-loading criterion. Based on this criterion, the external loadings of an indicator pertaining to its associated constructs should be higher than the other remaining constructs in order to ensure that the latent variable can explain the variance of its own indicators more efficiently than the variance of the other variables (Hair et al., 2016). Consequently, the results depicted in Table 6 demonstrate that the discriminant validity is acceptable for the entire constructs.

Table 6. The results of discriminant validity: cross-loadings.

	ELIB	F2F	FORM	INST	LMS	MOD	SIS	SS
ELIB1	**0.859**	0.581	0.492	0.529	0.604	0.675	0.498	0.501
ELIB2	**0.874**	0.535	0.477	0.445	0.548	0.592	0.481	0.446
ELIB3	**0.868**	0.498	0.515	0.462	0.520	0.643	0.523	0.460
ELIB4	**0.848**	0.539	0.433	0.457	0.531	0.571	0.550	0.495
ELIB5	**0.793**	0.528	0.455	0.562	0.442	0.583	0.478	0.479
F2F1	0.581	**0.822**	0.657	0.608	0.552	0.587	0.576	0.647
F2F2	0.526	**0.892**	0.630	0.563	0.560	0.553	0.536	0.660
F2F3	0.572	**0.878**	0.648	0.537	0.582	0.599	0.583	0.651
F2F4	0.544	**0.867**	0.521	0.489	0.568	0.612	0.514	0.632
F2F5	0.495	**0.863**	0.550	0.474	0.598	0.531	0.551	0.657
F2F6	0.518	**0.846**	0.565	0.499	0.559	0.515	0.531	0.672
F2F7	0.549	**0.796**	0.505	0.480	0.572	0.498	0.547	0.583
FORM1	0.451	0.597	**0.924**	0.506	0.420	0.532	0.549	0.611
FORM2	0.536	0.609	**0.898**	0.542	0.502	0.612	0.515	0.566
FORM3	0.510	0.586	**0.879**	0.595	0.460	0.533	0.555	0.604
FORM4	0.486	0.639	**0.841**	0.465	0.520	0.510	0.543	0.527
INST1	0.533	0.558	0.547	**0.835**	0.552	0.636	0.551	0.525
INST2	0.537	0.549	0.511	**0.835**	0.539	0.616	0.552	0.570
INST3	0.541	0.525	0.566	**0.905**	0.524	0.630	0.529	0.575
INST4	0.475	0.548	0.493	**0.907**	0.545	0.599	0.526	0.594
INST5	0.444	0.486	0.483	**0.869**	0.428	0.547	0.385	0.558
LMS1	0.533	0.547	0.436	0.568	**0.844**	0.634	0.709	0.533
LMS2	0.499	0.576	0.437	0.527	**0.882**	0.647	0.713	0.550
LMS3	0.583	0.632	0.550	0.545	**0.896**	0.682	0.709	0.616
LMS4	0.518	0.576	0.445	0.482	**0.885**	0.603	0.723	0.515
LMS5	0.527	0.568	0.447	0.476	**0.905**	0.607	0.715	0.508
LMS6	0.540	0.625	0.450	0.501	**0.890**	0.604	0.720	0.556
LMS7	0.602	0.536	0.476	0.517	**0.782**	0.600	0.662	0.494
MOD1	0.602	0.540	0.517	0.570	0.588	**0.831**	0.568	0.540
MOD2	0.622	0.560	0.567	0.588	0.642	**0.890**	0.569	0.575
MOD3	0.609	0.471	0.423	0.619	0.610	**0.833**	0.604	0.476
MOD4_	0.638	0.600	0.528	0.599	0.658	**0.868**	0.600	0.592
MOD5	0.567	0.557	0.540	0.548	0.525	**0.775**	0.552	0.557
SIS1	0.472	0.542	0.439	0.504	0.771	0.575	**0.835**	0.573
SIS2	0.505	0.544	0.470	0.497	0.789	0.605	**0.884**	0.559
SIS3	0.490	0.489	0.524	0.441	0.566	0.529	**0.794**	0.484
SIS4	0.460	0.525	0.490	0.482	0.650	0.592	**0.845**	0.497
SIS5	0.559	0.571	0.621	0.502	0.592	0.560	**0.806**	0.558
SS1	0.506	0.712	0.597	0.487	0.594	0.568	0.613	**0.810**
SS2	0.494	0.676	0.553	0.528	0.566	0.601	0.521	**0.817**
SS3	0.465	0.620	0.543	0.669	0.458	0.523	0.462	**0.848**
SS4	0.477	0.541	0.468	0.445	0.470	0.538	0.578	**0.803**
SS5	0.449	0.616	0.626	0.592	0.491	0.524	0.553	**0.871**
SS6	0.394	0.565	0.431	0.491	0.501	0.495	0.464	**0.819**

Significant Value between Blended Learning and Students' Satisfaction

In Table 7, the SMART-PLS tool is used to show as to whether or not there are any significant relationship between the blended learning factors/variables that achieve students' satisfaction. It is found to be proven from the obtained results that there is a significant relationship between students' satisfaction and INST and F2F where the p-value reaches 0.000 and FORM with a p-value that equals to 0.024 (a threshold of P value <0.05). Similarly, the MOD demonstrates a significant relationship with students' satisfaction for a p-value of 0.042 and SIS reflects similar significance with a p-value of 0.020. However, the ELIB shows no significant relationship with students' satisfaction since the p-value reaches 0.230 (>0.05). Moreover, the LMS shows no significant relationship with students' satisfaction as its p-value reaches 0.470 (>0.05).

Table 7. The relationship between blended learning and students' satisfaction.

Hypotheses	Path Coefficient	Sample Mean (M)	STDEV	T Statistics	P Values	Decision
ELIB >SS	-0.046	-0.048	0.062	0.740	0.230	Not Supported
F2F >SS	0.427	0.425	0.073	5.858	**0.000**	Supported
FORM >SS	0.125	0.123	0.063	1.990	**0.024**	Supported
INST >SS	0.182	0.182	0.051	3.546	**0.000**	Supported
LMS >SS	-0.006	-0.003	0.080	0.075	0.470	Not Supported
MOD >SS	0.115	0.116	0.066	1.730	**0.042**	Supported
SIS >SS	0.140	0.144	0.068	2.053	**0.020**	Supported

Additionally, Table 7 and Figure 3 illustrate the result of the Bootstrapping that is carried out to determine the significance of the relationships between blended learning and its sub-constructs on the endogenous variable for students' satisfaction. The assessment is based on the research hypothesis mentioned earlier in this paper. Accordingly, it is shown that all research hypotheses are supported except for Hypothesis H1-a and H1-e. In fact, this leads to the conclusion that E-library and LMS do not possess a significant relationship with students' satisfaction.

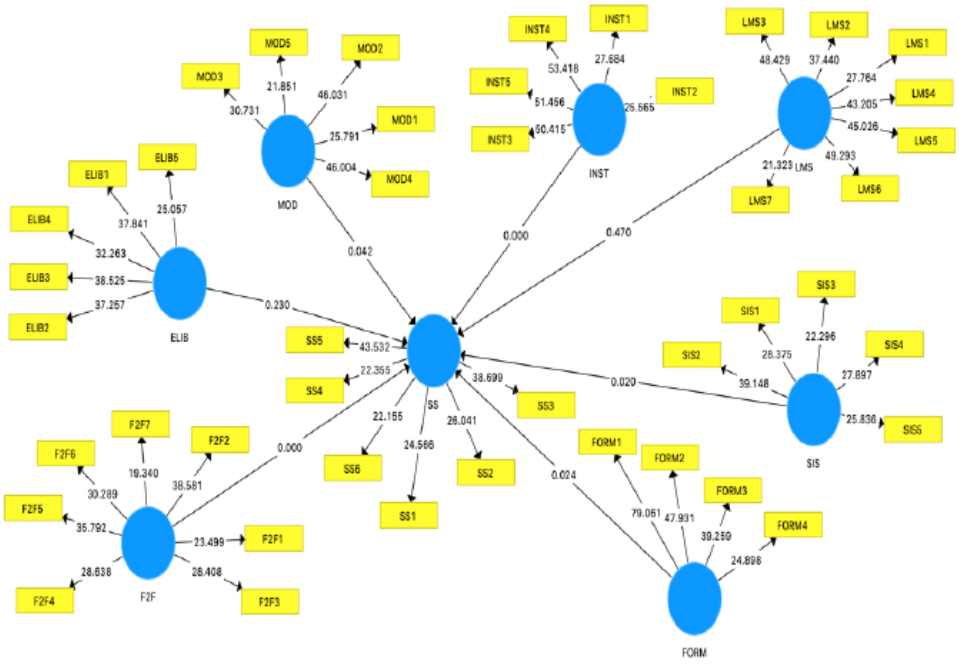

Figure 3. The relationship between blended learning and students' satisfaction.

NARRATIVE ANALYSIS AND DISCUSSION

The current study is conducted in order to obtain an overall perspective on the relationship between blended learning and students' satisfaction. In this context, researchers have considered all sub-variables, including the instructor, modules, E-library, Learning Management System (LMS), Student Information System (SIS), online discussion forum and face-to-face classes that represent the blended learning variables for investigating the relationship between blended learning and students' satisfaction. In the previous section, the researchers have conducted the data analysis by identifying the descriptive analysis in terms of the demographic profile. It is found to be proven from the obtained results that the female respondents represents the majority of respondents who participated in this study compared to the male respondents (Kane & Macaulay, 1993). Kane & Macaulay (1993) stated that female respondents tend to answer in a positive manner in most of the questions compared to male respondents. Additionally, it can be inferred that male respondents have a tendency to not answer the questionnaire in a serious manner. Moore et al. (2002) indicated that female respondents are more likely to participate than male respondents are. Meanwhile, the respondents who are aged between 21 to 30 years old represent the majority of this study, and are aligned with some other researchers who mention that younger people are likely to voluntarily participate in a given research compared to older people (Goyder, 1986; Moore et al., 2002).

The data analysis reveals that students from the AOU provide positive responses toward the **Face-to-Face** (F2F) and Videoconferencing Classes that form an indicator to their satisfaction. The outcome demonstrates a rigid and moderate relationship to students' satisfaction. The F2F classes possesses rigid and positive associations to students' satisfaction based on a research performed by Tratnik et al. (2019). Moreover, the outcome demonstrates that the integrated learning of F2F provides further effective means of communicating students' information through different forms of pedagogies that can inspire them to pursue their studies more attentively and creatively (Roach & Lemasters, 2006). This study is similar to the previous research carried out by Kintu et al. (2017), which stated that there is a significant relationship between the F2F and students' satisfaction. This can also be supported by the previous study, which recorded the average mean score of the F2F towards students' satisfaction. The results show that the respondents are satisfied with the F2F classes. This indicates that students possess a moderate level of satisfaction when applying the blended learning approach as a teaching process. Further efforts are required to make students satisfied with what they gain in their face-to-face classes or online classes and enhance their attendance's rate. The Face-to-Face and Videoconference Classes (F2F) represent the most effective way for AOU's students, as the F2F classes possess a reliable and stable connection with students' satisfaction in comparison with others. Since the results from respondents indicate to a 'neutral' form, the AOU must find the most effective method for transferring from average to rigid relationships. This is, in fact, important as the university can gain a better reputation by improving its blended learning and achieving students' satisfaction in the blended learning approach.

Moreover, it is shown from the data analysis that positive students' responses are achieved toward the **instructor** factor, which form an indicator to their satisfaction. The outcome demonstrates positive relationship between the instructor and students' satisfaction. These results are confirmed by an earlier research conducted by Joel & Christina (2018), which conclud that the quality of the blended learning system and instructors possess a significant positive effect on learners' satisfactions. According to a study performed by Eastman et al. (2017), it can be inferred that the perceived learning approach is positively related to the instructor-to-student interaction. The Instructor is a major factor, which affects the students' satisfaction based on several blended learning approaches. Additionally, this study is similar to a previous research conducted in (Ismail, 2018), which states that the module instructor affects and increases students' satisfaction with the blended learning approach that has a significant relationship with the students. The results of the current study can also be supported by a previous study, which reveals that the instructor is an important factor that directly affects students' satisfaction on this approach (Naaj, Nachouki, & Ankit, 2012). The results demonstrate that students are satisfied with the instructor. This can lead to conclude that instructors are motivators, available for consultations, their response times are adequate, and adequate feedbacks can be provided to their students. Consequently, the module instructors have a significant relationship with students' satisfaction.

According to the results of the investigated data analysis, students are satisfied with the **modules** and materials they receive for studying their courses within the blended learning approach. In fact, this approach

provides the suitable environment, which aims at delivering the modules' continents to students. Based on the studies carried out by Hadullo, Omwenga, & Oboko (2017), an efficient and adequate quality should be obtained for the resources and materials pertaining to the involved modules. Similarly, Rockinson-Szapkiw et al. (2016) indicate that a valuable connection is performed with the contents of students courses based on the perceived learning approach. This action ensures that modules should be rich and accessed anytime and anywhere, and should be frequently improved (Khan et al., 2012; Shivam & Singh, 2015). In the same context, it is suggested by Rovai & Baker (2005) that students' perspectives can be realised based on their self-reported perceived learning by improving their performances on many different educational modules. Further, a research study conducted by (Kavitha & Jaisingh (2019) indicates that the success of blended learning can be directly affected by the quality of the provided material of the modules. Moreover, a research study produced by Afacan (2018) investigates the direct and indirect effects of blended learning on students' satisfaction and performances of the entire modules. These modules improve students' satisfaction where their designs can directly put an impact on students' performances, which improve students' satisfaction with blended learning. Similar research is investigated by Giannousi et al. (2009) for exploring students' satisfaction with different blended learning modules. The results show that students' satisfaction is higher than average. The results demonstrate that students are satisfied with these modules where this indicates that modules are made available, accessible anytime and anywhere. Hence, the assessments of the modules cover the entire learning outcomes, which are related to these modules.

Alzahrani (2017) pointed out that the students of four leading universities in the KSA are satisfied with applying **online forums** through their education. In this study, it is also shown that the students are satisfied with using them through their learning. Similar research conducted by Fu et al. (2017) shows that online discussion forums can have a significant impact on blended learning environment, and can contribute to improve students' learning outcomes and progress bsed on involving an important rule as a communication link between students and tutors. Online forums represent the fundamental factors that contribute in practicing blended learning for which tutors can post different topics related to the modules they are delivering. These can enable the students to interact with their assigned tutors and other students in an easy and efficient manner.

The Student Information System (SIS) is an important system that contributes in evolving and administrating many different institutions of the higher education (Gurkut & Nat, 2017). This system shows that the satisfaction has influenced directly on students' satisfaction based on the provided information quality and indirectly by information quality and system quality when a decision making is used as a mediator (Gurkut & Nat, 2017). The study demonstrates that the students are satisfied with the SIS as it possess several functions that can assist them in performing their tasks, such as registering modules, accessing the study plan, and etc. In the context of the research, the SIS provides easy user-friendly interfaces where this efficient advantage can provide the ability for students to easily make use of the SIS when required and valuable services can be accordingly achieved and supported to them in efficient and desirable manners.

Based on the obtained results, it is found to be proven that the variables, namely, LMS and E-library, produce P values of 0.454 and 0.239, respectively. This reveals that the two obtained values are greater than the P value threshold, which is 0.05, where the two values imply that negative responses emerge for the two values. In fact, the reason behind this is that most students find that the LMS and E-library factors are adversely affecting their tasks as the two systems remain frequently stuck due to a number of technical issues.

Furthermore, Holley & Powell (2004) state that 53.8% of respondents are unable to comprehend the 'grasp' of answering different questions when using their E-library system. In the context of this paper, AOU's students are also unaware of understanding different questions that are incurred in such a system. The results of the current study are confirmed by the results of Aljaraideh and Rabee (2018) who conclude that students are moderately satisfied by the Elibrary resources.

However, Najmi et al. (2016) indicate that respondents are more satisfied with their electronic resources, unlike the results of the current study, which reveal that they are unsatisfied with the LMS since these systems remain frequently unmanageable in an effective manner. On the contrast, Ohliati & Abbas (2019) conclude that the dominant factor, which impacts students' satisfactions with LMS represents the service quality. On the other hand, it is argued by Islam (2014) that their involved respondents are dissatisfied with the

LMS factor, and hence, further trainings must render them to enhance their perceptions in being satisfied with this factor. Similar to Alzahrani (2017) declares that students are dissatisfied with the LMS for some grounds, such as different continuous system failures and the lack of acquiring an appropriated training experience. Additionally, it can be inferred from the study that is produced by Alzahrani (2017) that the system failure is not a reason to be taken into account. Nonetheless, this reason is significant in the current study since many students enrolled in a university are persistently complaining about their dissatisfaction with the system failure alongside their lack of being trained in managing the LMS and E-library systems.

To sum up, it could be concluded that these results are important to be studied and adopted by the university. This is because a more effective reputation is gained for the university by improving its blended learning approach and making its students satisfied with the blended learning process.

LIMITATIONS AND FUTURE RESEARCH

This research has provided an invaluable amount of information in order to explain the way the blended learning approach enhances students' satisfactions by proposing seven blended learning factors, which are assessed in terms of their impact on respondents' satisfactions. Although this study has indeed provided an insightful information, there are some encountered limitations that should be addressed for future studies in order to ensure that more insights can possibly highlight the investigated phenomenon.

Intially, as the data analysis demonstrates that the majority of the respondents' are female students with the age of 20-30 years old, the moderating effects of the respondents' demographic characteristics such as gender, age and technical skills level are not included in the research framework. The inclusion of these variables in for the future studies could enrich the research findings even further.

Additonally, although the questionnaires of the study are effectively designed and reviewed, and are validated through a pilot study that is approved by university educationalists, it is a new questionnaire that is not validated in other environments and countries. Thus, the replications of the current study when using the same questionnaire is recommended to validate its usability for assessing students' satisfaction via the blended learning approach.

Furthermore, this study has been undertaken among the six Saudi branches of the AOU. Thus, the replication of the research in other regional branches (i.e. Kuwait, Bahrain, Lebanon, Egypt, and so on) can provide a more effective insight into students' satisfactions with based on using the blended learning approach throughout the entire AOU's branches.

Moreover, the results of this research reveal that students' dissatisfactions with the LMS and E-library resources are provided by the university, and their technical skills are considered as a control variable within the proposed framework. Nonethtless, students with higher technical skills can use these resources more easily in comparison with those possessing lower technical skills. Hence, the inclusion of students' technical skills as a control variable can reveal more effective insights into students' satisfaction as confirmed by earlier studies (Mihanovic, Batinic & Pavicic, 2016), particularly, for those factors in which students are found to be dissatisfied with the LMS and E-Library resources.

To conclude, future studies should measure how the blended learning approach assists students in improving their skills and performances within this approach. Additionally, such studies could also include significant comparisons among their plans for using the LMS between the first and final-year students on a regular basis. In fact, this approach could enable future researchers to understand the components related to students' satisfactions and encourage effective improvements in the quality of any offered mixed learning courses. Consequently, further researches should be taken into account to find the reasons behind different levels of satisfaction within these areas. Finally, it is deduced that being able to understand students' demands when students are supported by mixed learning courses where fostering a positive learning experience can be crucial to the overall success of the mixed learning within the university.

CONCLUSION

The blended learning approach has currently become an essential norm, and the conventional method of teaching is still applied by providing several flexibilities for students when proceeding further along with their studies. Moreover, students' satisfactions with the blended learning approach is essential since it can put an impact on their motivation, and thus, their progress and completion rates are improved.

Assessing students' satisfactions is also essential for universities and educational institutions as they can be used to assess programs and courses, and to forecast different attrition rates for students to some extent. This paper is performed to assess students' satisfactions with the blended learning approach they receive within a private university in Saudi Arabia. It is found to be proven from the obtained results that students are mostly satisfied with face-to-face and video conference classes, instructors, modules, student information system and online discussion forums. Nevertheless, students are unsatisfied with their university's learning management system nor their university's e-library system. Furthermore, the results demonstrate that students perceive face-to-face and video conferencing classes more practically in the AOU. The reason behind this is that the face-to-face method enables to spark their motivations directly toward encouraging them in proceeding efficiently along with their studies.

Apart from that, this method provides a significant value to the university when evaluating their current practices in integrating technology and digital platform for enhancing the capabilities toward teaching and learning, particularly, after the current COVID19 pandemic. Not only does the diversified technique assist students in being more attentive and satisfied with it, but can also generate various creative and innovative ideas from instructors through their teaching styles.

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FACTORS INFLUENCING GRADUATE STUDENTS' PERCEPTION OF ONLINE AND DISTANCE LEARNING IN NEPAL

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ABSTRACT

This study explored the perception of online and distance learning (ODL) experienced by postgraduate students in Nepal during the COVID-19 pandemic in 2020. An online survey on Graduate Student Perception on ODL (GSPODL) with a five-point Likert-scale was designed and administered to 71 postgraduate (57 male and 14 female) students of science education in a public higher education institution in Nepal in spring 2020. A Principal Component Analysis with rotation in Varimax Kaiser Normalization was employed in the Statistical Package for Social Sciences (IBM SPSS 26) to construct six major components of students' perception of course delivery and participation. These components were- Quality, Opportunity, Relevance, Development, Support, and Challenges. Mann-Whitney U Test or Kruskal-Wallis Test at 0.05 level of significance showed that the participants' views about Quality, Opportunity, Relevance, and Support were significantly different across their place of Residence (rural and urban residences). Likewise, there was a significant difference in their views on the Relevancy of the ODL with respect to Device Use. There was no significant difference in their views across the variables Gender, Ethnicity, School Type, and Device Use in all other criteria. These results demonstrated that participants' hometown location made a big difference in their perception of online and distance classes' Quality.

Keywords: Online and distance education, flexible learning, teacher education, Nepal.

INTRODUCTION

An early form of distance education started as correspondence education that could be traced back to 1728. However, there is controversy if such correspondence could be considered a distance education because of a lack of concrete evidence of two-way communications during learning and teaching, even with the mails (Kentnor, 2015). Nonetheless, formal distance education was in practice since a long time ago (in the 1800s) in the US through correspondence programs (Gunawardena & McIsaac, 2008), and it began in England in 1840 with lessons through mails (Molenda, 2008). In Germany, distance education was established to teach language through correspondence mode in 1856 (Demiray & Isman, 2001). By 1892, distance education through correspondence gained momentum with the help of post offices (Drexel Univeristy, 2017). Then it took different paths through the advancement of education through the introduction of radio in 1922, a television in 1953, a telephone in 1965, Internet in 1969, courses with computers in 1981, and worldwide web (www) in 1989 (Drexel University, 2017). It expanded rapidly with the online course offerings of colleges and universities (Drexel University, 2017). There were 6,932,074 students enrolled in at least one online and distance education course at higher education institutions in the US in the 2018-19 academic year (National Cener for Educaitonal Statisticas [NCES], 2019). However, the pattern of online and distance learning has changed with mixed results. For example, enrollment in the distance learning programs in the US universities was growing (NCES, 2019), but it was decreasing in the UK and Australia by 5% in the 2017-18 academic year (Kemp, 2019).

As open and distance learning at higher education gained popularity despite some ups and downs, many countries began to offer online and distance (ODL) programs to provide better access to people who could not afford regular education. Nepal's neighboring country, India, started ODL programs establishing open universities in 1982 with the establishment of Dr. B. R. Ambedkar Open University, Hyderabad (MHRD, India, 2020). Then they opened Indira Gandhi National Open University (IGNOU) in 1985 to provide nationwide ODL programs with the central government initiative. India had about 22% (more than 3.6 million) of the total enrollment of higher education students in the ODL mode in 2012 (Suneja, 2012). This number reached 4.2 million in the year 2019 (Qayyum & Zawacki-Richter, 2019). Similarly, the number of enrollment in the ODL system in China has also grown by 8.8% annually in the last decade (2004 to 2016) (Qayyum & Zawacki-Richter, 2019).

When the world was making rapid progress in ODL, Nepal, too, marched its step with the New Education System Plan 1971(NESP), which mandated training primary school teachers. These teachers had degrees of school leaving certificate (SLC), which was the tenth-grade certificate, and had permanent positions as primary school teachers (Pradhan, 2011). In general, they suffered from geographical obstruction and the absence of transportation to reach the training centers while working at schools. The USAID, UNICEF, and British Council came together with a plan to train these teachers from a distance. Radio Education Teacher Training Project was started in 1978 with technical and financial support from the USAID (Holmes, 1990). It took quite a while to prepare the design and materials for the training. Eventually, Radio Education Program was conducted from1984 until 1989 for training the primary school teachers with the financial and technical support of USAID (Holmes, 1990). With the growing need for teacher training, the Institute of Education (IOE) started another program called 'teacher training' through distance learning in 1976-77. This program was mainly to upgrade the competencies of the primary school teachers, preparing them for grade-teaching in the remote zones of Nepal (Pradhan, 2011). Despite these efforts, Nepal could not make remarkable progress in the ODL for a long time because the higher education institutions remained inactive to develop such programs. The government could not deliver any policy and guidelines to promote ODL until 2007.

The effectiveness of the ODL in a country is severely affected by the government's plans and policies regarding such programs. For example, the ODL policy affected the quality of such programs in South Korea, China, and Turkey (Gunduz, Kursun, Karaman, & Demirel, 2020). The Government of Nepal, Ministry of Education (MoE) approved ODL policy on January 4, 2007, to provide "full access to schools and higher education to learners having diverse and special needs, especially of out-of-school children, deprived groups, working people, and housewives through open and distance learning systems as supplementary to the existing system of education" (MoE, 2007, p. 1). This policy addressed the educational needs of people who are unable to present at physical campuses due to geographical barriers, gender discrimination,

poverty, and marginalized citizens. The ODL policy had four distinct agendas. The first agenda was about increasing access to education for all kinds of learners/students. The second agenda aimed to improve the quality of education by integrating the ODL system into the existing traditional face-to-face education. The third agenda emphasized continuing education as a part of lifelong learning and teachers' professional development through flexible modes of the ODL and community learning centers. The fourth agenda was related to the certification of informal knowledge and skills through an appropriate mechanism. This way, the policy had initiated several other provisions of education through Radio, FM, and TV channels and networking with other national and international institutions that offer ODL programs (MoE, 2007). With such efforts, the Ministry of Education, Science, and Technology (MoEST) has launched an e-learning portal (https://learning.cehrd.edu.np/) for grades 1 to 10 students in schools. The portal has been launched for students who have been deprived of education due to the fear of COVID-19 (MoEST, 2020).

The Government of Nepal (GoN) established Nepal Open University (NOU) in 2016 as an autonomous and well-organized higher education institution (GoN, 2016). The preamble of the act of NOU states that the establishment of the university was an appropriate initiative to promote high-quality teaching, learning, and research through new approaches of open education technology, methods, and techniques. The university aims to provide higher education access to the general public to develop competent human resources with knowledge, skills, and technological competencies (GoN, 2016). Currently, NOU has launched some undergraduate and graduate (masters) programs under three distinct faculties – Faculty of Management and Law, Faculty of Social Science and Education, and Faculty of Science, Health, and Technology (NOU, 2020). About 1,200 students enrolled in different programs at NOU by the end of 2019 (Dhakal, 2019). This number reached nearly 2000 by July 2020 (Panta, Padam Raj, A NOU Employee; Personal Communication on July 22, 2020).

Besides Nepal Open University, other universities, such as Tribhuvan University and Kathmandu University, have launched some of their programs in ODL mode. For example, the School of Education Kathmandu University (KUSOED) has recently launched a one-year Masters of Education in English Language Teaching, which can be delivered both face-to-face and online mode as per the demand of the students who enroll in the program (KUSOED, 2020 a). During the COVID-19 Pandemic, KUSOED issued a guideline for its faculty members and students to run all the classes in online mode (KUSOED, 2020 b).

Tribhuvan University established the Open and Distance Education Center (ODEC) in 2015 as an independent unit within its organizational framework to provide access to higher education to the general public through flexible open and distance learning modes. The center has run a four-semester Two-Year Master of Education program in Mathematics and English Language Teaching. It also offers a short course on academic writing (ODEC, 2020). Likewise, some constituent campuses of Tribhuvan University have run the master's program in the ODL mode. For example, Mahendra Ratna Campus Tahachal has conducted a one-year (two-semesters) Master's Degree program in science education through the ODL mode. Currently, there are 92 students enrolled in the program from 33 districts of Nepal (Dhakal, Krishna Prasad, Chief of Mahendra Ratna Campus Tahachal, Personal Communication on April 25, 2020). The campus also has been offering a one-year (two-semester) postgraduate diploma (PGD) in social study and mathematics education to train inservice teachers through the ODL mode. These were signature programs for the university to continue online and distance learning without any hassle during the COVID-19 Pandemic when other face-to-face programs much suffered from confusion, chaos, and mismanagement.

There are some Kathmandu-based private institutes that offer open learning programs affiliated with national or foreign universities. For example, the Institute of Open Learning (IOL) is affiliated with Purbanchal University, and International Center for Academics (ICA) is affiliated with Indira Gandhi National Open University of India. The IOL offers a one-year bachelor's in education (B.Ed.) program for inservice teachers who already have a bachelor's degree in non-education major (IOL, 2020). The ICA offers certificate, bachelor's, postgraduate diploma (PGD), and master's programs in collaboration with different higher education institutions, such as Indira Gandhi National Open University (ICA, 2020).

Although there are some programs and initiatives in ODL in Nepal, there is a massive scarcity of research literature in the area of online and distance education in Nepal. Few articles (e.g., Pangeni, 2016; Chouhan, 2014) and some graduate theses (e.g., Sapkota, 2012) are good to study some background in the distance

and online education in Nepal but are not adequate to understand the prospects and practical problems or challenges due to lack of empirical data or lack of focus on the main issues of ODL. This research paper's primary objective was to investigate the perceptions of ODL students in Nepal. This study was designed to answer the following research question: How do postgraduate students perceive the ODL in Nepal? In the rest of the paper, first, we presented a review of the related literature. Second, we explained the methodology of this study. Third, we analyzed the results of the investigation. Then, finally, we discussed the findings and presented this study's conclusion.

REVIEW OF LITERATURE

This section presents a review of some literature from 2009 to 2020 that included different countries and contexts. It emphasized the study's areas, aims, methodological tools, and a few findings of the studies.

Lee, Yoon, and Lee (2009) studied learners' acceptance of e-learning in South Korea at a paradigm shift from teacher-centered to student-centered education. They studied four independent variables that were instructor's characteristics, teaching materials used in the classrooms, design of learning contents, and playfulness in the class. They also studied two belief variables-- perceived usefulness and ease of use of e-learning, and the dependent variable was the intention to use e-learning. They designed a survey questionnaire using five points Likert scale. They used Cronbach's alpha coefficient to test the internal consistency among the items. They distributed 250 questionnaires to undergraduate students who had some course experiences in e-learning in a comprehensive university in South Korea. They received 214 valid responses from the participants. They used SPSS 12 to analyze the data by using factor analysis with principal components and varimax rotation method. The study results revealed that instructor characteristics and teaching materials positively correlated to the perceived usefulness of e-learning. They further found that learner's acceptance of e-learning and playfulness positively affected the intention to use e-learning. They found that perceived ease of use was the weakest among the seven hypotheses.

Firat (2016) examined the e-learning autonomy of distance education students in the e-learning environment. Firstly, the researcher developed an e-learning scale and established the validity and reliability of the scale by the piloting of the tool with the 1152 participants from Anadolu University, in an open education system. The internal consistency was measure by coefficient of reliability with Cronbach's ⍰ = 0.952. The researcher then administered the survey to a large sample of 3,292 students frosm 42 different programs (6 undergraduate and 36 associate degree programs) during the 2014-2015 academic year. The researcher developed an e-LAS scale to analyze the autonomy of the students in e-learning environments. He used percentage (%), frequency (f), mean, parametric independent sample t-test, and one–way ANOVA. He conducted the statistical tests in IBM SPSS 22. He computed the Kaiser–Meyer-Olkin (KMO) value ranging between 0 and 1. In this study, Firat (2016) reported that the KMO value was 0.943. The Bartlett's Sphericity test result showed the Chi-square value 10329.547 which was significant at $p<0.001$. The results revealed that students' autonomy in e-learning environments did not statistically vary significantly with their programs' characteristics. Moreover, the e-LAS scores were compared by gender with the help of an independent sample t-test. The result showed that there was no significant difference between the e-LAS scores when compared by gender. The majority of them met both workload flexibility (strongly agree 34.6% and agree 27.1%) and possibly studying at the place of residence (strongly agree 40.8% and agree 20.4%). These results indicated that distance education among people of different ages and those living in rural areas was entirely justified (Firat, 2016).

Vasilevska, Rivza, Pivac, Alekneviciene, and Parlinska (2017) studied the demand for distance education at an eastern and central European higher education. The study aimed to identify the need for the distance learning model to identify its problems and development trends. They took five countries: Latvia, Lithuania, Serbia, Poland, and Belarus, for this study. They included four main issues like adaptability, technical capabilities, computer literacy, and self-control and motivation as the study variables. The study employed a structured survey research design with the five-point Likert scale to collect the data. The total number of respondents was 877, which included 491 females and 386 males. They analyzed the data in SPSS 16 and Excel spreadsheets for descriptive statistics. The findings showed that 42% of the students were completely satisfied, 32% would prefer the traditional form of education, while 26% of respondents expressed that the

model was not suitable for them. The study also revealed that the traditional teaching method of education based on communication between teachers and students was more demanding than distance mode. The participants agreed that distance education at a higher level provides strong technical skills and independent self-learning environments.

Markova, Glazkova, and Zabarava (2017) studied quality issues in distance learning. This study aimed to present the result of the survey conducted at the Ural State University of Economics and Ural Federal University in Russia. They used a survey design on a sample of over 830 postgraduate students involved in the distance learning programs. The students' age was 19-54 years, covering 27 big and small towns of the Ural region in 2015 and 2016. The questionnaire included the items related to the area of use of technology and resources, effectiveness of distance learning, motivation, challenges, learner/instructor communication, interaction, evaluation and self-assessment, and satisfaction of the students in distance learning (Markova et al., 2017). The results indicated that postgraduate students positively evaluated their distance learning experiences, although they faced a few learning challenges, especially communication and instruction. The results revealed that technology does not teach students, but technical support plays a crucial role in distance learning and reducing student's anxiety. Faculty qualifications were essential factors in upgrading and creating the quality of the distance program. Over 70% of the participants expressed that guidance and counseling, and maintaining emotional contact with instructors were vital. Therefore, they highly rated the supporting environments. Lastly, the survey pointed out a lack of emotional communication with the teachers (31.1%), a lack of teacher control (20.5%), and a sense of isolation (13.1%) were some of the drawbacks of distance learning (Markova et al., 2017).

Cabi and Kalelioglu (2019) studied students' perspectives on an online course concerning attitude, readiness, and thoughts. The objective of their study was to examine the effect of an online course on the students' attitudes, thoughts, and readiness to learn the subject matter through a mixed-method study design with pre-test, intervention, and post-test on a group of 266 undergraduate and associate degree students. The results of the study indicated that there was a significant difference in the pre-test and post-test results on computer/Internet self-efficacy and self-directed learning. Also, the study showed that there was a significant effect of students' familiarity and escape attitude on e-learning. The qualitative data showed that several students found benefits of distance education in terms of accessibility and availability of the course materials.

Serhii, Vladyslav, Viacheslav, Kateryna, and Svitlana (2020) studied the realities and prospects of distance education at higher education institutions in Ukraine. The study outlined the current status of distance learning, especially in Ukraine. This study used a survey design, including 102 students as participants. The survey questionnaire was prepared to cover the students' attitudes towards distance learning, organization, advantages, and disadvantages. The survey questionnaire was based on the current state of higher education in Ukraine. They designed the survey tool in Google Form and shared the survey link with the respondents. They analyzed the data using Microsoft Office Excel spreadsheets. They found that students at all four higher education institutions were familiar with distance education and used this technology, and most of them preferred mixed learning. The results of the study revealed that the students were able to integrate their work, and they could self-determine. However, the study time and place were the significant advantages of distance learning. It also revealed that the student's self-motivation was needed in distance learning, which indicated a major disadvantage of it.

Ali (2020) studied online and remote learning in higher education institutes. The purpose was to examine how teaching and learning could be continued during the COVID-19 pandemic time. Almost all the countries in the world had been affected by COVID 19, and educational institutions were being closed physically and socially. Regarding this pandemic situation, some educational institutions started online learning. In this study, Ali utilized the data from the World Health Organization (WHO) when 213 countries were affected by the virus as of 12 April 2020. At the moment, New York University Shanghai and Duke Kunsan University utilized Zoom applications and other video conferencing tools instead of face-to-face teaching-learning. Ali (2020) conducted a meta-analysis of the world context, politics of resistance, infrastructure support, staff readiness, student accessibility, and the confidence of the teaching staff, which played a vital role in ICT integrated learning. He added that ICT became an integral part of everyday life, and it became a means to transform the learning environment. He further revealed that the blended learning model attracted existing political agendas, and establishing such a mode was better than other alternatives. Staff readiness

and motivation also helped in the successful assimilation of technology in higher education institutions. Furthermore, he found that students had a special bonding with ICT.

Reich and Tobias (2020) evaluated the access, quality, and equity in online learning based on a case study of a blended professional degree program. The study's main aim was to examine students' experiences in one Massive Open Online Courses (MOOC)–based on the blended professional degree program. They formulated hypotheses to address the study's aim and used a mixed-method design with a motivation to develop MOOC-based professional online, blended learning. A total of 81,000 students participated in the chain management of MOOCs. Among them, 7,999 were verified students paid the fee at least one course for an opportunity to get certificates. Likewise, 3,804 obtained the certificate for at least one course in Micro Master sequence, 622 got a certificate Micro, 130 applied for the Accelerated Master Program at MIT, and 40 participants enrolled and arrived on campus in a blended cohort program. They designed survey questions including age, gender, and level of education and variety of data sources, including the five MOOCs courses in the Micro Master program. They conducted a semi-structured interview at the beginning of January 2018. They coded the qualitative data using the grounded theory approach. They coded each interview independently by three raters (one author and two undergraduate research assistants) to identify the data's theme. They calculated Cohen's kappa, and the overall pooled kappa from all of the interviews was 0.72. They analyzed log data from edX of all students who participated in one of the five MOOCs courses in the program (with eight total courses run) and differences in students' activities using a non-parametric test (Wilcoxon and Mann-Whitney Test). They found that self-regulated habits were fostered and supported through socio-environmental factors. Overall, blended students felt that online courses provided quality learning experiences. The blended group mentioned the job-oriented content, the flexibility of the courses, low cost, and affordance in technology as important aspects of a blended approach. Blended students got higher grade in their residential course than other students (⊠ =0.11, t = 3.26, df =3374, $p < 0.01$) and students from outside the program who studied in the same classes (⊠ =0.25, t =10.42, df = 3374, $p < 0.01$). The study's results revealed that at the end-of-semester survey, 66% of blended students said they learned from teamwork and positively influenced their intellectual growth.

Trespalacios and Uribe-Florez (2020) reported a study on graduate students' experiences of sense of community in an online study program. They studied two research questions that focused on students' rating of the online course and their sense of community, and their perception of the relevance of online learning. They applied a quantitative survey design with a classroom community survey, end-semester course evaluation and semi-structured interviews on twelve graduate students at a university in the US. The findings of the study showed that the participants (graduate students) had a high sense of community with a high value of connectedness. Almost all the participants had a high satisfaction rating for the end-of-semester course evaluation, indicating that they highly valued the performance of the course instructors. The results indicated that e-learning was an effective tool for the graduate program of educational technology.

METHODOLOGY

This study employed an online quantitative survey design with multiple-choice five-point Likert scale items named Graduate Student Perception of ODL (GSPODL). Survey research design is a procedure in quantitative research in which the researcher administers a questionnaire to a sample of the population (Creswell, 2012). A sample survey is a technique to collect quantitative data by administering questionnaires to the sample of a population under the study. The questionnaires can be adopted into an online platform such as Google Form or SurveyMonkey.com because they are convenient and flexible (Behrend, Sharek, Meade & Wiebe, 2011).

Construction of the Tool

First, a structured survey questionnaire was developed by the researchers in eighteen different areas from our experiences, including the students' voices and concerns with ODL. The items in the questionnaire were discussed among the researchers to improve the relevancy and sufficiency of the items. Altogether, 83 questions (items) were listed for selection, modification, and finalization in Google Form to construct a scale

on Graduate Student Perception of ODL (GSPODL). After a lengthy discussion among the four researchers, it was finalized and shared the developed scale with two senior experts and colleagues at Tribhuvan University at the Online and Distance Learning Center. Some minor corrections were made from their suggestion and feedback, and selected the 40 best questions out of 83 after removing 43 questions according to the recommendations of experts to keep them aligned with the research problems and issues (Please, see in Appendix).

Administration of Survey

Altogether there were 92 students enrolled in a postgraduate two semesters M.Ed. Science Education program at the ODL Center in a program at Mahendra Ratna Campus Tahachal, Kathmandu. They were from 33 districts and seven provinces of Nepal. We categorized them into two groups (group A and group B), whereas 78 students regularly presented in the ODL class, and the rest of the others dropped out of the program. Among the 78 regular students, 71 students participated in the study; amon them 64 were male and 14 were female students. Among them, 32 students were from rural areas, and the remaining 39 were from urban areas of Nepal. As a teacher, counselor, and IT person, the researchers were frequently in contact with all the students. Table 1 shows the distribution of participants across Gender, Age Group, Ethnicity, Hometown, School Type, and Device Use.

Table 1. Distribution of Research Participants across Gender, Age Group, Ethnicity, Hometown, School Type, and Device Use

Gender: Male 57 and Female =14	*Hometown*: Rural = 32 and Urban = 39
Age Group: 26 – 30 = 15, 31-35 = 42, 36-40 = 12, and 40 – Above = 2	*School Type*: Community = 16, Institutional = 28, Public = 20, and Other = 7
Ethnicity: Brahman = 35, Kshetree = 15, Baishya = 21, Sudra = 0.	*Device Use*: Laptop and Mobile = 44, Laptop Only = 21, Mobile Phone = 4, Desktop computer = 2

The survey link was shared with the participants in Microsoft Teams online virtual classroom platform in both A and B sections on the same date and time. All the students were informed about the purpose of the study and the use of the data. They were requested to fill up the questionnaire during their free time voluntarily. They were provided with one week's time to decide their participation and to have queries about the survey questionnaires (Richards & Schwartz, 2002). Their participation in the survey was followed by informed consent while responding to the questionnaire (GSPODL) in Google Form. The participants had a choice to either write their names on the form or keep them anonymous. There was a follow-up communication with them to clarify any questions they had and observe their progress in responding to the questionnaire. Finally, 71 students submitted the completed questionnaire (GSPODL) through online submission within two weeks.

Coding Data in SPSS

The survey data were retrieved in Excel spreadsheets from the Google Form. The data were uploaded into IBM SPSS 26 to analyze the collected data. First, the categorical data were coded into numerical form. The items were coded with the nominal categories, such as Gender, Hometown, Ethnicity, Age Group, School Type, and Device Use with numbers 0 and 1 for binary categories (Gender as male and female and Hometown as rural and urban) and 1, 2, 3, 4 as variables in multidimensional categories, such as Age Groups 21-25 as 1, 26-30 as 2, 31-35 as 3, 36-40 as 4 and above 40 as 5. Likewise, the Ethnicity of Brahman was coded as 1, Kshetree as 2, Baisya as 3, and Sudra was coded as 4. The School Type, such as Public was coded as 1, Institutional as 2, Community as 3, and Other as 4. The Device Use like MobileAndLaptop was coded as 1, Laptop as 2, Phone as 3 and Desktop as 4. The Likert scale items were coded in IBM SPSS 26 with Strongly Disagree as 1, Disagree as 2, Neutral as 3, Agree as 4, and Strongly Agree as 5. The multidimensional categorical variables (Ethnicity, Age Group, School Type, and Device Use) needed

additional coding with dummy variables to facilitate Multiple Linear Regression (MLR) analysis. Dummy variables were created for these independent variables to convert them into multiple binary variables. For example, Ethnicity had four groups Brahman, Kshetree, Baisya, and Sudra, and each was coded with 0 and 1 under separate columns as new variables.

Data Analysis

First, an analysis of dimension reduction was carried out from the 40 Likert scale data to find fewer but more meaningful groups or categories of the items. The analysis steps were followed as —analyze, dimension reduction, factor, selection of 40 items as variables, Descriptives (initial solution, coefficients, KMO and Bartlett's test of sphericity), and Extraction (principal components, correlation matrix, unrotated and roated factor solutions, scree plot, a fixed number of factors to extract 6, maximum iteration for Convergence at 25). Then, rotation method Varimax with Kaiser Normalization was applied with a display of rotated matrix, display factor score coefficient matrix, excluding any missing cases listwise, coefficient display to be sorted by size, and suppress coefficients smaller than absolute value 0.4.

There were 13 items loaded with negative coefficients in the rotated matrix. A reverse coding was applied on the Likert scale values of the respective itesm to change the negative statements into positive to resolve the issue of negatively loaded items with some components. After replacing the reversed items in place of the original item, respectively, then it was found positive coefficient values of all factors in the rotated matrix. There were five items that did not load with any of the six factors or components due to low factor loading coefficients (< 0.40). Therefore, these items were not included in further analysis. The six new composite variables were constructed from the components using the Transform function of Compute New Variables in the SPSS. The categorical variable measures were determined by averaging the item scores within each component. These six new component variables and the other six categorical variables (Gender, Age Group, Ethnicity, Location, School Type, and Device Use) were used for further analysis-- hypothesis tests for group comparison and MLR analysis for determining significant predictors of dependent variables.

FINDINGS

Principal Component Analysis

After retrieving the survey data in an Excel spreadsheet and transferred it to IBM SPSS 26 from the Google Form, a test of the reliability of the survey results was conducted by using Cronbach's Alpha, and it was found to be 0.844, which was at the acceptable level (higher than 0.6). A factor analysis was conducted with the extraction method of rotated Principal Component Analysis applying Varimax with Kaiser Normalization with the extraction of components based on eigenvalues more than one. This process provided us with ten possible components that had the eigenvalues higher than one. However, the coefficients of factor loading for the items at absolute value 0.4 distributed the items across the components that looked similar. Therefore, the scree plot was observed and identified six potential number of components from the six distinct elbows with eigenvalues greater than one (Figure 1). Then, the principal component analysis was applied again by fixing the number of components to be extracted as 9, 8, 7, and 6, and the best distribution of items was achieved across the components when the number of components was fixed at 6 with a rotation of items converged in ten iterations. The Kaiser-Meyer-Olkin measure of sampling adequacy for the principal component analysis was 0.652, which was at the average level that can be accepted as valid with an eigenvalue greater than 1. Also, Bartlett's Test of Sphericity with approximate Chi-square 1373.58 and degree of freedom 595 was significant ($p < 0.05$) (Table 2).

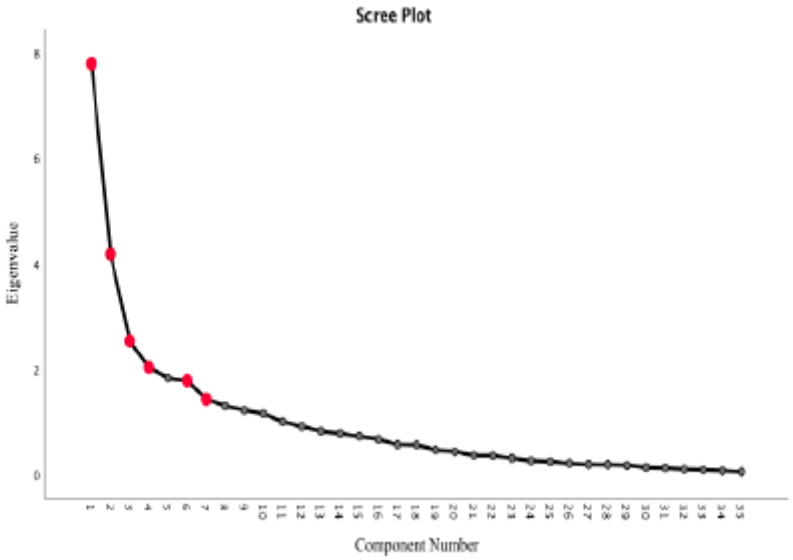

Figure 1. Scree Plot for Principal Component Analysis by Varimax with Kaiser Normalization

Table 2. KMO and Bartlett's Test for Sample Adequacy of Principal Component Analysis

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.652
Bartlett's Test of Sphericity	Approx. Chi-Square	1373.580
	df	595
	Sig.	.000

The rotated factor loading for each component has been displayed in Table 3 with items loaded, coefficients, and their reliability coefficients (Cronbach's Alpha). Among the thirty-five items run for the principal component analysis, there were seven items loaded into the first component with factor loading coefficients between 0.437 and 0.847 (Table 3). Based on the nature of the majority of the components loaded into this component and the item with the highest loading coefficient, it was named as the *Quality* of the online and distance learning. The reliability coefficient (Cronbach's Alpha) of this component was found to be 0.82. Similarly, there were seven items loaded into the second component with minimum and maximum coefficients of 0.430 and 0.754, respectively, with a reliability coefficient of 0.79. This component was named as student *Opportunity* for learning through the ODL. The third component had six items loaded into it with a range of coefficients from 0.452 to 0.752, with a reliability coefficient of 0.78. It was named as *Relevance* of the ODL. Likewise, the fourth, fifth, and sixth components had factor loading coefficients from 0.481 to 0.734 and reliability coefficients 0.72, 0.75, and 0.74, respectively. They were named as professional *Development*, student *Support*, and *Challenges*, respectively, based on the nature of the majority of the items loaded with them (Table 3). These six components were used as the new composite variables for further statistical analyses of independent samples test and MLR modeling.

Table 3. Factor Loading from Rotated Components

Rotated Component Matrix Items	Factor Loading	Components
Q1. The quality of assessment in ODL is better than face to face traditional on campus exams.	0.847	Factor-1: *Quality* of ODL (Cronbach's Alpha = 0.82
Q2. The quality of assignments in ODL is better than face to face traditional on campus learning.	0.759	
Q3. There is a lack of motivation among educators to adopt and integrate ICT as a tool into their teaching or educational curriculum.	0.631	
Q4. The quality of learning in ODL is better than face to face traditional on campus classroom learning.	0.591	
Q5. There is a lack of trained teaching manpower for ODL program implementation that has affected the quality.	0.566	
Q6. Unavailability of digital educational resources is the difficulty for teaching-learning activities has affected the quality.	0.554	
Q7. The classes on virtual online mode are as effective as the face-to-face mode classes in terms of quality.	0.437	
O1. The ODL courses provide students and teachers opportunities to integrate content, process, and context while working within a variety of cooperative learning groups.	0.754	Factor-2: *Opportunity* in ODL (Cronbach's Alpha = 0.79
O2. Online classes are comfortable for me as I have an opportunity to study from my own place.	0.746	
O3. The curriculum has been designed in a way that we have opportunity to organize activities on the online mode delivery structure.	0.615	
O4. The ODL classes create interactive environment for both teachers and students with opportunity to interact and support each other.	0.595	
O5. The current curriculum implemented by ODL provides us opportunity of higher education through distance learning.	0.580	
O6. I feel that ODL has provided us a good learning experience and opportunity with flexible learning time and place.	0.454	
O7. I have found a greater scope and opportunity of distance learning amid of COVID-19.	0.430	
R1. I feel that the ODL program is relevant way of gaining higher education in Nepal.	0.752	Factor-3: *Relevancy* of ODL (Cronbach's Alpha = 0.78)
R2. The use of ICT tools in ODL is relevant and motivates me in study.	0.674	
R3. The ODL classes are effectively conducted on time using relevant online technology.	0.597	
R4. The ODL teaching model helps teachers and students to analyze and solve relevant problems related to connectivity and delivery of the lessons.	0.563	
R5. The ODL online education is relevant in my professional development to be a competent teacher.	0.489	
R6. The online courses through the ODL are relevant to my profession because they provide me an opportunity to get access to higher education while working full-time.	0.452	
D1. The ODL program helps me to increase the quality of education as compared to former degree.	0.677	Factor-4: Professional *Development* (Cronbach's Alpha = 0.72
D2. The ODL online classes help me to fulfill several teaching-learning purposes for my profession.	0.602	
D3. The ODL teaching techniques provoke self-learning and independent learning to develop my skills.	0.577	
D4. The teaching techniques in online classes motivate me for independent learning and development.	0.543	
D5. There is sufficient interaction between students and teachers and among the students while teaching learning in an online class.	0.488	
S1. In the ODL system, the structure of curriculum and delivery system support students' learning.	0.734	Factor-5: Student *Support* in ODL (Cronbach's Alpha = 0.75)
S2. There is sufficient availability of the learning resources for ODL in the context of Nepal.	0.720	
S3. The ODL materials are sufficient, as you have been provided by teacher, in online platform such as Moodle, Google Classroom, Microsoft Teams, etc.	0.619	
S4. The courses in ODL are clear in the objectives, course requirements and grading systems that are helpful.	0.481	
S5. The ODL teachers provide sufficient study-materials to help in my study.	0.481	
C1. The ICT-related skills and training of ODL teachers are the major factors for difficulty in maintaining good online teaching and learning.	0.732	Factor6: *Challenges* with ODL (Cronbach's Alpha = 0.74)
C2. Technical competency of online instructors are the major challenges of ODL	0.705	
C3. Lack of ICT knowledge and awareness of the students, teachers are the difficulties in classroom practices	0.703	
C4. Pedagogical competency of online instructors are the major challenges of ODL.	0.656	
C5. There is a lack of ICT integration in ODL curriculum that is a challenge for teachers and students to adapt in the virtual classes.	0.512	

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. Rotation converged in 10 iterations.

The total variance explained for the Principal Component Analysis in Table 4 shows that the initial eigenvalues for each component ranged from 1.778 to 7.786, all higher than 1. The percentage of initial eigenvalues variance contributed by each component ranges from 5.081% to 22.245% with the first component accounted for the highest variance (22.245%), and the sixth component accounted for the least variance (5.081%) among the six components. However, the total cumulative variance explained only 57.508% of the total variance, indicating that the six factors partially explained the characteristics of the GSPODL-scale. How these variances changed from initial extraction to the rotated extraction has been demonstrated in Table 4

Table 4. Total Variance Explained for Principal Component Analysis

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
Components	Total	% of Variance	Cumulative%	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
Quality)	7.786	22.245	22.245	7.786	22.245	22.245	4.094	11.697	11.697
Opportunity	4.177	11.935	34.180	4.177	11.935	34.180	3.638	10.395	22.093
Relevance	2.531	7.231	41.411	2.531	7.231	41.411	3.280	9.373	31.465
Development	2.029	5.798	47.209	2.029	5.798	47.209	3.215	9.185	40.650
Support	1.826	5.218	52.427	1.826	5.218	52.427	3.038	8.680	49.330
Challenges	1.778	5.081	57.508	1.778	5.081	57.508	2.862	8.178	57.508

Student Perception of ODL

A descriptive statistics (mean and standard deviation) were applied with one-sample t-test to determine if the mean differences were significant s the items for each component. A null hypothesis test was conducted to examine if the participants' views had any significant difference in the six components and a composite perception concerning their Gender, Hometown, Age Group, Ethnicity, School Type, and the Device. Independent-Samples Mann-Whitney U Test was run to compare the participants' views on the seven variables concerning Gender and Hometown (two groups comparison). Similarly, the Independent-Samples Kruskal-Wallis Test was conducted to compare more than two groups. Both tests were conducted at the level of significance of 0.05. The results of these tests in IBM SPSS 26 have been discussed under each category separately.

The MLR analyses were conducted to fit models of each of the six dependent variables (the six component variables) against the categorical (nominal) independent variables (Gender, Location, Age Group, Ethnicity, School Type, and Device Use). Additional dummy variables were created for the independent variables (Age Group, Ethnicity, School Type, and Device Use) because they had more than two nominal categories to be compared. The results of the MLR analyses have been presented separately under each component.

Perception of Quality

The participants' responses in the items related to perceptions on the *Quality* (Q1-Q7) (Tabel 5) showed that they were almost neutral (Mean = 3.07, Standard Deviation = 0.71) to the overall quality of the ODL. That means, the graduate students the ODL program could not make their opinion either as good or bad about the program. Their opinion about the quality of assessment, motivation to adopt ICT, and availability of competent teachers was not significantly different from the neutral value 3. They rated higher in the items related to quality of learning in the ODL and classes on online mode equally effective as the face-to-face classes. However, they rated low (below neutral) for the unavailability of digital educational resources as one of the difficulties in the ODL (Table 5 and Figure 2).

Table 5. Descriptive Statistics and One-Sample t-test for the Perception of *Quality* of ODL

One-Sample Statistics and t-Test (test value = 3)						
Items	N	Mean	STD Dev	Mean Diff	t-Value	Sig. (two-tailed)
Q1	71	3.23	.959	.225	1.980	.052
Q2	71	3.17	1.082	.169	1.316	.192
Q3	71	3.14	.930	.141	1.276	.206
Q4	71	3.39	.933	.394	3.561	.001
Q5	71	2.96	1.088	-.042	-.327	.744
Q6	71	2.08	.996	-.915	-7.742	.000
Q7	71	3.52	1.157	.521	3.795	.000

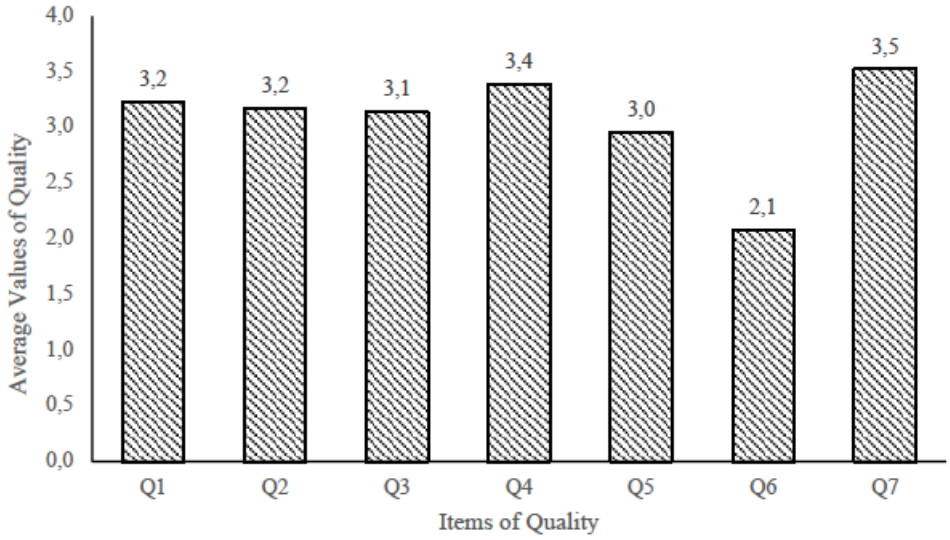

Figure 2. Average Value on Perception of *Quality* of the ODL

Independent-samples Man-Whitney U Test for the distribution of participants' perceptions on *Quality* of the ODL experience across the Gender (male and female) showed no significant difference (Retain Q-$H_0$1) at 0.05 level of significance. However, it was significant across Hometown (Reject Q-$H_0$2) (Table 6). Likewise, the Kruskal-Wallis Test results in Table 6 showed no significant difference in the participants' perceptions across Age Groups, Ethnicity, School Type, and Device Use (Retain Q-$H_0$3, QH$_0$4, Q-$H_0$5, QH$_0$6) ($p > 0.05$).

Table 6. Hypothesis Test on the Distribution of Perception of *Quality* across Gender, Hometown, Age Group, Ethnicity, School Type, and Device Use

Null Hypothesis		Test	Sig.	Decision
Hyp. No.	Hypothesis			
Q-$H_0$1	The distribution of *Quality* is the same across categories of Gender.	Independent-Samples Mann-Whitney U Test	0.533	Retain the null hypothesis.
Q-$H_0$2	The distribution of *Quality* is the same across categories of Hometown.	Independent-Samples Mann-Whitney U Test	0.018	Reject the null hypothesis.
Q-$H_0$3	The distribution of *Quality* is the same across categories of Age Group.	Independent-Samples Kruskal-Wallis Test	0.300	Retain the null hypothesis.
Q-$H_0$4	The distribution of *Quality* is the same across categories of Ethnicity.	Independent-Samples Kruskal-Wallis Test	0.052	Retain the null hypothesis.
Q-$H_0$5	The distribution of *Quality* is the same across categories of Type of School.	Independent-Samples Kruskal-Wallis Test	0.146	Retain the null hypothesis.
Q-$H_0$6	The distribution of *Quality* is the same across categories of Device Use.	Independent-Samples Kruskal-Wallis Test	0.798	Retain the null hypothesis.

Asymptotic significances are displayed at the level of 0.05.

An MLR analysis was run for the dependent variable *Quality* and the independent variables (Gender, Location, Ethnicity, Age Group, School Type, Device Use, and perceptions on *Opportunity, Relevance, Development, Support,* and *Challenges*) (Table 7). The results showed that Age Group (Age 2), Ethnicity (Brahman), School Type (Community), and perception (*Support* and *Challenges*) were the significant predictors of participants' views on the *Quality* of the ODL (the significant values being 0.015, 0.009, 0.016, 0.000, and 0.007, respectively, with R^2 of regression = 0.643 and variance being significant at $p<0.05$). None of the other independent variables were significant predictors of the participants' opinions on the Quality of the ODL program ($p > 0.05$). Four independent variables (Age3, Baishya, MobAndLap, and InsSchool) were automatically excluded from the model by the SPSS because their tolerance values were all zeros making the variance inflation factor (VIF) infinitely large due to the existence of multiple collinearities caused by those variables.

Table 7. MLR Analysis of Dependent Variable *Quality* and Independent Variables (Gender, Location, Ethnicity, Age Group, School Type, Device Use and Perceptions of *Opportunity, Relevance, Development, Support*, and *Challenges*)

Model	Model Parameters	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	2.717	.987		2.753	.008		
	Gender	-.451	.248	-.256	-1.821	.074	.356	2.806
	Hometown	-.269	.165	-.191	-1.628	.110	.512	1.954
	Age2	-.485	.192	-.282	-2.528	.015	.564	1.774
	Age4	.010	.182	.005	.056	.955	.743	1.346
	Age5	-.110	.498	-.026	-.220	.826	.511	1.957
F (18, 52) = 5.014, $p < 0.05$, $R^2 = 0.634$	Brahman	.443	.163	.316	2.719	.009	.521	1.918
	Kshetree	.094	.187	.055	.503	.617	.593	1.685
	Laptop	.322	.163	.210	1.974	.054	.623	1.606
Excluded: Age3, Baishya, Mob. and Laptop, Ins. School	Mobile Phone	-.020	.303	-.006	-.065	.948	.707	1.414
	Desktop	.156	.441	.037	.355	.724	.652	1.534
	Com. School	.412	.166	.245	2.489	.016	.723	1.383
(0 tolerance)	Pub. School	.139	.175	.089	.796	.430	.559	1.791
	Other School	-.281	.301	-.120	-.933	.355	.429	2.333
	Opportunity	.184	.144	.147	1.278	.207	.530	1.888
	Relevance	-.205	.178	-.151	-1.156	.253	.410	2.441
	Development	.052	.147	.043	.354	.725	.479	2.087
	Support	.424	.107	.432	3.968	.000	.592	1.688
	Challenges	-.250	.089	-.261	-2.816	.007	.817	1.225

Dependent Variable: *Quality*

Perception of Opportunity

The participant responses in the items related to the perception of the educational *Opportunity* through the ODL showed that they were very positive (Mean = 4.14, Standard Deviation = 0.52) to the educational opportunity through the ODL. This means that the graduate students in the ODL had a high-level feeling that the program provided them an opportunity for higher education which, otherwise, would not be possible for them without leaving their jobs. Their opinion about the course content, process, and context; comfort of education, curriculum, interactive environment, flexibility, and scope of distance education all were rated significantly above the neutral value (Table 8 and Figure 3).

Table 8. Descriptive Statistics and One-Sample t-test for the Perception of Educational *Opportunity* through ODL

One-Sample Statistics and Test at Population Mean = 3						
Items	N	Mean	STD Dev	Mean Diff	t-Value	Sig. (two-tailed)
O1	71	4.00	.697	1.000	12.090	.000
O2	71	4.27	.861	1.268	12.403	.000
O3	71	3.54	1.053	.535	4.282	.000
O4	71	4.11	.854	1.113	10.973	.000
O5	71	3.54	.969	.535	4.656	.000
O6	71	4.01	.870	1.014	9.821	.000
O7	71	4.32	.752	1.324	14.842	.000

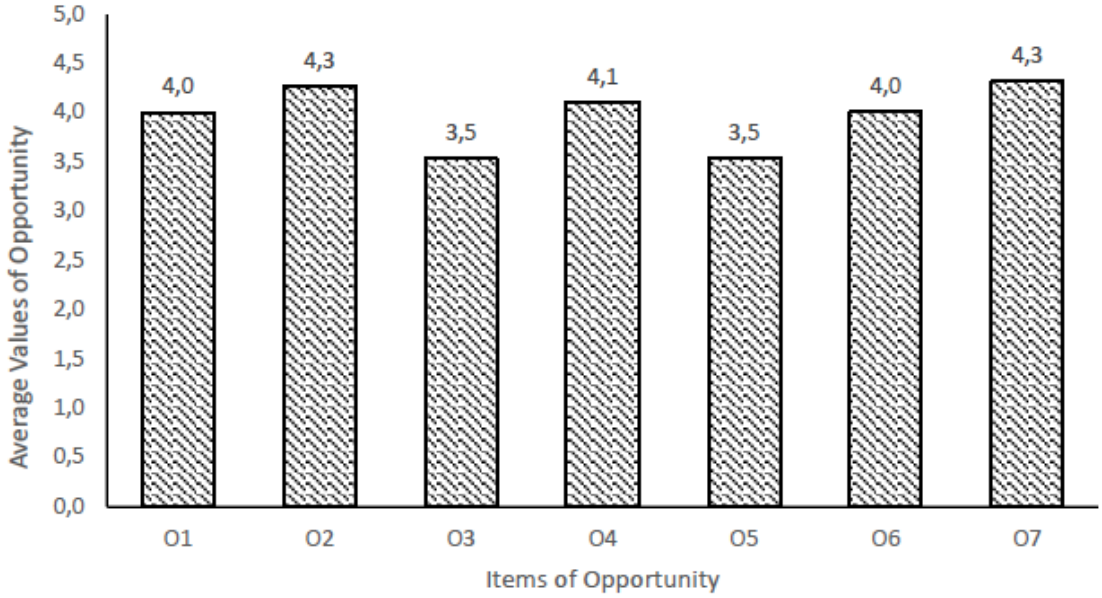

Figure 3. Average Value of Perception of Educational *Opportunity* through the ODL

Independent-samples Man-Whitney U Test for the distribution of participants' perceptions on educational *Opportunity* through the ODL across the Gender (male and female) showed no significant difference (Retain O-$H_0$1) at 0.05 level of significance. However, it was significantly different across the Hometown (Reject O-$H_0$2) (Table 9). Likewise, the Kruskal-Wallis Test results in Table 9 showed no significant difference in the participants' perceptions of educational *Opportunity* through the ODL across Age Groups, Ethnicity, School Type, and Device Use (Retain O-$H_0$3, O-$H_0$4, O-$H_0$5, O-$H_0$6) ($p > 0.05$).

Table 9. Hypothesis Test on the Distribution of Perception of Educational *Opportunity* across Gender, Hometown, Age Group, Ethnicity, School Type, and Device Use

Null Hypothesis		Test	Sig.	Decision
Hyp. No.	Hypothesis			
O-$H_0$1	The distribution of *Opportunity* is the same across categories of Gender.	Independent-Samples Mann-Whitney U Test	0.711	Retain the null hypothesis.
O-$H_0$2	The distribution of *Opportunity* is the same across categories of Hometown.	Independent-Samples Mann-Whitney U Test	0.022	Reject the null hypothesis.

O-$H_0$3	The distribution of *Opportunity* is the same across categories of Age Group.	Independent-Samples Kruskal-Wallis Test	0.425	Retain the null hypothesis.
O-$H_0$4	The distribution of *Opportunity* is the same across categories of Ethnicity.	Independent-Samples Kruskal-Wallis Test	0.541	Retain the null hypothesis.
O-$H_0$5	The distribution of *Opportunity* is the same across categories of Type of School.	Independent-Samples Kruskal-Wallis Test	0.976	Retain the null hypothesis.
O-$H_0$6	The distribution of *Opportunity* is the same across categories of Device Use.	Independent-Samples Kruskal-Wallis Test	0.298	Retain the null hypothesis.

Asymptotic significances are displayed at the level of 0.05.

An MLR analysis of dependent variable *Opportunity* and independent variables (Gender, Location, Ethnicity, Age Group, School Type, Device Use, and perceptions on *Relevance, Development, Support*, and *Challenges* was performed (Table 10). The results showed that only *Relevancy* was the significant predictors of participants' views on the *Opportunity* of the ODL (the significant values being 0.001, with R^2 of regression = 0.487 and variance being significant at $p<0.05$). None of the other independent variables were significant predictors of the participants' opinions on their learning *Opportunity* in the ODL program at $p > 0.05$. Four independent variables (Age2, Brahman, MobAndLap, and InsSchool) were excluded from the model because their tolerance values were all zeros making the variance inflation factor (VIF) infinitely large as a result of multiple collinearities with those variables (Table 10).

Table 10. MLR Analysis of Dependent Variable *Opportunity* and Independent Variables (Gender, Location, Ethnicity, Age Group, School Type, Device Use and Perceptions of *Quality, Relevance, Development, Support*, and *Challenges*)

Model	Model Parameters	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
2	(Constant)	-.293	.973		-.301	.765		
	Gender	.313	.239	.221	1.310	.196	.346	2.890
	Hometown	.084	.161	.074	.524	.602	.489	2.043
	Age3	-.001	.193	-.001	-.005	.996	.346	2.888
	Age4	.032	.242	.021	.132	.896	.381	2.627
	Age5	.404	.451	.119	.896	.374	.561	1.783
F (18, 52) = 2.737, p < 0.05, R^2 = 0.487	Kshetree	.139	.166	.101	.838	.406	.681	1.469
	Baishya	.106	.165	.086	.645	.522	.552	1.811
	Laptop	-.052	.161	-.042	-.323	.748	.580	1.723
	Mobile Phone	-.247	.286	-.101	-.864	.392	.717	1.394
	Desktop	-.240	.418	-.070	-.574	.569	.654	1.528
Excluded: Age2, Brahman, Mob. And Laptop, Ins. School	Com. School	.002	.166	.002	.013	.990	.646	1.548
	Pub. School	.146	.166	.117	.882	.382	.560	1.786
	Other School	.329	.285	.175	1.155	.253	.432	2.313
	Relevance	.530	.154	.488	3.438	.001	.490	2.040
(0 tolerance)	*Development*	.116	.139	.119	.833	.409	.484	2.065
	Support	.160	.114	.204	1.410	.164	.472	2.119
	Challenges	.051	.090	.067	.568	.573	.713	1.403
	Quality	.166	.130	.207	1.278	.207	.377	2.652

Dependent Variable: *Opportunity*

Perception of Relevance

The participant responses to the items related to the *Relevance* of the ODL showed that they were positive (Mean = 3.94 and Standard Deviation = 0.57) to the relevancy of the ODL in Nepal. That means the graduate students in the ODL program found the program relevant to their needs for professional growth and development. Their opinion about the ODL program in Nepal for higher education, ICT tools for learning, effective and timely classes, connectivity and delivery of lessons, professional growth, and access to higher education seemed to prove it very relevant in the current context of COVID-19 pandemic (Table 11 and Figure 4).

Table 11. Descriptive Statistics and One-Sample t-Test for the Perception of Educational *Relevance* of ODL

One-Sample Statistics and Test at Population Mean = 3						
Items	N	Mean	STD Dev	Mean Diff	t-Value	Sig. (two-tailed)
R1	71	4.14	.850	1.141	11.307	.000
R2	71	4.24	.686	1.239	15.227	.000
R3	71	4.10	.740	1.099	12.513	.000
R4	71	3.89	.871	.887	8.585	.000
R5	71	4.11	.854	1.113	10.973	.000
R6	71	4.20	.729	1.197	13.830	.000

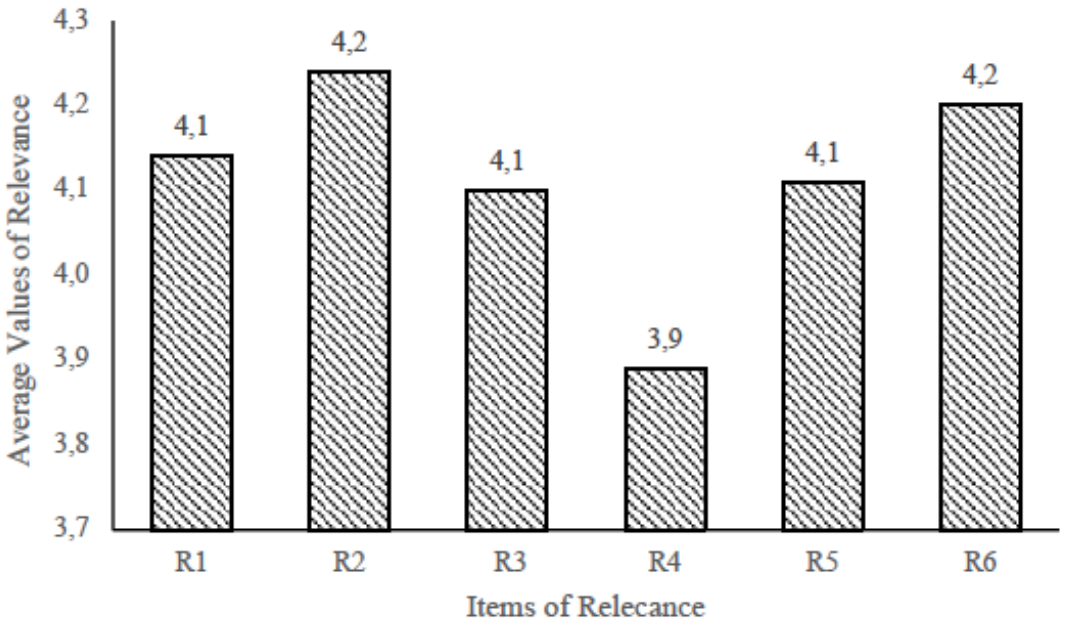

Figure 4. Average Value on Perception of Educational *Relevance* of the ODL

Independent-samples Man-Whitney U Test for the distribution of participants' perceptions of educational *Relevancy* of the ODL across the Gender (male and female) showed no significant difference (Retain R-$H_0$1) at 0.05 level of significance. However, it was significantly different across the Hometown (Reject R-$H_0$2) (Table 12). Likewise, the Kruskal-Wallis Test results in Table 12 showed no significant difference in the participants' perceptions of educational *Relevancy* of the ODL across Age Groups, Ethnicity, and School Type (Retain R-$H_0$3, R-$H_0$4, R-$H_0$5), but the participants' groups differed significantly in their opinion based on the Device Use (Reject R-$H_0$6) ($p < 0.05$). The post-hoc test for the comparison of the groups with device usage showed that the students' using laptop differed signficantly with those using mobile phone to access ODL classes and materials at 0.05 level of signficance. This difference in the perceptions of *Relevance* in these two groups might be due to their different experience in these devices to make the ODL relevant or not.

Table 12. Hypothesis Test on the Distribution of Perception of Educational *Relevance* of ODL across Gender, Hometown, Age Group, Ethnicity, School Type, and Device Use

Null Hypothesis		Test	Sig.	Decision
Hyp. No.	Hypothesis			
R-$H_0$1	The distribution of *Relevance* is the same across categories of Gender.	Independent-Samples Mann-Whitney U Test	0.930	Retain the null hypothesis.
R-$H_0$2	The distribution of *Relevance* is the same across categories of Hometown.	Independent-Samples Mann-Whitney U Test	0.018	Reject the null hypothesis.
R-$H_0$3	The distribution of *Relevance* is the same across categories of Age Group.	Independent-Samples Kruskal-Wallis Test	0.441	Retain the null hypothesis.
R-$H_0$4	The distribution of *Relevance* is the same across categories of Ethnicity.	Independent-Samples Kruskal-Wallis Test	0.371	Retain the null hypothesis.
R-$H_0$5	The distribution of *Relevance* is the same across categories of Type of School.	Independent-Samples Kruskal-Wallis Test	0.466	Retain the null hypothesis.
R-$H_0$6	The distribution of *Relevance* is the same across categories of Device Use.	Independent-Samples Kruskal-Wallis Test	0.030	Reject the null hypothesis.

Asymptotic significances are displayed at the level of 0.05.

The MLR analysis of dependent variable *Relevancy* and independent variables (Gender, Hometown, Ethnicity, Age Group, School Type (Institutional), Device Use, and perceptions on *Quality, Opportunity, Development, Support*, and *Challenges*) is presented in Table 13. The results showed that Gender, Hometown, Use of Device (Laptop), School Type (Other School), and perception (*Development* and *Opportunity*) were the significant predictors of participants' views on the *Relevancy* of the ODL (the significant values being 0.016, 0.004, 0.006, 0.007, 0.041 and 0.001, respectively, with R^2 of regression = 0.601 and variance being significant at $p<0.05$. None of the other independent variables were significant predictors of the participants' opinions on their learning *Relevancy* in the ODL program at $p > 0.05$. Four independent variables (Age3, Baishya, MobAndLap, and InsSchool) were excluded from the model because their tolerance values were all zeros making the variance inflation factor (VIF) infinitely large due to the potential existence of multiple collinearities among those variables (Table 13).

Table 13. MLR Analysis of Dependent Variable *Relevance* and Independent Variables (Gender, Location, Ethnicity, Age Group, School Type, Device Use and Perceptions of *Quality, Relevance, Development, Support*, and *Challenges*)

Model	Model Parameters	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
3	(Constant)	3.171	.686		4.625	.000		
	Gender	-.466	.186	-.358	-2.502	.016	.375	2.665
	Hometown	-.361	.121	-.347	-2.995	.004	.571	1.752
	Age2	-.243	.153	-.191	-1.583	.120	.526	1.900
F (18, 52) = 4.345, p < 0.05, R^2 = 0.601	Age4	.040	.140	.029	.286	.776	.744	1.344
	Age5	-.175	.383	-.056	-.457	.650	.512	1.951
	Brahman	.201	.131	.194	1.526	.133	.477	2.097
	Kshetree	.125	.144	.099	.873	.386	.599	1.669
	Laptop	.346	.122	.305	2.843	.006	.669	1.494
	Mobile Phone	.056	.234	.025	.240	.811	.708	1.413
Excluded: Age3, Baishya, Mob. And Laptop, Ins. School	Desktop	.116	.340	.037	.343	.733	.652	1.534
	Com. School	-.023	.135	-.018	-.167	.868	.646	1.547
	Pub. School	-.218	.132	-.189	-1.647	.106	.581	1.722
	Other School	-.618	.218	-.356	-2.831	.007	.487	2.055
(0 tolerance)	*Development*	.229	.109	.256	2.099	.041	.518	1.929
	Support	-.095	.093	-.131	-1.021	.312	.464	2.156
	Challenges	-.044	.073	-.062	-.596	.554	.713	1.402
	Quality	-.122	.106	-.165	-1.156	.253	.375	2.667
	Opportunity	.349	.102	.379	3.438	.001	.630	1.587

Dependent Variable: *Relevancy*

Perception of Development

The participants were very positive about their *Development* through the ODL in Nepal. The overall perception of professional development through the ODL was positive (Mean = 4.00 and Standard Deviation = 0.58). That means the graduate students in the ODL program were positive about their learning experiences in terms of their professional development while they were full-time teachers and students at the same time. They seemed to agree on the opinion that the ODL program helps them in promoting quality of education, professional enhancement in teaching-learning, independent and self-learning, and interaction among students and teachers through the ODL facilities in Nepal (Table 14 and Figure 5).

Table 14. Descriptive Statistics and One-Sample t-Test for the Perception of Educational *Development* of ODL

	One-Sample Statistics and Test at Population Mean = 3					
Items	N	Mean	STD Dev	Mean Diff	t-Value	Sig. (two-tailed)
D1	71	4.00	.894	1.000	9.421	.000
D2	71	4.32	.692	1.324	16.114	.000
D3	71	3.99	.727	.986	11.429	.000
D4	71	3.99	.853	.986	9.734	.000
D5	71	3.70	1.020	.704	5.819	.000

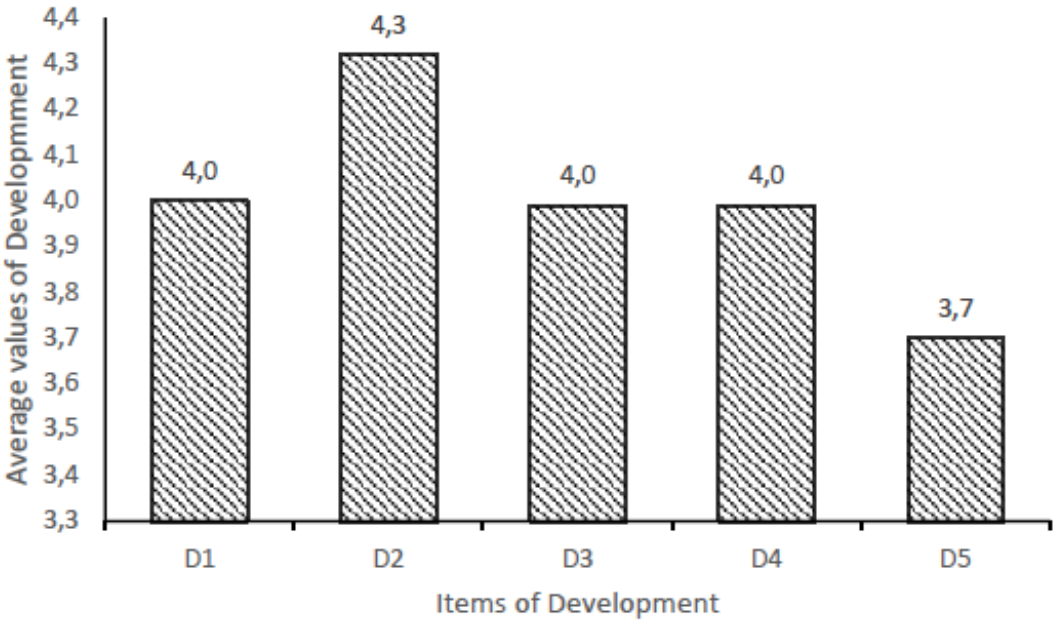

Figure 5. Average Value on Perception of Educational *Development* of the ODL

Independent-samples Man-Whitney U Test for the distribution of participants' perceptions on professional Development through the ODL across the Gender and Hometown showed no significant difference (Retain D-$H_0$1, D-$H_0$2) at 0.05 level of significance (Table 15). Likewise, the Kruskal-Wallis Test results in Table 15 showed no significant difference in the participants' perceptions of *Development* through the ODL across Age, Ethnicity, School Type, and Device Use (Retain D-$H_0$3, D-$H_0$4, D-$H_0$5, D-$H_0$6) ($p < 0.05$).

Table 15. Hypothesis Test on the Distribution of Perception of academic *Development* through ODL across Gender, Hometown, Age Group, Ethnicity, School Type, and Device Use

Null Hypothesis		Test	Sig.	Decision
Hyp. No.	Hypothesis			
D-$H_0$1	The distribution of student *Development* is the same across categories of Gender.	Independent-Samples Mann-Whitney U Test	0.532	Retain the null hypothesis.
D-$H_0$2	The distribution of *Development* is the same across categories of Hometown.	Independent-Samples Mann-Whitney U Test	0.168	Retain the null hypothesis.
D-$H_0$3	The distribution of *Development* is the same across categories of Age Group.	Independent-Samples Kruskal-Wallis Test	0.147	Retain the null hypothesis.
D-$H_0$4	The distribution of *Development* is the same across categories of Ethnicity.	Independent-Samples Kruskal-Wallis Test	0.400	Retain the null hypothesis.
D-$H_0$5	The distribution of *Development* is the same across categories of Type of School.	Independent-Samples Kruskal-Wallis Test	0.625	Retain the null hypothesis.
D-$H_0$6	The distribution of *Development* is the same across categories of Device Use.	Independent-Samples Kruskal-Wallis Test	0.505	Retain the null hypothesis.

Asymptotic significances are displayed at the level of 0.05.

An MLR analysis was conducted between the dependent variable *Development* and the independent variables (Gender, Location, Ethnicity, Age Group, School Type, Device Use, and perceptions on *Quality, Opportunity, Relevance, Support,* and *Challenges*)). The results in Table 16 showed that Age Group (Age4, 40-above) and *Relevancy* were the significant predictors of participants' views on their development through the ODL with the corresponding significant values being 0.023 and 0.041, respectively, with R^2 of regression = 0.522 and variance being significant at $p<0.05$). None of the other independent variables were significant

predictors of the participants' opinions on their *Development* through the ODL program, as $p > 0.05$. Four independent variables (Age3, Brahman, MobAndLap, and InsSchool) were excluded from the model because their tolerance values were all zeros making the variance inflation factor (VIF) infinitely large due to the potential existence of multiple collinearities among those variables (Table 16).

Table 16. MLR Analysis of Dependent Variable *Development* and Independent Variables (Gender, Location, Ethnicity, Age Group, School Type, Device Use and Perceptions of *Quality, Relevance, Opportunity, Support*, and *Challenges*)

Model	Model Parameters	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
4	(Constant)	2.037	1.012		2.013	.049		
	Gender	-.443	.232	-.305	-1.904	.062	.358	2.791
	Hometown	-.087	.159	-.075	-.545	.588	.490	2.042
	Age2	-.205	.189	-.145	-1.086	.283	.513	1.947
	Age4	-.092	.171	-.059	-.536	.595	.747	1.339
	Age5	-1.040	.446	-.298	-2.334	.023	.564	1.773
F (18, 52) = 3.156, $p < 0.05$, $R^2 = 0.522$	Kshetree	-.118	.165	-.084	-.718	.476	.678	1.475
	Baishya	-.184	.162	-.145	-1.136	.261	.561	1.782
	Laptop	.073	.159	.058	.458	.649	.582	1.719
	Mobile Phone	.036	.286	.014	.126	.900	.707	1.414
Excluded: Age3, Brahman, Mob. and Laptop, Ins. School	Desktop	.086	.415	.024	.206	.837	.651	1.537
	Com. School	.034	.165	.025	.208	.836	.647	1.547
	Pub. School	.131	.165	.102	.794	.431	.558	1.791
	Other School	-.536	.276	-.277	-1.942	.058	.452	2.212
(0 tolerance)	*Support*	.171	.112	.212	1.528	.133	.475	2.105
	Challenges	-.001	.090	-.002	-.014	.989	.709	1.411
	Quality	.046	.130	.056	.354	.725	.366	2.729
	Opportunity	.114	.136	.111	.833	.409	.520	1.922
	Relevance	.341	.162	.306	2.099	.041	.433	2.308

Dependent Variable: *Development*

Perception of Support

The participant responses in the items related to the perception of the *Support* in the ODL showed that they were almost neutral (Mean = 3.02 and Standard Deviation = 0.72) to the overall rating of this construct. That means the graduate students in the program did not have a biased feeling of the ODL either as supportive or not supportive. They were undecided regarding the program support. Their opinion about the quality of assessment, motivation to adopt ICT, and the availability of competent teachers was not significantly different from the neutral value 3. They rated higher in the items related to quality of the learning in the ODL and classes on online mode equally effective as the face-to-face classes. However, they rated low (below neutral) for the unavailability of digital educational resources as difficulty in the ODL (Table 17 and Figure 6).

Table 17. Descriptive Statistics and One-Sample t-Test for the Perception of Student *Support* in ODL Courses

One-Sample Statistics and Test at Population Mean = 3						
Items	N	Mean	STD Dev	Mean Diff	t-Value	Sig. (two-tailed)
S1	71	3.27	.925	.268	2.437	.017
S2	71	4.24	.686	1.239	15.227	.000
S3	71	3.10	1.197	.099	.694	.490
S4	71	3.38	.900	.380	3.559	.001
S5	71	2.96	1.034	-.042	-.344	.732

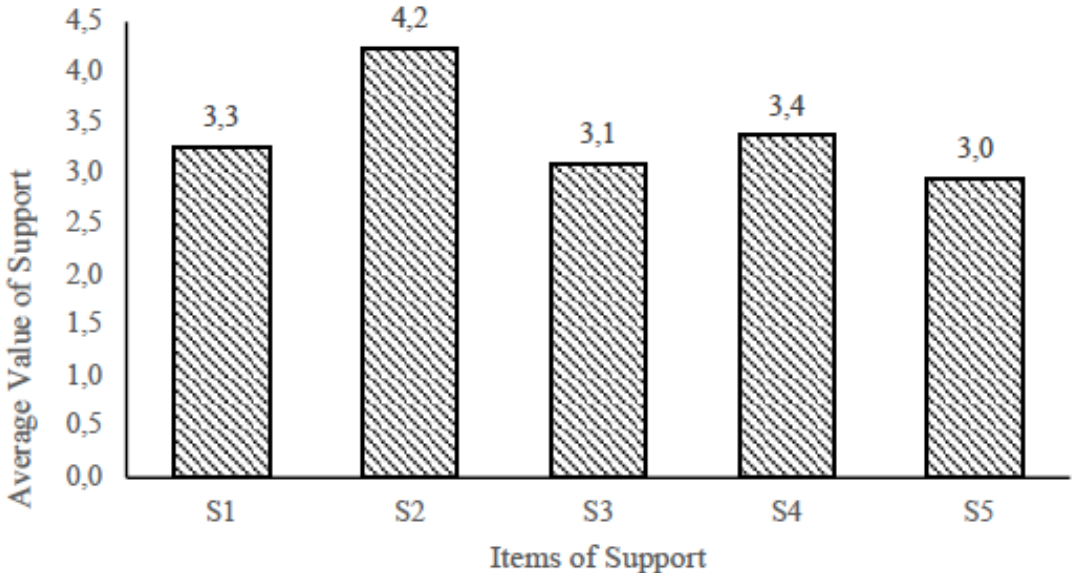

Figure 6. Average Value on Perception of Student *Support* in the ODL Courses

Independent-samples Man-Whitney U Test for the distribution of participants' perceptions on student *Challenges* in the ODL courses across the Gender showed no significant difference (Retain S-$H_0$1), but the perceptual difference in *Support* was significant across their Hometown (Rejet S-$H_0$2) at 0.05 level of significance (Table 18). Likewise, the Kruskal-Wallis Test results in Table 18 showed no significant difference in the participants' perceptions of *Support* within the ODL across Age Groups, Ethnicity, School Type, and Device Use (Retain S-$H_0$3, S-$H_0$4, S-$H_0$5, S-$H_0$6) ($p < 0.05$).

Table 18. Hypothesis Test on the Distribution of Perception of *Support* in ODL Courses across Gender, Hometown, Age Group, Ethnicity, School Type, and Device Use

Null Hypothesis		Test	Sig.	Decision
Hyp. No.	Hypothesis			
S-$H_0$1	The distribution of *Support* is the same across categories of Gender.	Independent-Samples Mann-Whitney U Test	0.421	Retain the null hypothesis.
S-$H_0$2	The distribution of *Support* is the same across categories of Hometown.	Independent-Samples Mann-Whitney U Test	0.038	Reject the null hypothesis.
S-$H_0$3	The distribution of *Support* is the same across categories of Age Group.	Independent-Samples Kruskal-Wallis Test	0.405	Retain the null hypothesis.
S-$H_0$4	The distribution of *Support* is the same across categories of Ethnicity.	Independent-Samples Kruskal-Wallis Test	0.916	Retain the null hypothesis.
S-$H_0$5	The distribution of *Support* is the same across categories of Type of School.	Independent-Samples Kruskal-Wallis Test	0.272	Retain the null hypothesis.
S-$H_0$6	The distribution of *Support* is the same across categories of Device Use.	Independent-Samples Kruskal-Wallis Test	0.906	Retain the null hypothesis.

Asymptotic significances are displayed at the level of 0.05.

An MLR analysis of the dependent variable *Support* and the independent variables (Gender, Location, Ethnicity, Age Group, School Type, Device Use, and perceptions on *Quality, Opportunity, Relevance, Development,* and *Challenges*)) in Table 19 showed that perception of *Quality* was the only significant predictor of participants' views on the student *Support* in the ODL at a significant level of 0.000 < 0.05 and R^2 of regression = 0.545, and variance being significant at p<0.05). None of the other independent variables were significant predictors of the participants' opinions on student *Support* in the ODL program at p > 0.05. Four independent variables (Age3, Brahman, MobAndLap, and InsSchool) were excluded from the model because their tolerance values were all zeros making the variance inflation factor (VIF) infinitely large due to the potential existence of multiple collinearities among those variables (Table 19).

Table 19. MLR Analysis of Dependent Variable *Support* and Independent Variables (Gender, Location, Ethnicity, Age Group, School Type, Device Use and Perceptions of *Quality, Opportunitity, Relevance, Support*, and *Challenges*)

Model	Model Parameters	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
5	(Constant)	.193	1.270		.152	.880		
	Gender	-.151	.290	-.084	-.522	.604	.337	2.970
	Hometown	-.220	.190	-.153	-1.158	.252	.499	2.002
	Age2	.188	.230	.107	.818	.417	.509	1.966
	Age4	.211	.205	.110	1.027	.309	.758	1.319
	Age5	-.384	.564	-.089	-.682	.498	.515	1.942
F (18, 52) = 3.465, p < 0.05, R^2 = 0.54	Kshetree	.166	.199	.095	.835	.407	.681	1.469
	Baishya	.266	.195	.170	1.368	.177	.567	1.763
	Laptop	-.111	.192	-.071	-.579	.565	.583	1.715
	Mobile Phone	.485	.339	.156	1.432	.158	.735	1.361
Excluded: Age3, Brahman, Mob and Laptop, Ins. School	Desktop	.438	.498	.101	.879	.383	.660	1.515
	Com. School	-.214	.197	-.125	-1.085	.283	.661	1.514
	Pub. School	-.314	.195	-.197	-1.606	.114	.579	1.727
(0 tolerance)	Other School	.037	.346	.015	.107	.915	.422	2.372
	Challenges	.085	.108	.087	.788	.434	.717	1.395
	Quality	.548	.138	.538	3.968	.000	.476	2.100
	Opportunity	.230	.163	.181	1.410	.164	.533	1.876
	Relevance	-.207	.202	-.150	-1.021	.312	.407	2.455
	Development	.250	.164	.202	1.528	.133	.499	2.003

Dependent Variable: *Support*

Perception of Challenges

The participants were positive to the four (except one) items related to *Challenges* of the ODL in Nepal. The overall perception of graduate students on the challenges in the ODL was slightly higher than neutral (Mean = 3.35 and Standard Deviation = 0.74). Their opinions about the challenges of the ODL program in Nepal indicated potential problems related to ICT skills and training for teachers and students and pedagogical competency of online instructors, but they rated neutral for the lack of ICT integration in the ODL curriculum as the difference of mean was not significant (Table 20 and Figure 7).

Table 20. Descriptive Statistics and One-Sample t-Test for the Perception of *Challenge*s in the ODL Courses

One-Sample Statistics and Test at Population Mean = 3						
Items	N	Mean	STD Dev	Mean Diff	t-Value	Sig. (two-tailed)
C1	71	3.52	1.094	.521	4.015	.000
C2	71	3.35	1.030	.352	2.882	.005
C3	71	3.41	1.154	.408	2.983	.004
C4	71	3.37	.975	.366	3.166	.002
C5	71	3.08	1.025	.085	.695	.489

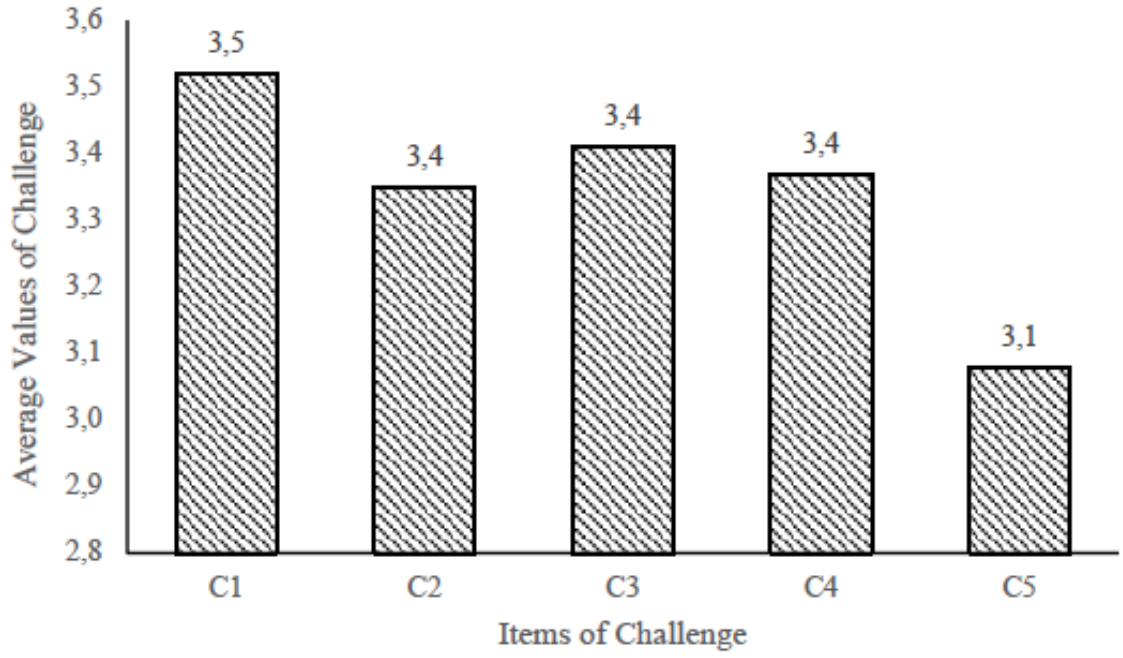

Figure 7. Average Value on Perception of *Challenge*s in the ODL Courses

Independent-samples Man-Whitney U Test for the distribution of participants' perceptions on *Challenges* in the ODL courses across the Gender and Hometown showed no significant difference (Retain C-$H_0$1, C-$H_0$2) at 0.05 level of significance. Likewise, the Kruskal-Wallis Test showed no significant difference in the participants' perceptions of *Challenges* of the ODL across Age Groups, Ethnicity, School Type, and Device Use ($p < 0.05$) (Retain C-H03, C-H04, C-H05, C-H06) (Table 21).

Table 21. Hypothesis Test on the Distribution of Perception of *Challenges* in ODL Courses across Gender, Hometown, Age Group, Ethnicity, School Type, and Device Use

Null Hypothesis		Test	Sig.	Decision
Hyp. No.	Hypothesis			
C-$H_0$1	The distribution of *Challenges* is the same across categories of Gender.	Independent-Samples Mann-Whitney U Test	0.632	Retain the null hypothesis.
C-$H_0$2	The distribution of *Challenges* is the same across categories of Hometown.	Independent-Samples Mann-Whitney U Test	0.754	Retain the null hypothesis.
C-$H_0$3	The distribution of *Challenges* is the same across categories of Age Group.	Independent-Samples Kruskal-Wallis Test	0.352	Retain the null hypothesis.
C-$H_0$4	The distribution of *Challenges* is the same across categories of Ethnicity.	Independent-Samples Kruskal-Wallis Test	0.407	Retain the null hypothesis.

C-$H_0$5	The distribution of *Challenges* is the same across categories of Type of School.	Independent-Samples Kruskal-Wallis Test	0.493	Retain the null hypothesis.
C-$H_0$6	The distribution of *Challenges* is the same across categories of Device Use.	Independent-Samples Kruskal-Wallis Test	0.528	Retain the null hypothesis.

Asymptotic significances are displayed at the level of 0.05.

An MLR analysis of dependent variable *Challenges* and independent variables (Gender, Location, Ethnicity, Age Group, School Type, and Device Use and five perceptual variables in Table 22 showed only one independent variable of perception associated with *Quality* as significant to predict the participants' views about *Challenges* in the ODL program with $p = 0.007 < 0.05$, R^2 regression = 0.291, and variance being significant at $p < 0.05$ (Table 22). None of the other independent variables were significant predictors of the participants' opinions on their opinion on *Challenges* in the ODL program, as $p > 0.05$. Four independent variables (Age2, Brahman, MobAndLap, and InsSchool) were excluded from the model because their tolerance values were all zeros making the variance inflation factor (VIF) infinitely large due to the potential existence of multiple collinearities among those variables (Table 22).

Table 22. MLR Analysis of Dependent Variable *Challenges* and Independent Variables (Gender, Location, Ethnicity, Age Group, School Type, Device Use and Perceptions of *Quality, Opportunity, Relevance, Development, and Support*)

Model	Model Parameters	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
6	(Constant)	5.036	1.315		3.830	.000		
	Gender	-.351	.368	-.191	-.955	.344	.341	2.934
	Hometown	-.130	.246	-.088	-.527	.600	.490	2.043
	Age3	.373	.291	.250	1.282	.205	.357	2.799
	Age4	-.114	.369	-.059	-.310	.758	.381	2.623
	Age5	.565	.691	.128	.818	.417	.559	1.788
F (18, 52) = 1.188, $p > 0.05$, $R^2 = 0.291$	Kshetree	-.320	.252	-.178	-1.270	.210	.692	1.444
	Baishya	-.130	.252	-.081	-.515	.609	.550	1.817
	Laptop	.078	.246	.048	.316	.753	.580	1.723
	Mobile Phone	.364	.438	.115	.830	.410	.716	1.396
	Desktop	-.132	.640	-.030	-.207	.837	.651	1.537
Excluded: Age2, Brahman, Mob. and Laptop, Ins. School	Com. School	.054	.254	.031	.213	.832	.647	1.547
	Pub. School	-.294	.253	-.181	-1.165	.249	.566	1.766
	Other School	-.324	.439	-.132	-.737	.464	.426	2.348
	Quality	-.528	.188	-.507	-2.816	.007	.421	2.374
(0 tolerance)	*Opportunity*	.120	.211	.092	.568	.573	.517	1.936
	Relevance	-.155	.260	-.110	-.596	.554	.402	2.487
	Development	-.003	.214	-.002	-.014	.989	.478	2.092
	Support	.139	.176	.136	.788	.434	.460	2.174

Dependent Variable: *Challenges*

DISCUSSION

The present study analyzed the participants' views on the ODL in the Nepalese context based on six perceptual components —*Quality, Opportunity, Relevance, Development, Support, and Challenges* concerning independent variables Gender, Ethnicity, Age Group, Hometown, School Type, and Device Use. These perceptual dimensions of the ODL were derived from the principal component analysis of 40 items in the GSPODL questionnaire. This indicated that the graduate students' perceptions of the ODL were mostly related to the quality and relevancy of the program to provide opportunity of higher education and professional development of the working teachers in Nepal. The participants' perceptions were also aligned with the management aspects of the ODL, such as the challenges facing by the students in the ODL and the nature and quality of support they received from the institution.

Among the forty-two null hypothesis tested either by Mann-Whitney U Test or Kruskal-Wallis Test, only six were rejected at 0.05 level of significance. These results showed that the participants' views about *Quality, Opportunity, Relevance*, and *Support* were significantly different across their place of residence (rural and urban residences). Likewise, there was a significant difference in their views on the *Relevancy* of the ODL concerning Device Use. There was no significant difference in their views across the variables Gender, Ethnicity, School Type, and Device Use in all other criteria. These results demonstrate that participants' Hometown location makes a big difference in their perception of online and distance classes' quality. Internet connectivity in Nepal is yet to be improved at different places, especially out of urban areas. Since the ODL classes were run synchronous way in which all students and teachers had to be in the virtual class through the Microsoft Teams meeting platform, this connectivity through the virtual synchronous courses requires a good broadband Internet connection, which is still far from the rural areas where several research participants were staying. Even the asynchronous virtual classroom interaction needs a high bandwidth for such applications (Regmi, 2017). This issue is also related to the device students used during the virtual class sessions as some devices might not support high-definition videos for quality communication and interaction, leading to the significant difference among the participant views on *Relevancy* of the ODL.

Quality related perception of the participants showed that the quality of the ODL was better than the traditional face-to-face on-campus learning. However, they also agree that the availability of digital and other technical resources affected the quality of teaching and learning in the ODL program. The virtual online classes on the synchronous mode were not less effective than the face-to-face mode. That means, for the working teachers, the ODL provided them quality of education that was not, in many ways, less than the traditional mode of teaching-learning in the Nepalese context. However, the quality was significantly affected by the location of the students due to low Internet connection and lack of regular power supply. The perception of quality was not significantly different in other independent variables, such as gender, age-group, ethnicity, school type, and device use. While concerning the level of perception based on the different causal variables, age group (between 26–30 years), ethnicity (brahmin), and school type (community schools) were the relevant factors that can be attributed to forming positive or negative perceptions about the quality of the ODL in Nepal.

When the implementation of online and distance learning is concerned, *Quality* is always the most critical component to be considered. The quality of the ODL is always compared with the conventional mode of education to make decisions about investment in ICT infrastructure, human resources, and management of the teaching-learning system (Markova et al., 2017). Several studies compared the quality and effectiveness of the ODL and the face-to-face mode of education. They reported that learning in a distance or online manner can be equally valid or even more effective than the traditional pattern (Allen & Seaman, 2014). The high *Quality* of the ODL can be attributed to students' self-study and independence in the study process, and gaining several skills that otherwise would be overshadowed in the face-to-face pattern. These skills are self-dependence, planning and organizing resources for study, appropriate time management based on individual needs, perseverance in problem-solving, taking self-responsibility, and working under multiple tasks context (e.g., family, job, and college course) (Markova et al., 2017). Such skills can be connected to e-learning that "offers multiple opportunities for self-regulated learning" (Paechter & Maier, 2010, p. 296).

The participants in this study also rated high for the *Opportunity* related items indicating that they have considered the ODL as an opportunity for their learning and growth. The graduate students viewed that the

course content, process, and context; the comfort of education, curriculum, interactive environment, flexibility, and scope of distance education all provided them with an opportunity to continue higher education while they were working full-time as school teachers at the different locations of Nepal. They seemed happy to have this opportunity to study from their own place through the online and distance education. They also felt that the classes were interactive and the curriculum helped them to organize their learning experiences by helping and supporting each other, despite being distant from each other. However, their perception of the opportunity was not the same across the locations. The reason might be the access of Internet and online platforms to classes from rural and remote places of Nepal where these facilities are limited or not adequate. Although the perception of participants about the opportunity of the ODL seemed very positive, there was not a single predictor that could accurately or reliably predict this variable among the independent variables, age group, gender, location, school type, ethnicity, and device use, except the feeling of the relevance of the program.

There is a widespread skepticism toward the effectiveness of online and distance education because it is still viewed as "inferior to face-to-face education" (Protopsaltis & Baum, 2019, p. 30). Such skepticism has been stemmed from a lack of affordability, high cost, and lack of substantive interaction among the students and teachers during the online/distance learning. Despite these limitations and skepticism, ODL has gained popularity and expansion in recent years. The application of the ODL tools and techniques has been exponentially grown at the current moment due to the COVID-19 Pandemic. The majority of higher education institutions across the globe are going for a fully online and distant or blended mode of teaching-learning (Ali, 2020). Students at higher education institutions may consider the *Relevancy* of the ODL in terms of feeling connected, having shared feelings as members of the learning community, and continue learning through the synchronous and asynchronous communication with each other despite the physical distance from the educational institution (Swaggerty & Broemmel, 2017).

The graduate students (research participants) found that the ODL was very relevant in the context of Nepal. The sense of the relevancy of the ODL was high due to flexibility of the delivery, access to the program from participants' place, use of devices such as computers or phones and other online technology and applications, professional connection (as school teachers), and continuous education despite being far from the university location while working at schools. However, there were two critical factors that affected their perception of the relevancy of the ODL with respect to their location where Internet and other services such as electricity supply were poor and the technological tools, such as dependency only on the phone due to lack of laptops or computers connected to the Internet. The graduate students' perception of the relevancy of the ODL in Nepal had a significant relationship with Gender, Hometown, Device (laptop), and School Type (other than private and public schools) as predicting variables. That means their perception of the relevancy of ODL could be predicted reliably with these independent variables. Likewise, their perception of the development and educational opportunities through the ODL could affect the degree of perception about the relevancy. It seems that the graduate students' perception of the relevancy of the ODL could be predicted (to some degree) with their feeling of the opportunity to develop in their teaching careers.

The online and distance learning (ODL) has been an alternative pathway for students who cannot afford regular face-to-face on-campus classes in several higher education institutions. Allen and Seaman (2014) reported a trend of online learning in the United States higher education institutions with the following questions—(1) Is online learning strategic?, (2) Are learning outcomes in online comparable to face-to-face?, (3) How many students are learning online?, and (4) What is the future of online learning? They reported that higher education institutions in the US strategically planned to expand their online learning programs from 2002 and onwards. A higher percent of the higher education institution leaders (77%) agreed that online classes' outcomes are the same or superior to the on-campus face-to-face courses in 2012. This percent was a considerable increase from 57% in 2003 (Allen & Seaman, 2014). The number of students taking online classes has been increasing each year. In this context, a vast majority of the educational leaders firmly believed that the future of online education is broader with "self-directed, self-paced components in future online courses" (Allen & Seaman, 2014, p. 5).

Despite a growing trend of online and distance education at higher education institutions, there are mixed opinions of students about such programs. Yang and Cornelius (2004) reported students' perceptions of online learning to be affected by several factors, including flexibility, cost, electronic research, connectivity, class interface, feedback, technical support, student motivation, and nature of the course designed and delivered.

There was a high sense of perception towards the developmental aspects of their careers as teachers while in the ODL program. They felt that the program helped them to enhance the quality of their education compared to their prior experience in higher education. This is a very critical factor that demonstrates how the ODL can play a significant role in professional growth and development in Nepal, provided the program is managed well and run properly. The ODL not only provided the participant teachers an opportunity to develop them through higher education, but it also helped them in improving teaching-learning in the classrooms. They developed a sense of independent learners through the ODL, enhancing their self-esteem through interaction among the students. There was no significant difference in their perception with respect to gender, age group, and other independent variables indicating that the degree of perception of development was not discriminated or varied concerning the grouping variables. Regarding the predictability of the perception of development through the ODL, only the age group (above 35 years) could be a significant predictor together with the feeling of relevance. Both the age group above 35 and sense of relevancy of the ODL seem to mutually affecting the sense of development because, after this age, there is a negative tendency to continue higher education and training for growth and development, maybe due to a sense of stability in the job and they don't think that they need further education for professional development. They might have the perception that education at this age was not very relevant due to overage.

In the present context of maintaining the flexible mode of training and *Development* in a higher education institution, the ODL provides an opportunity and resources for teachers' professional development through enhancing their pedagogical, content, and technological knowledge in addition to other kinds of skills, such as curriculum, classroom management, action research, to name a few (Shohel, 2012). "The emerging technology is going to be a solution for teachers' professional development in meeting the crisis of inadequate teacher supply in the Global South" (Shohel, 2012, p. 94). Nepal is one of such countries among the Global South where the government and higher education institutions have initiated teacher development through various means of the ODL, and it is even more evident in other areas as well due to the COVID-19 Pandemic in 2020. Therefore, school-based *Support* to teachers through the ODL has made it an effective way to improve their knowledge, skills, and attitudes in teaching-learning in Nepal. The participants' views and beliefs expressed that they have such support through the ODL courses.

The graduate students in the ODL had both positive and negative feelings regarding the support they received while in the program. They had a positive perception of the curriculum structure and other online learning resources in the context of Nepal and the clarity in objectives, course requirements, and assessment and grading system. However, they had a negative perception of the sufficiency of the learning materials provided during the synchronous teaching-learning hours. They felt that the teachers could not provide them sufficient tasks and study materials while in the class. Although, they had a positive feeling about technical and other support, and course-related plans and activities, they seemed not happy with the teacher-created or provided materials. These views or perceptions were significantly different across their location of Hometown. The reason might be that the farther they were from the cities, the more difficulty they had with accessing these resources and supports through the institution and open sources as well. None of the variables in the study other than the quality aspects of the ODL was identified as a significant predictor of the graduate students' perception about support in the program.

The graduate students in the ODL program had a high sense of Challenges in terms of the ICT-related skills, instructor competency in ICT, ICT integration in classroom practices, and pedagogical competency of the course instructors. That means the graduate students who were in the ODL program faced challenges due to a lack of appropriate technical skills to use the information and communications (ICT) skill for teaching-learning purposes. This lack of skills was implied for both the students and teachers. The perception of the Challenges of the ODL was not significantly different across any grouping variables. That means all groups, such as Gender, Age group, Ethnicity and other grouping variables had similar level of challenges. Their perception of Challenges could be predicted reliably only with one variable, Quality, but not in an usual way as the unstandardized coefficient was negative. This result could be due to the sense of Quality negatively affecting the sense of Challenges, a high quality meant a low challenge due to ease of access and use, perceptually.

In addition to such opportunities for teacher *Development* in the ODL, some *Challenges* have been documented in the literature. For example, Wall (2012) outlined some challenges to be faced by teachers and students in ODL as technological challenges (tools, Internet, and connectivity), organizational challenges (managing time, persons, and resources), pedagogical challenges (teaching-learning through a variety of tools and applications and making both teachers and students ready to adapt with changes), and cultural challenges that arise from different social and cultural values, norms, and beliefs (Shakya, Sharma, & Thapa, 2017). The participants in this study rated high for online instructors' pedagogical competency as a potential challenge in ODL, but they remained neutral with the nature of ICT integration in ODL. One of the reasons for being indifferent to ICT integration is that they might not have felt such integration as a challenge. Without such integration, ODL courses would not be delivered.

IMPLICATION, LIMITATION, AND CONCLUSION

The findings of this study have pedagogical and policy implications in the context of ODL in Nepal. The pedagogical implications are related to Quality, Opportunity and Challenges as percieved by the graduate students. The Quality of ODL program directly affects the quality of students' learning and their professional development. Therefore, there should be revision of curriculum, self-learning materials, and quality of delivery modes through the synchronous and asynchronous means to fit with the ODL tools and learning contexts. There should be more Opportunities for students' interaction and participation through asynchronous media such as group chats, reflections on relevant topics, and sharing of ideas. These kinds of additional activities may provide learners Opportunities to constantly interact with each other and the instructors to build upon the ideas discussed in the synchronous classes. The students who are in the remote areas face Challenges in continuous learning through the synchronous mode of discussion. Therefore, the asynchronous mode of interaction will provide them more access to group activities and minimize the effect of challenges due to frequent disconnections of the Internet and power supply.

The policy implications of this study can be related to the Relevance, Development, and Support for the ODL programs, including students and teachers. The government of Nepal should focus on reforming the higher education for teachers by providing more access to the ODL programs while they are still working in schools. However, these programs should be made more relevant to their teaching practices and continuous professional development. Likewise, the distance education policy should be reformed and updated with the current needs of working teachers and other professionals to develop their careers as well as to develop the institutional infrastructure of the ODL programs. For this, there should continuous Support from the government and the public to enhance the quality of ODL in Nepal. The findings of this study contributed to the knowledge of ODL processes in developing and underdeveloped countries. The lessons learned from this study can support in the pedagogical and policy reforms in other similar contexts and countries.

There were several limitations while conducting this study. One of the most critical limitations was the sample size. Altogether, there were 94 students enrolled in the Master of Education in Science Education program at Mahendra Ratna Campus Tahachal, Kathmandu Nepal through the ODL mode, who were our study subjects. Since the participation of the survey was not a part of the course work, and it was a voluntary action, only 71 were able to fill up the online survey (GSPODL-scale) in Google Form through a link distributed through Microsoft Teams virtual classroom platform. This sample size is small to generalize the study results in other contexts. Despite this limitation, the study result has suggested some critical ideas, such as the six components of participants' perceptions of the ODL in terms of *Quality, Opportunity, Relevance, Development, Support,* and *Challenges*.

The programs of online and distance education in Nepal should acknowledge the students' learning experiences in terms of the quality of the program and support system. The graduate students have positive feelings about the program regarding new educational opportunities to develop their professional careers as school teachers. The programs, such as the ODL, should be designed to make the courses relevant to the professionals in terms of the use of ICT and relevant resources despite the challenges of geophysical and technological infrastructure in remote areas of Nepal. These kinds of programs are also helpful for professionals to develop their self-efficacy on independent learning and professional development through both synchronized and asynchronized online and distance education programs. Each of the areas indicated in this study-- *Quality, Opportunity, Relevance, Development, Support,* and *Challenges* were the significant concerns in the ODL courses and programs at higher education institutions in Nepal. Improving these areas will impart a positive impression and broader participation through enhanced metacognition of the students and teachers of the ODL in Nepal and elsewhere. It is recommend that further study should be carried out on the effectiveness of different online applications and programs on student performance through distance learning.

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APPENDIX

Questionnaire

Graduate Students' Perception of Online and Distance Learning (GSPODL) in Nepal

Please, select your response to the following statement, where, SD = Strongly Disagree, D = Disagree, N = Neutral, A = Agree, and SA = Strongly Agree.

Items	SD	D	N	A	SA
1. I feel that ODL has provided us a good learning experience and opportunity with flexible learning time and place.					
2. The use of assistive technologies helps to meet my learning needs.					
3. The curriculum has been designed in a way that we have opportunity to organize activities on the online mode delivery structure.					
4. The current curriculum implemented by ODL provides us opportunity of higher education through distance learning.					
5. The classes on virtual online mode are as effective as the face-to-face mode classes in terms of quality.					
6. The ODL classes create interactive environment for both teachers and students with opportunity to interact and support each other..					
7. The ODL courses provide students and teachers opportunities to integrate content, process, and context while working within a variety of cooperative learning groups.					
8. The ODL materials are sufficient, as you have been provided by teacher, in online platform such as Moodle, Google Classroom, Microsoft Teams, etc.					
9. Online classes are comfortable for me as I have an opportunity to study from my own place.					
10. Due to the limited resources, the students are unable to participate in the class well.					
11. The ODL classes are effectively conducted on time using relevant online technology.					
12. The ODL teaching techniques provoke self-learning and independent learning to develop my skills.					
13. There is sufficient interaction between students and teachers and among the students while teaching learning in an online class.					
14. The teaching techniques in online classes motivate me for independent learning and development.					
15. In the ODL system, the structure of curriculum and delivery system support students' learning.					
16. There is a lack of trained teaching manpower for ODL program implementation that has affected the quality..					
17. There is a lack of motivation among educators to adopt and integrate ICT as a tool into their teaching or educational curriculum.					
18. The ODL teaching model helps teachers and students to analyze and solve relevant problems related to connectivity and delivery of the lessons.					
19. The use of ICT tools in ODL is relevant and motivates me in study.					
20. English is the dominant language on the internet, so language is the challenge of integrating ICTs use in the education system.					
21. The ODL online education is relevant in my professional development to be a competent teacher.					
22. The ODL online classes help me to fulfill several teaching-learning purposes for my profession.					
23. The ODL program helps me to increase the quality of education as compared to former degree.					

24. The online courses through the ODL are relevant to my profession because they provide me an opportunity to get access to higher education while working full-time.					
25. Unavailability of digital educational resources is the difficulty for teaching-learning activities has affected the quality.					
26. Lack of ICT knowledge and awareness of the students, teachers are the difficulties in classroom practices					
27. There is a lack of ICT integration in ODL curriculum that is a challenge for teachers and students to adapt in the virtual classes.					
28. Lack of support from family, employer and friends are the major hindrances of the study.					
29. Pedagogical competency of online instructors are the major challenges of ODL.					
30. The ICT-related skills and training of ODL teachers are the major factors for difficulty in maintaining good online teaching and learning.					
31. There is sufficient availability of the learning resources for ODL in the context of Nepal.					
32. The ODL teachers provide sufficient study-materials to help in my study.					
33. The quality of learning in ODL is better than face to face traditional on campus classroom learning.					
34. This program has been launched at the right time from T.U. of FOE.					
35. The quality of assignments in ODL is better than face to face traditional on campus learning.					
36. The quality of assessment in ODL is better than face to face traditional on campus exams.					
37. Technical competency of online instructors are the major challenges of ODL					
38. The courses in ODL are clear in the objectives, course requirements and grading systems that are helpful.					
39. I have found a greater scope and opportunity of distance learning amid of COVID-19.					
40. I feel that the ODL program is relevant way of gaining higher education in Nepal.					

DO TURKISH STUDENT TEACHERS FEEL READY FOR ONLINE LEARNING IN POST-COVID TIMES? A STUDY OF ONLINE LEARNING READINESS

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ABSTRACT

The purpose of this descriptive study is to investigate on-line learning readiness levels of student teachers according to several variables. By using purposive sampling method, the sample consisted of 270 (200 female and 70 male) student teachers in Turkey. Data collection tools include (i) Student Demographics Form with 18 items, (ii) On-line Learning Readiness Scale with 18 items and five factors. Statistically, the quantitative data were analyzed via ANOVA, t-test and ANCOVA. The findings suggest that mean of on-line learning readiness levels of student teachers is at good level. On-line learning readiness levels of student teachers are significantly different according to their departments [$F(4,265)=3.450$, $p=0.09$]. Namely, the mean scores for the students from Elementary Education and Pre-school Education departments were significantly higher than those from Social Science Education department. Besides, student teachers who has Internet access had higher on-line learning readiness scores ($M= 67.27$, $SD=9.86$) than did those without access ($M= 60.14$, $SD=10.64$), $t(268)=3.16$, $p=.002$. There are also significant differences between student teachers' on-line learning readiness scores per their perceived information and communication technology use competency and departments after differences in accessibility to the Internet is controlled ($p<.001$). As mentioned by International Society for Technology in Education in 2019 standards, on-line learning readiness needs to be considered in detail to assist learners in using digital media in 21st century for learning; teaching; gathering, producing, sharing information for educational purposes. In conclusion, it is suggested that practitioners should increase online, distance or blended (both on-line and face-to-face) learning experiences of their students who are prospective teachers of the 21st century learners. Therefore, it is strongly suggested contributing development of learning and teaching skills of student teachers by getting them more familiar with on-line learning environments especially in post-Covid times.

Keywords: Online learning readiness, student teachers, distance learning, distance education.

INTRODUCTION

21st century learning requires teachers have growth rather than fixed mindsets which are best adapted to the significant changes in learning, since they teach students the future with the knowledge that it is unknown yet filled with possibilities (Faulkner and Latham, 2016). This statement implies a critical requirement for future teachers as having growth mindsets since life and skills for surviving in the future constantly evolve. For example, information and communication technology (ICT) have grave impacts on the way we learn and teach in teacher training specifically. With the help of the advances in ICT, distance learning especially

online distance learning is becoming pervasive worldwide. As Li and Lalani (2020) implies, the overall online education market projected to reach $350 Billion by 2025.

Among plethora of definitions, online learning in this paper refers to learning that is mediated by the Internet (Rapanta, Botturi, Goodyear, Guàrdia and Koole, 2020). The popularity of online learning enormously increased by the novel Coronavirus. The Covid-19 pandemic around the world caused many schools shut down and so over 1.2 billion children are out of the classroom (Li and Lalani, 2020). In these post-Covid times, online learning offers learners and teachers accessibility, flexibility, self-paced and customized learning facilities and interaction in educational settings so the increasing number of online courses and students at institutions of higher education is remarkable nowadays (Tsai, 2020; Wei and Chou, 2020). So, the prospective teachers need to possess essential knowledge and skills for the 21st century to raise the new generation who are born in a digital world. But, do the prospective teachers themselves ready for online distance learning? Are they ready to make use of digital learning environments effectively? The answers to these questions are more vital especially in these post-Covid pandemic times with more emphasis on online and blended learning. We think that online distance learning seems to be the only safest way out in these post-Covid days. Joosten and Cusatis (2020) suggest that the antecedent variables such as student characteristics need to be refocused for online learning success. Also, Bovermann, Weidlich and Bastiaens (2018) imply that designing learning environments which consider online learning readiness (OLR) and motivational factors of students is a challenge for instructors. Therefore, present study focuses on explaining some of the variables for OLR for successful results in online learning and teaching experiences.

There are many studies related to OLR of higher education students in several countries and the variables which effect OLR. For example, Afolabi (2015) studied available online learning tools and OLR at a university in Nigeria. The findings revealed the availability of online learning tools and readiness of both the students and the staff for online learning practices whenever they put into effect. A study of Matanaghi (2015) from Eastern Mediterranean University, North Cyprus showed that online readiness levels of student teachers are relatively high and there is no significant difference in OLR according to their fields. In his dissertation Cavusoglu (2019) studied the relations between online and self-directed learning readiness of college students and industry professionals. And he came up with significant and positive correlations between those variables. He suggested a cross-cultural study to reveal if cultural differences exist with self-directed and OLR. Also, he suggested comparing online and self-directed learning readiness of students, who enrolled only in online courses and those only in traditional courses. Ramadhanu, Putra, Syahputra, Arsyah & Sari (2019) examined learning satisfaction, OLR, learning culture and character strength of university students in Indonesia. Their findings indicated that learning culture, character strength and learning satisfaction significantly effect OLR. In another study, Wei and Chou (2020) investigated the relations between online learning perceptions, OLR, online learning performance and course satisfaction of higher education students. They found out that computer/Internet self-efficacy for OLR possesses a mediated effect on both online learning perceptions and online discussion score and on online learning perceptions and course satisfaction.

Moreover, studies related to OLR of Turkish preservice teachers also exist – e.g. Horzum, Kaymak and Gungoren (2015) investigated the relations between OLR, academic motivation, and perceived learning of university students who experienced online learning. They found out that online-learning readiness directly predicted academic motivation while indirectly predicted perceived learning and suggested that practitioners should increase readiness for higher motivation for learning. Demiralay, Bayir, & Gelibolu (2016) investigated the relations between personal innovativeness and readiness for online learning. It was their claim that the higher students' personal innovativeness is the higher adaptation which occurs for online learning. And they revealed that there is a positive correlation between readiness for online learning and personal innovativeness at medium level. Also, Kuleli (2018) studied the pre-service teachers' readiness level for online learning and computational thinking skills. Her findings indicated that pre-service teachers considered themselves sufficient in general OLR and a significant difference was found in general OLR and in sub-dimensions like computer and internet self-efficacy and learner control among departments, and it was English Language Teaching students that showed the highest readiness level in these sub-dimensions and in the general scale.

Although these studies give insight about OLR and some of the related variables, there is a lack of comparison of OLR of student teachers according to department, having Internet access and further analysis related to Internet access. It is considered to be vital for investigating OLR of student teachers and some underlying factors especially during Covid-19 pandemic since remote online learning is inevitable for many schools and

universities which have been affected by the pandemic at various levels worldwide. Besides, it is considered that online learning readiness studies are of great importance both before and after Covid-19 for designing quality online instruction in the digitalized world. Therefore, present study investigates following research questions:

1. What is the level of online learning readiness of students?
2. Does on-line learning readiness of student teachers significantly differ according to their departments?
3. Does on-line learning readiness of student teachers significantly differ according to their accessibility to the Internet?
4. If we control for differences in student teachers' accessibility to the Internet, does their on-line learning readiness significantly differ according to their departments?
5. If we control for differences in student teachers' accessibility to the Internet, does their on-line learning readiness significantly differ according to their perceived ICT use competency?

METHOD

In this descriptive study, the researchers conducted a survey to investigate on-line learning readiness of student teachers. Cohen, Manion & Morrison (2007) reports that descriptive research is used to describe characteristics of the phenomenon being studied or to define the relationship between phenomenon.

Participants

Purposeful sampling technique is applied for selecting the study group. About purposeful sampling, Emmel (2013) notes that the researcher decides how to use the sampling strategy and the issues he/she consider have central importance in that decision-making. In present study, freshman students of educational faculty were selected as the study group since it would be possible to design instruction according to the results of current study in the following few years of them before graduation. The student teachers who enrolled in the Information Technology course in Spring semester took part in the survey. The participants of the study are intentionally selected from departments other than Computer Education and Instructional Technology (CEIT) since the students at CEIT departments are taking courses for online learning-teaching, ICT integration, effective ICT use, digital material design and so on (Council of Higher Education, 2018). So, the study group included 270 student teachers (200 female, 70 male) from five departments of Ege University, Faculty of Education located in Izmir which is at the west coast of Turkey. Their demographics and some preferences for learning are shown in Table 1.

Table 1. Demographics of the study group (n= 270)

Variable	f	%	Variable	f	%
Department					
Pre-school Education	54	20.0	Owning Internet access		
Guidance & Counseling	55	20.4	Yes	249	92.2
Elementary Education	57	21.1	No	21	7.8
Social Science Education	55	20.4			
Turkish Education	49	18.1	Perceived level of ICT use		
Gender			Insufficient	45	16.6
Female	200	74.1	Moderate	121	44.8
Male	70	25.9	Good	104	38.5
GPA			Age		
1.99 and below	13	4.8	23 and below	69	25.6
2.00 – 2.49	68	25.2	24 – 26	114	42.2
2.50 – 2.99	105	38.9	Above 26	87	32.2
3.00 and above	84	31.1			

Table 1 presents those participants are from five departments of the educational faculty. GPA as an indicator for a*cademic background* showed that 38.9% (*n*= 105) has 2.50 – 2.99 points. They perceive their ICT (PC and internet) use at moderate level. About *technical facilities and capabilities,* the study group mostly (44.8%, *n*=121) perceive their ICT use at moderate level and 92.2% of them have Internet access.

Data Collection and Analysis

To investigate on-line learning readiness of student teachers, student demographics questionnaire and on-line learning readiness scale were administered.

Student Demographics Questionnaire

This questionnaire was developed by the researchers. It includes 18 items such as department, gender, having Internet access, perceived ICT use competency. And content validity of the questionnaire was checked by the three ICT education experts.

On-Line Learning Readiness Scale

On-line learning readiness (OLR) scale was developed by Yurdugul & Alsancak Sarikaya (2013). It is the Turkish version of Online Learning Readiness Scale, which was originally developed by Hung, Chou, Chen & Own (2010). The researchers conducted scale development in two stages: a) the development of the Turkish version of the scale with judgments of 13 experts of language and study domain, and b) the implementation of the scale with a total of 724 students from five different universities. It was found that the values of construct reliability and alpha reliability coefficients for the five subscales were acceptable which were higher 0.70. In present study, alpha reliability coefficient for the overall scale was calculated as 0.88.

In data analysis, demographic data of the sample was displayed via descriptive statistics such as frequency and percentage. The scale data was checked for normality assumption. As Leech, Barrett & Morgan (2008) suggested, if the skewness is less than plus or minus one (which is -0.68 in this case), the variable (online learning readiness) is at least approximately normal. For the second research question, 1-way between subjects ANOVA (Analysis of Variance) and for the third one, independent samples t-test was performed.

For the fourth and fifth research questions, the following assumptions were checked to do ANCOVA (Analysis of Covariance), (a) independence of observations, (b) normal distribution of the dependent variable, (c) homogeneity of variances, (d) linear relationships between the covariates and the dependent variable, and (e) homogeneity of regression slopes. For the third research question, the assumption of homogeneity of variances was violated; however, because cell sizes were similar (54, 55, 57, 55 and 49), this violation did not present an issue as reported by Leech et al. (2008) and all other assumptions were met.

The Competence of the Researchers

The authors are both experienced in teaching computer education and instructional technology era. Both authors graduated Faculty of Education; the first from Computer Education and Instructional Technology (CEIT) program and the second from Computer Systems Education program. They both have ICT teaching experience at high schools over two years. The first author has 14 years of teaching at Department of Computer Education and Instructional Technology of Educational Faculty while the second one has 18. Regarding current study, both authors are instructors of the participant students who were enrolled Information Technology course. And they have been teaching that course for over 13 years. Academically, the first author has master's degree in CEIT program besides PhD degree in Curriculum and Instruction program, while the second one has Master degree in Curriculum and Instruction program.

FINDINGS

What is the Level of Perceived Online Learning Readiness of Student Teachers?

Table 2. Descriptive statistics

	N	Min	Max	$\bar{X}$	*SD*
OLR score	270	26	88	66.71	10.087
Valid N (listwise)	270				

In Table 2, the minimum OLR score is 26 while maximum score is 88. The mean score for perceived online learning readiness of the participants is at good level (M = 66.71, SD = 10.087) in general. This finding posits that student teachers consider themselves sufficient for online learning.

Does On-Line Learning Readiness of Student Teachers Significantly Differ according to Their Departments?

A one-way between subjects ANOVA was conducted to compare the effect of department on on-line learning readiness of student teachers.

Table 3. One-way Analysis of Variance of online learning readiness by department

Source	*df*	*SS*	*MS*	*F*	*p*
Between groups	4	1354.56	338.64	3.45	.009
Within groups	265	26014.48	98.17		
Total	269	27369.04			

As Table 3 presents, there was a significant effect of department on on-line learning readiness at the p<.05 level for the five conditions [F(4, 265) = 3.450, p = 0.09]. Post hoc comparisons using the Tukey HSD test indicated that the mean score for the Pre-school Education department (M = 69.63, SD = 9.89) was significantly different than Social Science Education department (M = 63.62, SD = 13.18). Also, the Elementary Education department (M = 68.77, SD = 8.45) was significantly higher from the Social Science Education department (M = 63.62, SD = 13.18).

Does On-Line Learning Readiness of Student Teachers Significantly Differ according to Their Accessibility to the Internet?

An independent-samples t-test was conducted to compare on-line learning readiness in having Internet access and no Internet access conditions as shown in Table 4.

Table 4. t-Test results for comparing participants with and without Internet access on OLR

	Internet access Opportunity						95% CI for Mean Difference		
	Yes			No					
	M	SD	n	M	SD	n		t	df
Online Learning Readiness	67.27	9.86	249	60.14	10.64	21	2.69, 11.57	3.16*	268

* p < .01.

Student teachers who have Internet access had higher on-line learning readiness scores (M= 67.27, SD=9.86) than did those with no Internet access (M= 60.14, SD=10.64), t (268) = 3.16, p= .002. These results suggest that accessibility to the Internet effects on-line learning readiness of student teachers.

If We Control for Differences in Student Teachers' Accessibility to the Internet, Does Their On-Line Learning Readiness Significantly Differ according to Their Departments?

An analysis of covariance was used to assess whether student teachers' on-line learning readiness significantly differ according to their departments after controlling for differences in student teachers' accessibility to the Internet. Table 3 presents the means and standard deviations for on-line learning readiness of student teachers from all departments, before and after controlling for accessibility to the Internet. Table 4 indicates that after controlling for differences in student teachers' accessibility to the Internet, there is a significant difference according to department, $F(4, 264) = 3.37$, p=0.01, partial eta^2 = .035.

Table 5. Adjusted and unadjusted department variable means and variability for on-line learning readiness using accessibility to the Internet as a covariate

		Unadjusted		Adjusted	
	N	M	SD	M	SE
Pre-school Education	54	69.63	9.89	69.60	1.33
Guidance & Counseling	55	65.27	9.16	64.99	1.32
Elementary Education	57	68.77	8.45	68.84	1.29
Social Science Education	55	63.62	13.18	64.09	1.32
Turkish Education	49	66.20	7.79	65.95	1.40

Table 6. Analysis of covariance for on-line learning readiness as a function of department, using accessibility to the Internet as a covariate

Source	df	MS	F	p	eta^2
Accessibility to the Internet	1	909.57	9.57	.002**	.035
Department	4	320.16	3.37	.010*	.049
Error	264				

*Note. *p<.05, **p<.01*

5- If we control for differences in student teachers' *accessibility to the Internet*, does their *on-line learning readiness* significantly differ according to their *perceived ICT use competency*?

An analysis of covariance was used to assess whether student teachers' on-line learning readiness significantly differ according to their perceived ICT use competency after controlling for differences in student teachers' accessibility to the Internet. Table 5 presents the means and standard deviations for on-line learning readiness of student teachers from all levels of perceived ICT use competency, before and after controlling for accessibility to the Internet. Table 6 indicates that after controlling for differences in student teachers' accessibility to the Internet, there is a significant difference, $F(2, 266)=27.43$, p=0.00, partial eta^2=.017.

Table 7. Adjusted and unadjusted perceived ICT use competency variable means and variability for on-line learning readiness using accessibility to the Internet as a covariate

		Unadjusted		Adjusted	
	N	M	SD	M	SE
Insufficient	45	58.69	9.64	59.04	1.36
Moderate	121	65.83	9.12	65.89	0.83
Good	104	71.22	8.92	71.00	0.90

Table 8. Analysis of covariance for on-line learning readiness as a function of perceived ICT use competency, using accessibility to the Internet as a covariate

Source	*df*	*MS*	*F*	*p*	eta2
Accessibility to the Internet	1	389.03	4.73	.031*	.017
Perceived ICT use competency	2	2255.83	27.43	.000**	.171
Error	266				

*Note. *p<.05, **p<.01*

DISCUSSIONS AND CONCLUSION

As the literature implies (Allen and Seaman, 2013; Howard, Tondeur, Siddiq and Scherer, 2020; Tsai, 2020; Wei and Chou, 2020) online learning gains much more popularity day by day all around the world especially in post-Covid 19 pandemic times. It is considered that online learning readiness of preservice teachers is critical for future teachers especially after Covid-19 pandemic forced decision-makers to shift to fully online distance learning practices for public health. To get more successful online learning-teaching results, Rohayani and Sharipuddin (2015) suggest measuring online learning readiness and developing strategies accordingly. So, present study focused on the variables for online learning readiness of student teachers.

The findings for the first research question which is related to OLR levels of student teachers in general indicated perceived sufficiency is in consistent with recent related studies (Afolabi, 2015; Kuleli, 2018; Matanaghi, 2015). Another study which was conducted in rural Thai showed that the students' level of acceptance was only slightly more than neutral (Ngampornchai and Adams, 2016). In present study the pre-service teachers considered themselves sufficient for online learning readiness in general. However, their readiness scores do not posit an excellent readiness level which indicates that teacher educators need to find ways to increase the level of online learning readiness of student teachers.

For the second research question, the effect of department on on-line learning readiness of student teachers is investigated and significant differences are reported. The scores of the participants from Pre-school Education department and Elementary Education department are found to be significantly higher than Social Science Education department. A study by Kuleli (2018) also revealed significant differences according to departments indicating that English Language Teaching students showed the highest readiness level in these sub-dimensions and in the general scale. On the other hand, Matanaghi (2015) reported no significant difference among fields. Therefore, it is considered that the differences in the study need further investigation for underlying reason(s). The authors suggest researchers to study entry scores, personal interests, and background for online learning tendencies of the students in relation with OLR.

The third research question is related to the effect of accessibility to the Internet on on-line learning readiness of student teachers and the results suggest that when student teachers have Internet access, their perceived on-line learning readiness increases. Many OLR studies also support that finding – e.g. Koo (2008) found out that insufficient access to technology such as computer and internet is one of impediments to online collaborative learning as perceived by the teachers. Wei and Chou (2020) found out students with higher and positive online learning perception (e.g., perceived ease of loading in online courses, perceived accessibility of online learning resources) were readier to participate in online courses. Firat and Bozkurt (2020) also found out statistically significant correlation between the time spent online and online learning readiness. Similarly, many studies concluded that the success of e-learning adoption highly depends on technological accessibility and having a good Internet connection (Al-Asmari and Rabb Khan, 2014; Sarsar, Kaval, Klasser and Guneri, 2016).

The fourth research question aims to assess whether student teachers' on-line learning readiness significantly differ according to their departments after controlling for differences in student teachers' accessibility to the Internet. The findings indicated that a significant difference between student teachers per their departments remains after differences in accessibility to the Internet are controlled. And for the

fifth and last research question, the researchers investigated to assess whether student teachers' on-line learning readiness significantly differs according to their perceived ICT use competency after controlling for differences in student teachers' accessibility to the Internet. And a significant difference is found between student teachers per their perceived ICT use competency after differences in accessibility to the Internet are controlled ($p<.001$). That means, even if we provide Internet access for all student teachers, there can still exist significant differences in online learning readiness of student teachers according to department and ICT use competency. Wei and Chou (2020) also found out that computer/Internet self-efficacy for online learning readiness possesses a mediated effect.

Online learning is fast becoming a significant constituent of higher education (Allen and Seaman, 2013) and it is becoming pervasive worldwide. Especially in these post-Covid times, online learning seems to be an option for students to continue education during the pandemic. As Daniel (2020) mentions, face-to-face instruction has been ceased for most students, requiring them to switch to online teaching in many countries. And one of the concerns of professionals is the level of online learning readiness of their students at that time (Allam et al., 2020). Therefore, current study focused on some of the variables and level of online learning readiness of freshman student teachers. They are prospective teachers of 21st century learners who are born in a digitalized world. The findings indicated that mean of OLR levels of student teachers is at good level. OLR levels are significantly different according to their departments, namely, the mean scores for the students from Elementary Education and Pre-school Education departments were significantly higher than those from Social Science Education department. Besides, student teachers who have Internet access had higher on-line learning readiness scores than did those without access. Also, there are significant differences between student teachers' OLR scores per their perceived ICT use competency and departments after differences in accessibility to the Internet are controlled.

Based on the results of this study, we formulated some recommendations as follows. For the researchers, further studies are recommended to reveal other significant factors on perceived online learning readiness and the ways to improve online learning readiness for increasing the number of online courses (Tsai, 2020; Wei and Chou, 2020) and success (Joosten and Cusatis, 2020; Kim, Hong and Song, 2019; Moftakhari, 2013). In e.g. Firat and Bozkurt (2020) reported a correlation between ODL (Open and Distance Learning) learners' preferred technological devices and their OLR; moreover they found out that smartphone use has a large effect on OLR. Such demographic factors can be investigated in further studies. Keeping in mind the Internet and computer technology access factor (Koo, 2008) related to on-line learning readiness, it is suggested that decision-makers find solutions for the students without Internet and computer technology access to increase their online learning capabilities and readiness.

Since current study is based on quantitative data, the researchers are encouraged to use qualitative and/or mixed research designs as well to reflect different perspectives and experiences of the participants. Moreover, it is suggested instructional designers and practitioners to implement engaging online learning activities more often in their lessons for increasing OLR. Although the study is limited to freshman students in a Turkish educational faculty, the findings are considered to be helpful for comparing OLR of student teachers according to department, having Internet access and providing further analysis related to Internet access as a covariate variable. In these post-Covid times, online and blended learning offer great potential for continuing education worldwide which requires more attention and further studies for offering better on-line learning and teaching experiences.

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AN INVESTIGATION INTO BARRIERS IMPACTING AGAINST FACULTY BLENDED LEARNING ADOPTION

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ABSTRACT

Blended Learning has not attained campus-wide integration and adoption as the preferred teaching delivery mode by faculty members a few years after the management of a public university in Ghana decided to move from face to face delivery to the blended mode. This study investigates the barriers impacting faculty Blended Learning in Ghana. The study uses an exploratory qualitative approach to investigate the barriers to faculty non-adoption of blended learning. It also investigates their perceptions and experiences. A total of 22 faculty members from four faculties of the university were purposively selected and interviewed for this study. The data were coded and analyzed using a constant comparative analytical method. Thematic analysis was then applied to generate themes for the findings. The study found four themes that inductively constitute barriers to faculty BL adoption. These are infrastructure, faculty concerns, institutional, technical support barriers. The study provides insights into the lived experiences of faculty members relative to the impediments they face in adopting BL. Thus, administrative managers need to avert their attention to institutional related barriers, faculty related concerns, technical barriers, and infrastructure-related barriers when implementing BL.

Keywords: Blended Learning, faculty adoption, thematic analysis, adoption barriers, developing country.

INTRODUCTION

Over the past decade, universities have embraced Blended Learning (BL) as their preferred delivery approach (Bokolo et al., 2020). BL involves the combination of two distinctive delivery approaches, that is face-to-face and online learning to harness the best of the two approaches to create unique learning experiences for students (Friesen, 2012). The benefits for adopting BL are well documented and include, improving students learning outcomes (Chen & Tat Yao, 2016), personalization of learning for students (Eom & Ashill, 2016), reducing administrative cost (Jobst, 2016) and enhancing students interaction with faculty (Lee, Srinivasan, Trail, Lewis, & Lopez, 2011). There is evidence that students prefer to be taught in BL mode (Jobst, 2016). Previous studies (Lin, 2018) have outlined the advantages of BL.

Over the past decade, there has been a steady stream of studies suggesting that the landscape of HEI (Higher Education Institution) is changing (Dziuban, Graham, Moskal, Norberg, & Sicilia, 2018). HEIs have been called upon to respond more appropriately by making the investment that would embrace and fully integrate technology into the curriculum. Whiles some universities have been successful at this, studies on BL adoption suggest that the adoption rate is very low (O'Connor, Mortimer, and Bond, 2011). More recently, the digitalization of societies, with its attendant effect on academic work, has exposed the weak institutional attempts at integrating BL into the teaching and learning curriculum. At no point has there been a more compelling reason for HEIs to shift from face-to-face teaching to Blended Learning (BL) other than now. If there is ever a time for BL to gain mainstream attention, then it is now because it has the potential to transform the modern academy.

Studies have found faculty not using of BL for teaching and learning as one of the reasons accounting for the low adoption (Mtembe and Raisamo, 2014; Cunningham, 2016). The important role faculty plays if BL is to be institutionalized is well documented (Benson, Anderson, and Ooms, 2011). It has been argued that faculty members are very important in the sense that they must make the conscious decision to teach in BL mode (Teo, 2011). Therefore, understanding what factors influence their decisions to adopt BL for teaching has been a subject of critical research (Benson et al., 2011). Studies by Ali, Buruga, and Habibu (2019) suggest that the shift from face to face to BL mode comes with a lot of difficulties and challenges for many faculty members. Faculty members' technological efficacy and inadequate institutional infrastructure that supports BL implementation programs have been identified as barriers that militate against faculty members adopting BL (Previtali & Scarozza, 2019).

There is ample scholarship investigating barriers to faculty BL adoption (Liu and Tourtellott, 2011; Porter, Graham, Bodily, and Sandberg, 2016). Mostly, these have viewed the issues from the perspective of faculty members coming from developed country contexts. There is scant research focusing on faculty BL from developing countries such as Ghana. Thus, this study investigates barriers to faculty BL adoption by using a public university in Ghana as a case study. The case study university has since 2013 been implementing BL when the management of the university took a policy decision to move from face-to-face delivery to a fully integrated BL university by 2021. Unfortunately, faculty members have not adopted BL and continue to teach in the traditional mode after significant investment was made in infrastructure and training. This study investigates the underlying reasons for this by asking the research question: why are faculty members not adopting BL for teaching and learning?

The paper proceeds in section 2 by presenting a literature review on BL adoption. It provides a contextual definition of BL, reviews faculty BL adoption experiences and barriers to BL adoption. The methodology adopted for the study is described in section 3. The results, discussions and conclusions are presented in section 4, 5 and 6, respectively.

LITERATURE REVIEW

There is a plethora of definitions for BL and this is mainly so because of the different models and blends available (Zhang and Zhu, 2016). BL is defined as "combination of face-to-face and online delivery methods, with the aim of each complementing the other" (Poon, 2013). Verkroost, et al., (2008) hold the view that this is a narrow definition of what BL is since it assumes that the whole essence of the blend is to replace old media without due regard to the fact that it involves a redesign of the learning process using technology. In that regard, they define BL as "The total mix of pedagogical methods, using a combination of different learning strategies, both with and without the use of technology"(Verkroost et al., 2008). Alammary, Sheard, and Carbone, (2016) criticize this definition indicating that without thoughtfully integrating the pedagogy into a well-balanced combination between the two delivery approaches (face to face and online), (Verkroost et al., 2008) definition could easily be misconstrued as either a purely distance course or a face to face course. For this study, BL is defined as the combination of face-to-face and online delivery through a thoughtful and deliberate process that harnesses the utility of technology such as learning management systems to provide learning resources to students beyond the classroom to stimulate student learning and improve learning outcomes (Friesen, 2012 ; Caner, 2016; Dziuban et al., 2018). This definition finds expression and agreement with the BL policy of the case study university.

There is a lot of scholarship exploring what influences faculty members to adopt BL (Baltaci-Goktalay and Akif Ocak, 2006). Teo (2011) examined factors that influenced teachers' intention to use technology. The result of his study was a model that was developed and tested. Teo's (2011) model found that teachers adopt technology when they perceive adequate support from management be it technical support that is timely and when they perceive that the technology is free from effort. From the results, "perceived usefulness, attitude towards use, and facilitating conditions were found to have direct influences on behavioural intention to use technology" (Teo, 2011). The adoption of BL by faculty has been reported to be a complex and challenging one (Benson et al., 2011; Fathema and Leigh Sutton, 2013; Radif, Fan, and Mclaughln, 2015). In a study conducted by (Fathema and Leigh Sutton, 2013), the authors investigated why faculty members in a South-eastern university in the United States of America were under utilizing the LMS (Learning Management

Systems). Their study found that system challenges and design flaws accounted for the faculty members' resistance to adopt the technology. In a similar study, Ocak (2011) investigated why faculty members were not adopting BL for teaching and learning. He found and grouped the challenges the faculty faced into three, namely- instructional, technical and community concerns. Instructional wise, (Ocak, 2011) suggests that faculty members find the instructional process relative to course design too complex and also find student and faculty communication and interaction as ineffective, thus leading to their rejection of BL.

Asunka (2013) investigated the perspectives and barriers impacting faculty BL in a private university in Ghana. The author adopted a qualitative research design and interviewed 74 faculty members. The findings of the study indicate that faculty members hold a positive view of BL. However, the barriers found in the study included a lack of institutional support by way of top management commitment to the BL implementation process. Also, low IT skills needed to teach using technology was found to be a major barrier to facilitating instruction in a blended mode. Additionally, faculty members expressed concerns about the extra workload that was involved in designing courses and modules to teach in the blended mode, and the lack of incentives and rewards for faculty members as demotivating factors and reasons for their rejection of BL. The author concludes with the suggestion that these barriers can be overcome through participatory activities that collectively identify their concerns and address their challenges. Similar studies by Gregory and Lodge (2015) also suggest that academic workload and the lack of an effective workload management compensation scheme remains a silent barrier against faculty BL adoption in universities.

Blankson (2015) carried out a study in the University of Cape coast in Ghana by investigating the perceptions of academic staff towards BL and the barriers impacting their adoption thereof. The study found that factors such as the lack of regular electric power supply on campus and the level of computer and Internet skills hinder faculty effort to adopt BL for teaching and learning. The study concludes that BL adoption is still at an infant stage and suggested that it behoved on management to provide the required support services if faculty members were to adopt BL.

The literature on faculty BL adoption suggests that technological, faculty concerns and institutional impediments account for some of the reasons why faculty are apprehensive in teaching in BL mode. The studies available that contribute to understanding faculty BL are mainly from universities from developed countries. This study attempts to fill the gap by contributing to the research base with evidence from a developing country context.

METHODOLOGY

The case study was a public university with multi-campuses across five regions in Ghana. The university has 265 teaching staff and over 8,075 students. The university is uniquely positioned and offers bachelor's and post graduate degree programs serving not only the Ghanaian market but the West African sub-region and beyond. Pursuant to a management decision, a BL policy was developed in 2013 to adopt BL as a delivery approach with the objective to transition from face-to-face to a fully blended institution by 2021. Accordingly, the Centre for Online Learning and Teaching was established to train faculty members in instructional technology delivery methods to equip them with the skills required to integrate technology into their teaching methods. A Moodle Learning Management System (LMS) was also procured. Various BL models were applied, but basically, faculty members were required to upload their course and teaching materials, videos, and other media on to Moodle. The delivery was structured to accommodate face to face and online delivery. On days where there were no in-class delivery faculty members held classes online by leading discussions on the LMS platforms.

Research Design

An exploratory case study approach set out to inductively investigate a phenomenon within a social context without any a priori theoretical formulations was adopted. The study adopted a qualitative case study methodology with faculty members as the unit of inquiry to investigate the barriers impacting against BL adoption (Martins and Baptista Nunes, 2016).

Participants

The help of program managers was requested for the selection of research participants. The selected participants were drawn from a population of 55 lecturers who had been trained and certified to teach in the BL mode by the university. In all, 22 academics who use the LMS to teach in the blended mode were purposively sampled for the study. These purposively sampled academics were selected from the four faculties of the university namely the graduate school, faculty of I.T business, and the Faculty of engineering and Faculty of Computing and Information Systems. The perspective of these participants relative to the impediments they faced or continue to face when teaching BL courses was explored.

Data Collection Instruments

The main instrument for data collection for this study was the face to face interview. The researcher adopted Kvale (2011) as a guide for the interviews. This helped in providing guidance as to how to balance the researcher-interview power structure. It also shaped the researcher's understanding to look out for non-verbal cues that was worth noting during the interview sessions for further probing. An interview protocol was developed to elicit responses from the participants (see appendix 1). The interview protocol was emailed to the participants to enable them to familiarize themselves before hand with the questions to be asked before the interview session. The semi-structured questions were focused on understanding the impediments encountered by the lectures as they adopted BL for teaching and learning in the university. The questions were flexible to allow room for follow up and clarification of answers where necessary. Each interview session lasted between thirty-five minutes to one hour and was carried out in the comfort of the offices of the lecturers from October 2018 to December 2018. Prior to the interview sessions, permission was requested and subsequently granted to record the interviews on a portable audio recorder. This ensured that the views of the participants were captured to subsequently aid in the accurate transcription of the record during data analysis.

Data Analysis

The interview data were analysed using the constant comparative analytical method. Data analysis was in two parts. First, the recorded interviews were played over and listened to by the researcher. Through this, the researcher immersed himself in the data. In the process, deep insights, and conceptual understanding of what the data was saying was gained. The interviews were then transcribed and emailed to the participants to check for any inaccuracies that might have been captured or attributed to them and to allow them to make corrections. The transcripts were stored in file folders in NVIVO and analysed.

The second part involved the actual analysis using the constant comparative analytical technique which required that the textual data be broken into unique codes and analysed for themes. The transcripts were read line by line and where some thought processes of the respondents came across answering the research objective, they were assigned codes. These codes represented unique identifiers that vividly captured the thought processes in a phrase or word (designated as a code). In all, over 82 codes were generated from the transcripts. The unique codes were then regrouped into axial codes and selective codes. These codes representing varying meanings from the respondents were individually compared to each other, and those with the same meaning were grouped together. Groups of similar codes that were compared and grouped together this way were abstracted and re-grouped into sub-categories and categories. This process of open coding, creating categories and abstraction was facilitated using the NVIVO software.

The researcher ensured that his role in the research was minimal by approaching the research data with an objective mind. To deal with bias and ensure trustworthiness and reliability of the data, a second coder was recruited. For purposes of ensuring intra-coder reliability five of the transcribed transcripts were sent to another researcher independent of the research to recode and generate themes and categories. The external coder was selected based on his experiences and familiarity with qualitative and BL research. The external coder returned his results after two weeks and a meeting to discuss the outcome was held. A calculation of Cohen's Kappa was done to check for intra-coder reliability. According to Fraenkel and Wallen (2000) Kappa values greater than .70 are considered good evidence of agreement. In this paper instance, the Kappa's for both the first and second coders were .73 and .74 respectively indicating a satisfactory fit-for-reliability agreement. Where there were marked deviations in codes and outcomes, they were discussed and realigned to meet the study objectives.

FINDINGS

To arrive at these outcomes, the data were analysed looking for insights into what constituted barriers to faculty BL adoption. The study found four themes that inductively constitute barriers to faculty BL adoption. These are, institutional related barriers, faculty related concerns, technical barriers, and infrastructure-related barriers, respectively. Deriving from the above, the study found that the faculty members that were interviewed understand what BL is and the promise it holds. However, the challenges acts as demotivators as they seek to transition from their current delivery approach to becoming BL teachers.

Coding Categories

This sub-section summarizes the four inductive themes and presents the barriers of faculty adoption. Of the following main barrier categories, each of them had sub-categories of underlying factors that constituted impediments towards BL adoption. For example, the following sub-categories emerged from the institutional barrier themes: wrong approach to faculty training, uncoordinated strategies, poor implementation, policy incoherence, inadequate resource allocation, lack of stakeholder engagement and poor change management strategies. In the faculty related concerns, perceived faculty intrinsic demotivators relating to poor faculty attitudes, faculty apathy, faculty reluctance and resistance, Job insecurity, intellectual property and extra workload were found. Similarly, for technical barriers, inadequate orientation to use the system, platform, and usability issues constituted the main barriers in the sub-category. Finally, concerning infrastructure barriers the study found internet connectivity, erratic power supply and infrastructure deficit as the main barriers. Table 1 describes the barriers that were found.

Table 1. Categories and sub-categories of barriers to faculty blended learning adoption

Sub-category	Category	Themes
The wrong approach to faculty training uncoordinated adoption strategies Human resource issues poor implementation strategies policy incoherence Inadequate resource allocation Lack of stakeholder consultation Poor change management strategy	Management, policy, and implementation gaps	Institutional barriers
Poor faculty attitudes Faculty apathy Faculty reluctance and resistance Job insecurity Intellectual property extra workload	Perceived faculty Intrinsic demotivators	Faculty barriers
Inadequate instructional expertise Technological competence deficit Lack of Pre-requisite competence	Inherent faculty inadequacies	
Platform and system usability challenges inadequate orientation to use system Lack of technical support	Platform challenges	Technical support barriers
Inadequate campus computer labs for students unstable internet connectivity erratic campus power supply	Infrastructure deficit	Infrastructure barriers
unstable campus internet connectivity Inadequate internet bandwidth	Internet challenges	

Field work, Authors construct, (2020)

Institutional Barriers

These are barriers that are inherent in the institutional set up which relate specifically to management responsibility, institutional policies and how these policies are translated into action and implemented. The study found that faculty members' rejection or refusal to teach in BL is directly related to these institutional barriers. For example, many of the respondents were oblivious of any institutional BL policy. The few who indicated they knew of any such policy remarked that it was something they had heard of in passing or during meetings that they attended. Again, on the issue of policy, it became evident that a document of such nature had been conceived but because it was not developed in a consultative manner the faculty members had opted to disregard it and go about teaching in the face-to-face mood. The corollary of this was that the BL policy became incoherent and was applied with such lack of coordination that resulted in the apathy faculty displayed towards the whole process. A respondent's view about the BL policy was: *"No it hasn't done so well. There are a lot of reasons for this but chief among them is that the policy was not thought through fully. I think the policy was rushed."*

Secondly, faculty members were of the view that the BL training was carried through using the wrong approach. Many of the respondents indicated that the BL approach was new. More so, it required the faculty members to first be technology competent in order to develop courses and deliver online. However, without any consultation, training of faculty members was announced and facilitators assumed that all faculty

members had a good appreciation of the concepts. The result was that faculty members who had prior BL teaching experience, and those who had foundational understanding of instructional technology teaching methods hijacked the training sessions to the detriment of those with little or low technology competencies. In the end, many faculty members fell out from the training and consequently did not teach using BL. In articulating this view, a respondent indicated thus, '*Training is a challenge because it was not properly done because we were all boxed into the course without any segmentation. So that those who were technology savvy could go into different groups and those who are less inclined to technology are put in a different group*".

Thirdly, faculty members held the view that the implementation process should have been piloted at least starting with early adopters who had experience teaching in the BL mode. By so doing, they could share their stories to other faculty members and provide mentorship to colleagues who needed to be inspired or motivated to move beyond their anxieties for whatever they were to try teaching in BL mode. However, that was not the case since management decided without any form of consultation to announce the implementation of BL. This frustration was eloquently captured by a respondent when she expressed the view that "*I think there was need for a piloting because at the start everyone was pushed onto the system with many of us having no idea how to get online"*

Faculty Barriers

These are barriers that specifically relate to faculty perception of BL and their inherent competency inadequacies that impact on their decisions to teach in BL mode. Faculty members' view of teaching is constructed on the traditional face-to-face mode which thus makes it difficult to embrace BL. Informing these anxieties are the issues of perception, poor attitudes, and apathy towards BL. Faculty must find time to create course content and engage students online. They must read through course material, break them down into presentable online friendly formats and record lecture videos where delivery is asynchronous. Not that alone, for many, this constitutes extra workload especially when they must also conduct research that counts towards their promotions. A participant narrated his experience this way. "*You know yes you have 5-year-old notes and slides that you have always kept, you know and all of a sudden, now you need to break them into certain chunks, look for video somewhere all these are a lot of work for me as a lecturer'.* They were other faculty members who conceded that even though it entailed extra work in the initial course preparation, once done teaching in BL mode was easier because it brought some level of organisation into the teaching process, nonetheless. One summed it up this way, *'The initial work in trying to put the material etc. together and post it is a lot of work but once you finish with that it is very easy going".*

Technical Support Barriers

From the obtained results of the themes on technical support barriers, two groups emerged from the categories (inadequate orientation to use system and Platform and system usability challenges). Some of the respondents found the LMS to be user unfriendly and this was largely due to their lack of technical expertise to navigate the platform and use its functionality to deliver content. The respondents intimated that prior to the adoption of MOODLE there had been several versions of LMS that the university had introduced. Owing to this, faculty members found it too complicated to differentiate between the systems and what their functionalities were. One participant captured it as " *the LMS was not user friendly at all and in most cases, we did not know how to use the features on the platform".* Additionally, there was inadequate orientation given to the faculty members on how to navigate the LMS and use it to deliver content in the most effective way.

Infrastructure Barriers

These reflect the category of barriers relating to issues that deal with I.T. infrastructure and the support needed to run BL courses. Specifically, the faculty members mentioned the issue of irregular, often unstable internet connectivity on campus as a major demotivator towards adopting BL. To put it in perspective, the faculty members' major concern was the lack of a reliable internet network to support the LMS infrastructure by way of ensuring that content servers are hosted for utilization during and after class. Particularly, it was noticed from the respondents that the erratic nature of the internet connection often became pronounced

during synchronous lecture delivery. This occurrence created frustration for both lecturers and students. Instances were mentioned where lectures stalled because of connectivity issues, faculty members could not upload course syllabi and assignments, neither could they interact with their students. A respondent expressed his displeasure thus *'Internet connectivity is horrible'*. This captured the frustrations of the faculty as a significant number of the participants expressed great concerns about the Internet connectivity as being a major challenge towards their adoption of the BL approach. Elaborating further, a respondent surmised that "*So the context was we have to understand the environment so the environment creates challenges or itself is a factor so for example availability of network, internet connectivity to be able to use and go online it's a huge challenge"*

Additionally, a reliable electric power supply is a critical element needed to run BL programs because it is needed to keep internet servers, LMS and computer laboratories running. However, the faculty members bemoaned the unstable and unreliable power supply on campus, which practically makes it difficult if not impossible to engage in any meaningful BL teaching other than the resort to face-to-face delivery. This created apprehension within faculty members since the thought of redesigning courses and reorienting students back to the face-to-face delivery environment to compensate for the challenges presented a feeling of disillusionment for the faculty. Not only did it involve doing extra work but, at the end of the day, it defeats the very purpose of BL which is to create meaningful learning experiences for students rather than frustration and anxieties occasioned by technological glitches within the school environment**. "***Once you don't have the power running the Internet connectivity can also be another hindrance"*

DISCUSSIONS

This study investigated BL adoption from the perspective of faculty members in a public university. The outcome identifies significant barriers impacting against the faculty members use of BL approach for teaching. In the present study, even though the respondents disclosed that they know what BL is and use the University's LMS for the dissemination of course materials and communication, they insisted that they could not engage fully in BL delivery because the enabling environment required to support such a delivery approach was missing. The four themes derived from the analyses that respondents viewed as barriers to adoption relate to institutional, faculty concerns, technical support, and infrastructure. These findings suggest the need to understand both the institutional context where the implementation takes place and individual faculty issues to achieve campus-wide implementation. These findings are consistent with previous research (Buchanan, Sainter, & Saunders, 2013; Tshabalala, Ndeya-Ndereya, & Van Der Merwe, 2014) which indicates that structural barriers within institutions and the perceived usefulness of technology tools remain the barriers to BL adoption in universities

On the individual level, the study finds that faculty intrinsic inadequacies militate against adoption. Faculty intrinsic demotivators such as their lack of competence to teach using technology and poor attitudes towards teaching using technology were found to manifest in behaviors that lead to apathy and resistance.This finding agrees with Birch and Burnett's (2008) study that suggests that personal inhibitors such as resistance to change, fear of loss of autonomy and lack of incentives lead to faculty not adopting BL. For example, even though the respondents have a positive view of BL, their inability to use the school learning management systems to engage students became a barrier for them to teach in BL. Teaching in BL mode requires significant course redesign that faculty need to invest extra time to complete (Garrison and Vaughan, 2008). The extra workload that accompanies redesigning courses constitutes a major disincentive for faculty members towards adopting BL (Wingo, Ivankova, and Moss, 2017). Often, faculty members' expectations are that management finds a way to compensate them for these extra efforts that go into the process. Other studies have suggested that to address these inhibitors, management can reward or incentivize faculty adopters by way of recognition or making teaching using in BL a criterion that counts towards their promotions (Reid, 2014; Benson et al., 2011).

Besides these, many of the respondents had simply developed resistance to the BL initiative because, there was serious faculty opposition to the top-down implementation approach that was adopted by the school management. The respondents held the view that the implementation process was not consultative and engaging enough. Top-down implementation strategies are in themselves not a bad approach but there is the need to engage faculty to get their buy-in so that they own and drive the implementation process (Bohle

Carbonell, Dailey-Hebert, and Gijselaers, 2013). Preferably, a bottom-up implementation approach that is faculty-led is reported to facilitate change (Jobst, 2016). Furthermore, a huge disconnect and lack of clarity as to what the university's BL objective was and what it intended to achieve was reported. This result is consistent with the suggestion that a good blended learning initiative should be guided by institutional policies, plans, and clear implementation strategies as the absence of such policy frameworks results in the rejection of an otherwise far more innovative teaching and learning approach (Sharpe, Greg, and Richard, 2006).Previous research (Garrison and Kanuka, 2004;Porter, Graham, Spring, and Welch, 2014) indicates that where there are policies and top management commitment to the BL the transition towards BL becomes much easier.

As with new technology implementations, there is a need for the essential infrastructure to support the process to be provided. However, we found that there was inadequate infrastructure to support the BL and this contributed to faculty not teaching in BL mode. The two most challenging themes emerging here relate to infrastructure deficit and internet connectivity.

Finally, the study found technical support barriers as one of the reasons they were not teaching in BL mode. Studies by (Ocak, 2011) have found that teachers play dual roles when they teach in BL mode. First in their role as instructors and second they become technical experts who must address any technical challenges that come-with the process Ocak (2011). Not only do they find this overwhelming but the lack of or absence of a dedicated technical support centre by the university that addresses students' as well as faculty needs puts a burden on faculty who aside teaching must help students navigate through LMS platforms and the challenges arising thereof. In this present study, faculty members' background relative to their competence to teach using technology was suspect; thus, there was the expectation to train them in instructional methodologies, provide orientation and demonstration sessions that should prepare them with the effective pedagogic and technology skills implicit for teaching in the BL mode. There is also the need to provide adequate resources, technology and support to stimulate positive attitudes towards adopting new teaching practices (Benson et al., 2011).

CONCLUSIONS

The objective of this study was to investigate the perceptions of faculty members in a public university in Ghana to capture insights into their lived experiences relative to why they were not adopting BL for teaching as had been initiated by the university. The study found the respondents to be fully aware of the BL initiative nonetheless due to certain external and internal barriers they were not engaging students in the BL mode. The study found four themes that inductively constitute barriers to faculty BL adoption. These are infrastructure, faculty concerns, institutional, technical support barriers. The following sub-categories emerged out of the institutional barrier themes, the wrong approach to faculty training, uncoordinated strategies, poor implementation, policy incoherence, inadequate resource allocation, lack of stakeholder engagement and poor change management strategies. In the faculty related concerns, perceived faculty intrinsic demotivators relating to poor faculty attitudes, faculty apathy, faculty reluctance and resistance, Job insecurity, intellectual property and extra workload were found. Similarly, for technical barriers, inadequate orientation to use the system, platform, and usability issues constituted the main barriers in the sub-category. Finally, in relation to infrastructure barriers the study found internet connectivity, erratic power supply and infrastructure deficit as the main barriers.

For university administrators intending to implement BL, these findings present a good starting point to inform the process. Even though these identified barriers are not ranked according to which of them has a major impact, against faculty adoption, it is imperative to assess them and identify solutions to address them. The focus of university managers should be geared towards eliminating these barriers to get faculty buy-in and unleash their creative and adoption potential (Bohle Carbonell et al., 2013). This should involve a change in top management attitude, adopting bottom-up other than top-down BL strategies constituting BL implementation teams, identifying and promoting early adopters to become project champions and share experiences (Bohle Carbonell et al., 2013). Additionally, managers should promote strategies that encourage skills acquisition that are required to implement successful blended- learning environments (Adebayo et al., 2019). Above all, management's commitment to the transition process must be transparent to get all on

board. Thus, administrative managers need to avert their attention to institutional related barriers, faculty related concerns, technical barriers, and infrastructure-related barriers when implementing BL.

As in any educational research, limitation of the study needs mentioning. In the current work, purposive sampling was used in the selection of interview respondents. The likelihood that views expressed by the respondents may not be representative of the entire population exists. Also, given the sample size, it is difficult to know if the outcome is representative enough. Nonetheless, the findings provide a good starting point to understanding the barriers impacting faculty adoption. Another limitation is the context in which the research was carried out. It is to be noted that this research was carried out in a public university in Ghana. Thus, the findings must be appreciated within this context as the definitions of BL, what it means and how it is applied in that context might differ from approaches used in other environments and settings.

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ENHANCING VOCABULARY KNOWLEDGE AMONG SECONDARY SCHOOL EFL STUDENTS BY USING FACEBOOK

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ABSTRACT

This study attempted to compare the effectiveness of employing Facebook and traditional instruction in improving Iraqi EFL secondary school students' vocabulary knowledge. The factors that positively and negatively affect the EFL students' vocabulary learning were also investigated. The study employed a quasi-experimental design with two groups; the control and the experimental groups. In the control group, thirty-six students were taught English vocabularies via the in-class conventional method, and the experimental group which consisted of another thirty-six students were taught using Facebook as an Online Learning Platform (FOLP) to enhance their knowledge of English vocabularies. A mix of quantitative and qualitative research methodology was used where triangulation of pretest, posttest, semi-structured interview and observation were used. Results showed that FOLP was more effective than traditional instruction in improving EFL students' vocabulary knowledge. In addition, results indicated that a variety of teaching techniques, effective group work, immediate feedback, and autonomous learning opportunities are factors that positively affect students' learning of English vocabularies. Moreover, students perceived that domination of the good students of the discussion, technical problems, and social loafing are the factors that negatively affect their learning of English vocabularies. The results confirmed the liability of using Facebook in broader contexts.

Keywords: English vocabulary knowledge, facebook, secondary school, EFL students.

INTRODUCTION

Globalization has created great changes in the education field. Today, information technology has simplified learning and gaining knowledge instead of using books and libraries. Individuals can gain access to various types of education with Computer-Mediated Communication (CMC) tools. Accordingly, teaching and learning have incorporated with (CMC) and become less physically binding and more beneficial (Talan & Gulsecen, 2019; Aznar, et al., 2020).

Hence, to reduce the gap between what was used to be teacher-centred scenario and the formation of the Net Generation, educators need to incorporate self-directed learning strategies among students. In this way, they would be able to move away from the stereotypical teacher-oriented teaching and learning method and become autonomous learners (Blachowicz & Fisher, 2006; Challob, 2018; Abdullah, et al., 2019).

In this digital era, CMC have played a vital role in teaching and learning the various skills and elements of English language. English vocabulary learning is one of the English language elements that were affected by the use of CMC in general, and Facebook in particular (Jafari & Chalak, 2016; Lee, 2019; Motlagh, et al.,

2020). English vocabulary refers to the students' knowledge of various forms of words, their equivalences, and their appropriate use in everyday life meaningful situations (Cetinkaya & Sutcu, 2018). This is because through Facebook, students can be provided with ample learning opportunities to gain new vocabularies and practice them continuously with their classmates in Facebook platform. As Steven Stahl (2005) cited in Blachowicz & Fisher (2006), vocabulary knowledge can be deepened and enriched over time, and is not something that can ever be fully mastered. Therefore, integrating Facebook in learning vocabulary is an alternative way of teaching and learning in this globalized world.

Guidelines and demonstrations on classroom teaching and learning using Facebook are in abundance on the internet and in the past literature (Monica-Ariana & Anamaria-Mirabela, 2014; Tosun, 2015; Jafari & Chalak, 2016; Cetinkaya & Sutcu, 2018; Lee, 2019; Motlagh, et al., 2020).They did not only explain the merits and demerits of using Facebook as a learning platform but they also provided scientific evidence for using Facebook for teaching and learning and deliver various supporting pedagogical ideas based on the use of Facebook. In addition, students have to understand English to be able to participate in the learning/ teaching activities of Facebook since most of its features are in English. The authentic language communication available on Facebook can be utilized to cultivate students' motivation and performance of the English language (Blattner & Fiori, 2009).

As mentioned by Shahrokni (2009) and Cetinkaya & Sutcu (2019), the use of multimedia tools or online applications in teaching and learning enhances students' vocabulary learning. This is further supported by Pennington (1989) who stated that when using a computer, incidental learning is effective. The acquisition of vocabulary allows students to speak and write fluently and helps them to understand the exact meaning of what they hear and read.

In the educational field, proficiency in English is an important requirement for students' success as it provides opportunities for them to build their future. Therefore, teachers need to improve students' English proficiency by enhancing their vocabulary knowledge. Vocabulary development is one of the key elements that open the door to educational success. Unfortunately, in an EFL setting in Iraq, students' lack of direct and indirect exposure to English language vocabularies resulted from the constant use of their mother tongue inside and outside the classroom and the insufficient language exposure outside the classroom. This created weak students in the English language.

However, secondary school EFL students lack in their grasp in vocabulary and this is considered one of the factors that hinder their communication with others. Their exposure to English is limited to the classroom environment during English lessons only. Shedding light on this serious problem, the researchers tapped students' interest in using Facebook to inculcate their vocabulary knowledge by providing them with Facebook-supported learning activities that enrich their vocabulary knowledge. Hence, it is hoped that EFL students can be able to communicate better, construct meaningful sentences, and improve their English performance.

In this study, the researchers attempted to compare the effectiveness of employing FOLP and traditional instruction in improving vocabulary knowledge among Iraqi EFL secondary school students. The factors that positively and negatively affect the EFL students' vocabulary learning were also targeted. Accordingly, the following research questions were addressed:

1- Is there any difference in the EFL students' vocabulary knowledge between the students who used FOLP and those who received traditional instruction?
2- Is there any difference in the EFL students' English vocabulary knowledge before and after the experiment for the experimental group and the control group?
3- How do the EFL students perceive the determining factors that enhance and hinder their learning of English vocabulary in FOLP?

SIGNIFICANCE OF THE STUDY

Generally, the study is intended to investigate and explore the effectiveness of using Facebook as a platform of learning as compared with the traditional teaching method in enhancing students' vocabulary knowledge. The results of this study would provide an insight to secondary school EFL students, teachers, and textbooks designers and the practitioners in the field of English language learning and teaching.

As for the EFL students, the results of the study can help them get direct exposure to many vocabularies of various classes and be familiar with their meanings and usages. Adding to that, the use of Facebook as a platform of learning English vocabularies is new and attractive to EFL students. Thus, it can encourage them, motivate them, and immerse them in a creative learning environment. It can also help EFL students' continue their learning outside the time and place of the traditional classroom.

As for English language teachers, the use of Facebook can help them be in direct contact with his/her students without any restrictions. It can also help the English language teachers create language learning activities and discussion activities among the students and help them learn by themselves autonomously.

With reference to the significance of this study to textbooks designers and practitioners, the results of the study can provide them with useful theoretical and practical pedagogical evidences and recommendations for the effectiveness of utilizing Facebook in improving the EFL students' vocabulary knowledge. Consequently, these pedagogical evidences and recommendations can help improve students' English proficiency level, in general and enrich EFL students' vocabulary knowledge, in particular.

LITERATURE REVIEW

Vocabulary learning is a collective process whereby learners gather and store vocabularies learned in the lexical memory of the brain (Rose, 2006). Learners need constant opportunities to use the gathered words appropriately and thus gain an understanding of their use. There is a strong connection between vocabulary knowledge of readers and their ability to understand what they read (Blachowitz & Fisher, 2006). According to Schmitt & McCarthy (1997), good vocabulary instruction focuses on important words that help students understand the text, use words that students deal with frequently, and difficult words like idiomatic words; words with more than one meaning. Teachers, therefore, can help students by encouraging them to learn new words and enhancing their word knowledge through proper vocabulary instruction. According to Liu (2009), teachers should teach their students how to learn new words instead of just teaching them vocabulary. S/he stresses that activities used in the classroom should be learners-centered so that students could be independent learners and they could deal better with unknown words in context.

Various researches (Abdullah, et al., 2019; Challob, 2018; Dehham, 2018; Waring, 2008) have shown that effective participation in language and vocabulary learning makes learners learn better. They concluded that learners must form groups and practice the use of new words to avoid keeping words isolated and allow them to notice new words for themselves and assume the meaning of the new words.

Several studies like (Challob, et al., 2016; Shetzer & Warschauer, 2000) have stated that the Internet has now become one of the primary media for literacy and communication practices, opening multiple channels of communication for interpersonal contact, group discussion, and information exchange.

In addition, numerous studies have revealed the advantages of using CMC as the medium to support the learning process. Some of the advantages are as follows. Firstly, it produces a good equitable platform and decreases threatening forums for second language acquisition (SLA) discussion (Warschauer, 1996). Secondly, it shows an increase in sharing ideas and knowledge among students. Thirdly, it results in a more decentralized role of teacher and develops the quantity of the output of language (Kern, 1996). Finally, it enhances learners' attention to linguistic form as a text-based medium (Warschauer, 1996).

Facebook can be defined as online groups that can share photographs, personal, and educational information within an online social network site (Buckman, 2005 & Majida, 2020). Similar to CMC, several studies (Cheung & Vogel, 2011; Khe, 2011; Shahrokni, 2009) have revealed that there are positive inputs in using Facebook as a medium to support learning. Some of the skills can be useful for language learners by including them in online discussion platforms and searching for new information to improve their skills in a more informal way and give students the chance to learn so many practical skills. For example, Northcote and Kendle (2001) stated that learning via Facebook enhances students' critical analysis skills, resources, and it is also an active online interaction platform for filtering and decoding information. In addition, Roth (2009) indicated that teaching and learning should be interactive, personalized and holistic that aid students to move away from the passive realm of reading into the interactive world of digital pedagogy, as well technology should be made significant component in the curriculum by drawing Plato's goals for

education and adapting and realizing them. Therefore, the use of language in Facebook in terms of dialogues in conversational contexts can help learners in enhancing their vocabulary skills and knowledge.

As for the use of Social Networking Sites (SNSs) in general, and Facebook in particular in teaching English vocabulary, several studies have been conducted in various English language contexts. For example, Nikbakht and Boshrabadi (2015) explored the benefits of using Facebook as a Social Networking Site in developing Iranian EFL students' vocabulary knowledge. In addition, Motlagh, et al. (2020) investigated the effect of some educational videos, text material delivered through the use of social networks (i.e. Telegram) on EFL undergraduate students' vocabulary knowledge in Iran. The results of these two studies were positive in terms of improvement in students' vocabulary knowledge. Furthermore, Lee (2019) investigated the extent of the effect of quantity (frequency/amount of time) and quality (diversity) students' exposition to informal digital learning of English vocabularies on (L2) students' quality in vocabulary outcomes. The study concluded that the quantity of informal digital learning of English vocabularies was not associated with students' vocabulary outcomes and the quality of informal digital learning of English vocabularies was positively related to students' vocabulary outcomes. Moreover, Tosun (2015) investigated the effects of using blended learning strategy in enhancing EFL students' vocabulary and concluded that the use of blended learning strategy was effective in enriching EFL students' vocabulary. Besides, Jafari and Chalak (2016) investigated the effect of WhatsApp in improving Iranian junior high school EFL students' vocabulary learning. The findings revealed significantly positive effect of using WhatsApp on students' learning of English vocabularies. Cetinkaya and Sutcu (2018) conducted a study to compare between the effect of using WhatsApp and Facebook on English vocabulary instruction. The findings revealed that WhatsApp is more effective than Facebook in teaching English vocabulary.

Other studies (Monica-Ariana and Anamaria-Mirabela, 2014; Kabilan and Zahar, 2016) investigated the effectiveness of using social media, namely; Facebook to enrich students' vocabulary knowledge. To some extent, these two studies resulted in conflicting findings. The findings of Monica-Ariana and Anamaria-Mirabela (2014) study indicated that there was no significant difference between the control and experimental groups though the use of Facebook helped in improving the vocabulary knowledge in the two groups. As for Kabilan and Zahar (2016) study, it was found that the students performed better in the post-test as compared to the pre-test due to the use of Facebook in learning English vocabulary. Based on the findings of the aforementioned previous studies, there are contradictory evidences for the effectiveness of Facebook in improving students' vocabulary knowledge. In addition, the factors that help student' enrich their vocabulary knowledge or hider it were not investigated in the past studies. Accordingly, the current study aimed at investigating the effect of Facebook in enhancing EFL students' vocabulary knowledge. Besides, the determining factors that enhance and hinder EFL students' learning of English vocabulary were also addressed in the current study.

METHODOLOGY

This section presents details relevant to the research design, methods of collecting data, and analyzing.

Research Design

The mixed-method research design methodology was implemented in the current study, whereby it combines the quantitative and qualitative approaches of data collection in a single study (Creswell, (2014). According to Gay, et al. (2009), the use of quantitative and qualitative methods together develops the interconnection and strength that exists between them to understand the phenomena completely. The type of mixed-method research design that was used for this study was the QUANTI-QUALI Model which is also known as the explanatory mixed methods design (Denzin & Lincoln, 2018).

In addition, the quantitative research method that was used in this study was the Quasi-experimental design since it was not possible for the researcher to randomly allocate subjects. This method helped the researchers to sufficiently control the threats of validity. The non-equivalent control group design was chosen as it was like the pretest-posttest control group design except it did not involve random allocation. If differences between the groups on any major extraneous variables were detected, analysis of covariance (ANCOVA) could be used to statically equate the groups (Newby, 2014). As for the qualitative data, they were collected by using a semi-structured interview and observation.

Participants

Seventy-two students were chosen from one of the secondary schools in Erbil in the north of Iraq in the academic year 2019-2020. Those students were enrolled in an English as a foreign language course as a prescribed course in their 4th secondary year. They were all having the same proficiency level in English language as they upgraded from the 3rd academic year to the 4th academic year under the same educational system and conditions. The participants' ages ranged from sixteen to seventeen years old. They were homogenous in their gender, cultural background, mother tongue (Arabic), and the number of years of studying EFL. Though they were proficient in using Facebook to socially communicate with each other and for posting in a daily base, they have ever utilized it as a learning platform of English language. Before this semester, they were learning English language using the traditional Face-to-Face in class method.

Thirty-six students formed the experimental group and another thirty-six students acted as the control group subjects. Ten students from the experimental group were purposively selected to participate in the interview. The selection of the interviewees was based on their exposure to the teaching instruction, their performance, and engagement in the course (3 students are good, 4 students are medium, and 3 students are low) in their performance and engagement in the course.

Instruments

A triangulation of mixed-mode research instruments was used for data collection as described below:

1- Quantitative research instruments: They include the pretest represented by mini dialogues with omitting unneeded letters and the posttest represented by a crossword puzzle. The items in the pretest and posttest were developed based on the English language syllabus of the prescribed book entitled (English for Iraq) for the 4th year secondary school students. Then, the researchers ensured the face and content validity of the pretest and posttest by submitting them to a jury of five experts. Some amendments to the pretest and posttest were performed based on the experts' suggestions. Finally, the pretest and posttest were piloted to ensure their content and language clarity, accuracy, practicality, and reliability. Based on the Cronbach's Alpha values which should be more than 0.7 (Hair et al, 2017), the reliability value for the pre-test was (0.91) and the post-test was (0.89). These values represented that the two tests were highly reliable.

2- Qualitative research instruments: They include semi-structured interview and observation notes. The interview questions were submitted to the same jury of experts who also suggested some constructive recommendations to the questions of the interview to be amended by the researchers. It is worth noting that the interview was conducted by using the students' mother tongue; Arabic language, depending on the preference of the interviewees. Fortunately, this procedure helped the researchers to collect detailed answers and rich of information discussion from the interviewees. The students' answers were transcribed verbatim and translated by the researchers into the English language. The English version of the students' interview answers was submitted to an expert in the field of linguistics and translation for the purpose of validation and back translation.

Data Collection Procedures

The study was carried out in three phases as explained below:

1- Pre-Study Phase (Week-1): The students in the experimental and control groups were given a pretest.

2- The treatment phase (Week -2 to Week -11): The teacher taught the students in the experimental group using FOLP. Thus, the teacher provided the students with English vocabulary exercises and activities to be performed online via Facebook at an allocated time (online communication outside the classroom). The students were informed to attend four online hours on Facebook each week. As for the control group, students were taught by using the traditional method in their normal classroom. It is worth noting that the teacher- who was one of the researchers- of the experimental group and the control group was the same.

3- Post-Study Phase (Week -12): The students in the experimental and control groups were asked to do the posttest. In addition, a semi-structured interview was conducted to the experimental group to determine the students' perceptions relevant to the factors that affected their learning of English vocabulary. Figure 1 illustrates the procedures of data collection of this study.

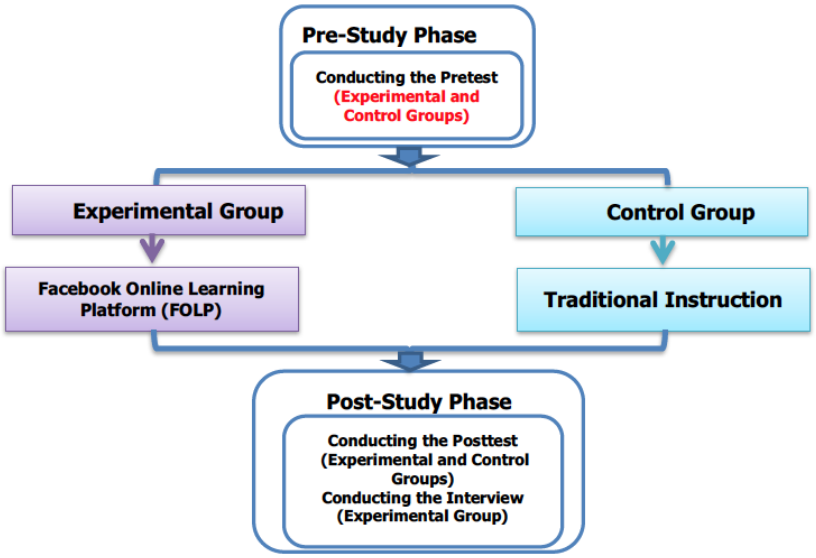

Figure 1. Procedures of the study.

Data Analysis Procedures

As for the quantitatively collected data; they were analyzed using the Statistical Package for the Social Sciences (SPSS Version 21) software. SPSS was used to get the descriptive statistics to show the number of subjects and to compare the means, standard deviation, and standard error of the experimental and control group in the pretest and posttest. In this study, ANCOVA was used to compare the differences in English Language vocabulary knowledge between the students who used FOLP and those who used traditional instruction. ANCOVA was utilized as the researchers were unable to randomly assign subjects to different groups but instead having to use the existing groups (e.g., classes of students). To identify the differences in the mean scores of the students' pretest and posttest for the Facebook group and the traditional instruction group respectively, the paired samples T-test was used.

As for the data collected qualitatively by using the semi-structured interview, and observation, they were analyzed qualitatively following the six phases of thematic analysis suggested by Creswell (2012). These steps are; preparing and organizing the data, exploring and coding the data, describing findings and forming themes, representing and reporting findings, interpreting the meaning of the findings, and ensuring credibility and trustworthiness of the findings.

To prepare and organize the data, the researchers transcribed the data collected by the students' interviews following verbatim transcription technique, typed the Arabic version of the interview responses, and saved them using Microsoft files. Then, the researchers translated the Arabic version of the students' interviews into English language and gave it to one expert in English- Arabic translation from the department of English, College of Education for Humanities-University of Anbar. He was asked to check the accuracy and compatibility of the meaning in both the Arabic and English versions. As for the observation notes, they were also types and saved as Microsoft files. Finally, the data were arranged and organized in tables. For the purpose of exploring and coding the data, the data were insightfully read for many times, and categorized. In addition, the researchers wrote some descriptive notes for these categories to develop deep understanding of the data and to arrive at the emerging themes relevant to the research questions of the current study. In describing findings and forming themes, the data were re-read again carefully to create broad themes that combine the sub-themes and categories emerged. Accordingly, these themes were categorized into main

themes and sub-themes according to the research questions of the current study. This phase is followed by scientifically reporting the findings and providing them with the required explanations and interpretations.

Finally, to certify the reliability, objectivity, and credibility of the findings emerged from the qualitative data and avoid the researchers' bias, triangulation and review by external auditors were implemented by the researchers (Stake, 2010; Yin, 2011). First, multiple data collection instruments were implemented for the purpose of triangulation of data and to compare them to ensure their accuracy and compatibility. This is ensured by checking out the stability of the findings obtained by various data collection sources (Denzin & Lincoln, 2018). Second, the researchers submitted the first draft of the analysis and the findings to an external auditor to scientifically and critically study the entire research process and provide constructive comments in terms of the strengths and weaknesses of the findings. This expert was a professional and long experience professor in the field of technology and English language teaching. He critically examined the accuracy of all stages of the research process and confirmed the validity and accuracy of the findings. Finally, to ensure the objectivity of the analysis and the accurateness of the themes emerged from the students' interviews and observation notes, inter-rater reliability was calculated (Creswell, 2014). To do this, the collected data were coded by two coders: the first one was one of the researchers, whereas the second one was the external auditor mentioned above. An agreement percentage between the two coders was calculated relevant to the coded patterns. The result was (96 %) for the two coders' agreement. Then, the disagreement point related to some themes were discussed again by the two coders and resulted in a (98%) percent of agreement between them.

RESULTS OF THE STUDY

The following sections cover a detailed survey of the results of the study described in terms of the previously stated research questions.

Quantitative Results

Results of the First Research Question

Table 1, 2, and 3 provide the ANCOVA results for the differences in English Language vocabulary knowledge between students who were taught by using FOLP and those who were taught by using the traditional instruction as calculated by the students' scores in the posttest.

Table 1. Descriptive Statistics of the Difference between the Control and the Experimental Groups as Measured by their Posttest Scores.

Dependent Variable: Posttest			
Groups	Mean	Std. Deviation	Number
Control Group	19.6389	8.50597	36
Experimental Group	22.0278	8.25828	36
Total	20.8333	8.41026	72

As shown in Table 1 above, the results gained from the students' posttest on both groups show that the mean score of the experimental (22.0278) is higher than that of the control group (19.6389). This means that the students' vocabulary knowledge of the experimental group is better than that of the control group.

Table 2 shows that the assumption of equality variance is not violated. The significant level is 0.112, which is greater than 0.05. Thus, the variances are equal and the assumption is not violated.

Table 2. Levene's Test of Equality of Error Variances.

Dependent Variable: Posttest			
F	df 1	df 2	Level of Significance
2.591	1	70	.112

** Tests the null hypothesis that the error variance of the dependent variable is equal across groups.*

a. Design: Intercept + pretest + method.

The statistical details mentioned in Table 3 clearly portray the statistically significant difference between the group of students who were taught by using FOLP and those who were taught by using traditional instruction in terms of the EFL students' vocabulary knowledge.

Table 3. Tests of Between-Subjects Effects.

Dependent Variable: Posttest								
Source	Type III Sum of Squares	df	Mean Square	F	Level of Significance	Partial Eta Squared	Noncent. Parameters	Observed Power a
Corrected Model	3278.168b	2	1639.084	64.855	.000	.653	129.711	1.000
Intercept	298.033	1	298.033	11.793	.001	.146	11.793	.923
Pretest	3175.446	1	3175.446	125.646	.000	.646	125.646	1.000
Group	102.722	1	102.722	4.065	.048	.056	4.065	.511
Error	1743.832	69	25.273					
Total	36272.000	72						
Corrected Total	5022.000	71						

a. Computed using Alpha= 0.05

b. R Squared = 0.653 (Adjusted R Squared = 0.643)

As shown in Table 3, the significant level is higher than 0.05. Therefore, there is a statistically significant difference in the mean scores of the posttest between the group of students who used FOLP and those who received the traditional instruction on the English language vocabulary knowledge after controlling the effect of the mean score of the pretest (F=4.065; df=1; p=0.48). This significant difference is in favour of the first group; i.e., the group taught by using FOLP. Thus, it can be concluded that FSBLP is more effective than traditional instruction in improving English language vocabulary knowledge.

Results of the Second Research Question

Table 4, and 5 show the results of the Paired-samples T-test for the difference in the students' English vocabulary knowledge of the experimental group members who were taught by using FOLP before and after instruction as measured by the students' pretest and posttest mean scores.

Table 4. Paired Samples Statistics of the Difference between the Mean Scores of the Pretest and Posttest of the Experimental Group.

	Mean	Number	Std. Deviation	Std. Error Mean
Pair 1 Pretest	20.1667	36	8.68990	1.44832
Posttest	22.0278	36	8.25828	1.37638

As shown in Table 4 above, the mean score of the posttest (22.0278) is higher than that of the pretest (20.1667). This means that the use of FOLP has improved the students' English vocabulary knowledge. Table 5 indicates whether there is a statistically significant difference between the mean scores of the English vocabulary test before and after the experiment.

Table 5. Paired Samples T-Test of the Difference between the Mean Scores of the Pretest and Posttest of the Experimental Group.

	Paired Differences					t	df	Sig. (2-tailed)
			Std. Error Mean	95% Confidence Interval of the Difference				
	Mean	Std. Deviation		Lower	Upper			
Pair 1 Pretest-Posttest	- 1.86111	4.63621	.77270	- .3.42978	- . 29244	2.409	35	.021

Based on the result shown in Table 5, the significance level is lower than 0.05 (t=2.409; df=35; p=0.021), which led to the conclusion that there is a statistically significant difference in the English language vocabulary knowledge before and after the experiment for the students in the experimental group. This significant difference is in favour of the posttest; i.e., the students in the experimental group who were taught by using FOLP were better in their posttest as compared with their performance in the pretest.

Results of the Third Research Question

Table 6 and 7 show the results of the Paired-samples T-test for the difference in the English language vocabulary knowledge of the control group who were taught by using the traditional instruction as measured by the students' pretest and posttest mean scores.

Table 6. Paired Samples Statistics of the Difference between the Mean Scores of the Pretest and Posttest of the control Group.

	Mean	Number	Std. Deviation	Std. Error Mean
Pair Pretest	20.1667	36	8.68990	1.44832
1 Posttest	19.6389	36	8.50597	1.41766

Table 6 indicates that the mean score of the posttest (19.6389) is slightly lower than that of the pretest (20.1667). This means that the use of traditional instruction did not make any type of improvement in students' English vocabulary knowledge. Table 7 indicates whether there is a statistically significant difference between the mean scores of the English vocabulary test before and after the experiment for the control group.

Table 7. Paired Samples Test of the Difference between the Mean Scores of the Pretest and Posttest of the control Group.

	Paired Differences					t	df	Sig. (2-tailed)
			Std. Error Mean	95% Confidence Interval of the Difference				
	Mean	Std. Deviation		Lower	Upper			
Pair 1 Pretest- Posttest	.52778	5.99755	.99959	-1.50150	2.55706	.528	.35	.601

Based on the result in Table 7, the significance level is higher than 0.05 (t=0.528; df=35; p=0.601). This leads to the conclusion that there is no statistically significant difference in the English language vocabulary knowledge for students of the control group before and after instruction.

Qualitative Results

EFL Students' Improvement in their Vocabulary Knowledge

Based on the quantitative results mentioned in the previous sections, it is found that the use of FOLP in teaching English vocabularies was statistically more effective as compared with traditional instruction. This result is also qualitatively confirmed when analyzing the students' responses to the semi-structured interview and observation. The majority of the interviewees (8 students out of ten students) indicated that they noticed a gradual enrichment on their vocabulary knowledge throughout FOLP. The following are extracts from the students' responses to the interview questions.

S1: I feel happy in learning the English language on Facebook. I feel that I have the required vocabulary wherever I need them in expressing myself.

S3: I think that the amount of vocabularies is better than before. I learned so many vocabularies during the course.

S4: We learnt so many vocabularies,……mmmmm, when we discuss with the teacher and with classmates, we shared so many vocabularies. hmmm….I feel now is better.

As for the other two students (S7, and S9), they also appreciated the use of Facebook as a platform of learning and viewed it as more flexible in terms of its time and place as stated by (S7), and it enhanced not only students' vocabulary knowledge, but it also encouraged them to speak as they have the number of vocabularies they need and it was psychologically not threatening as the case of the traditional instruction. Below are extracts from their responses to the interview questions.

S7: I feel more comfortable in Facebook learning since the teacher and classmates are always available for help as long as we are connected to the internet.

S9: Unlike the traditional instruction, in Facebook, we feel that there are no threatening factors when we discuss….mmm…. classmates also did not make fun from other students.

In addition, throughout the experiment, the students in the experimental group were noticed more active in their discussion as compared with those in the control group. They were also observed to utilize new vocabularies with their derivations. Some of them have prepared lists of vocabularies and their synonyms, and antonyms and share with their classmates on Facebook. Adding to that, students were able to use appropriate vocabularies to their context.

Factors that Affect the EFL Students' Vocabulary Learning Positively

In this section, the qualitatively collected data by using the students' interview, and observation notes were analyzed thematically. As a result of this thematic analysis, four themes emerged representing the factors that positively affect the EFL students' vocabulary learning as perceived by the members of the experimental group who were taught by the use of FOLP. These factors are presented and illustrated in Table 8.

Table 8. Factors that Affect the EFL Students' Vocabulary Learning.

No.	Factors	Frequency of students (out of 10 students)	Examples from the students' interview extracts	
1	Variety of the teaching techniques and activities	7	S3:	Every lecture, we participate in different learning activities, various vocabulary exercises. This is good for me as it keeps us away from the class routine.
			S5:	The variety of modes of learning encourages us to learn better in Facebook.
			S10:	Facebook is more motivating to me. Hmmmm,…I not only learn from the material, sometimes I learn new vocabularies from photos and animations available in our Facebook class.
2	Effective group work	9	S1:	Group work activities help me not only in learning vocabularies, but it develops my speaking ability.
			S2:	Facebook helps us to work in groups. This made me more relaxed. I have friends that helped me and I help them to do the activity and learn together.
			S3:	Facebook groups encourage me to learn outside the classroom and be more creative because we have enough time to think carefully.
3	Immediate feedback	9	S1:	Facebook gives us a chance to get the direct correction. I feel happy when working with my friends because they can help me, and I also can help them.
			S4:	On Facebook, I feel comfortable because I can ask the teacher whenever I encounter a language problem and get a recommendation for my mistakes.
			S7:	When practicing language together on Facebook, it is so easy to correct each other's mistakes.
4	Autonomous learning opportunities.	6	S8:	The types of activities practiced on Facebook encourage us to be more independent in our learning.
			S9:	Facebook platform gives us opportunities to learn by ourselves. Sometimes I do exercises with friends even if the teacher is not online.
			S10:	When working online, I can learn by myself. I can easily look for language knowledge and new vocabularies from online dictionaries, google…..

The aforementioned results emerged from the students' responses to the interview questions were also supported by the teacher's observation notes. Students were observed working actively and enthusiastically in FOLP, specifically when working in group form. They used to discuss with each other utilizing new vocabularies, share language and vocabulary knowledge, provide feedback, and correct each other's mistakes independently. Students were also noticed relaxed and enjoyed engaging and participating in the various language activities and materials posted on Facebook.

Factors that Hinder the EFL Students' Vocabulary Learning

Thematic analysis of the students' responses to the interview questions and observation revealed three themes relevant to the factors that negatively affect the EFL students' vocabulary learning as perceived by the members of the experimental group. These factors are described and illustrated in Table 9.

Table 9. Factors that Hinder EFL Students' Vocabulary Learning.

No.	Factors	Frequency of students (out of 10 students)	Examples from the students' interview extracts	
1	Domination of the good students of the discussion and work.	7	S3:	…..mmmm, sometimes the good student takes the responsibility of the majority of the activity. Little work is given to the other students.
			S6:	Ahh, I think, hmm, weak students depend on the students who are better than them when doing a specific activity.
			S9:	,,,students who have good speaking ability dominate on the discussion. They did not give the other students time to discuss. In this case, they impede our learning.
2	Technical problems	4	S4:	….when we work in the activity, electricity power cut hinder learning because I'll be offline and cannot continue with friends in doing the activity for a few minutes
			S5:	Weak signal caused a problem for me frequently.
			S6:	hmmm, Internet is not good in my house, sometimes is cut and other time its signal is so weak. This interrupts our discussion in the activity.
3	Social Loafing	3	S1:	Sometimes, some students waste time in speaking outside the activity.
			S7:	Students, mmmm, sometimes, argue in other topics not related to the activity we are doing.
			S10:	Some students, sometimes, leave the activity we are doing and talk on another topic, hmmm, they did not work seriously in the activity. This confused our learning.

As shown in Table 9, students' reflections in the interview clearly clarified the three factors that hinder English vocabulary learning. In addition, the analysis of the observation notes confirmed the same factors mentioned above. Sometimes, good students, specifically those that have good language commands used to take the whole discussion and responsibility for doing the activity. Accordingly, the teacher intervenes in this discussion and encourages the other students to participate and contribute to the activity. On some occasions, some students were seen not enrolled in the discussion for a short time or completely absent in the time of the activity. They claimed that there are technical problems represented by either temporary weak Internet signal or electricity cut and their Internet routers are not connected to UPS to help them be always online. Sometimes, few students were seen doing discussing outside the learning activity. These problems are normal in Iraq due to the various economic and political reasons.

DISCUSSION

Although the use of Facebook has been widely implemented socially and educationally, its effectiveness in improving EFL students' vocabulary knowledge as online learning English language environment is still neglected. Moreover, exploration of the factors that are available in this learning environment and that have positive and negative effects on EFL students' vocabulary knowledge is still ignored in past studies. The majority of past studies were concerned with using Facebook to enhance students' English language and communication among students themselves (Buckman, 2005; Blattner & Fiori, 2009; Roth, 2009; Cheung & Vogel, 2011; Khe, 2011). Other past studies such as (Liu, 2009; Sharokani, 2009; Ajisoko, 2020) were mainly concerned with using technology in general in teaching and learning English vocabularies. Some other studies (Rose, 2006; Dehham, 2018) investigated the use of other teaching techniques in teaching English vocabulary. Accordingly, the current study might be the first experimental study that integrated Facebook with conventional classes to examine its effectiveness in improving the EFL students' vocabulary knowledge and identify the determining factors that positively or negatively affected the EFL students' vocabulary knowledge.

Results of the current study showed that the use of FOLP was significantly effective in improving the EFL students' vocabulary knowledge in favour of students of the experimental group as compared with students of the control group as measured by their mean scores of the post-test. This is in agreement with Klein (2008) and O'Hanlon (2007), who stated that language, writing (indirect vocabularies), and fluency are increased with the use of Facebook. These results are also in accord with Ajisoko (2020) study. However, thought the Ajisoko (2020) investigated students' vocabulary learning as a dependent variable, it is different from the current study in terms of its independent variable; i.e., the use of Duolingo Apps. Unlike the current study, Ajisoko (2020) used descriptive statistics and compared the students' scores in the pretest with the posttest only. Accordingly, the current study is different from this study in terms of research design, independent variables, and data analysis.

These types of improvement can be due to many factors. The first factor is the usefulness, ease of use, and accessibility of Facebook as a platform of learning. All students enrolled in the study were so familiar with using Facebook as they already have created their Facebook accounts and used them frequently for social activities. This fact is in harmony with Albashtawi and Al Bataineh (2020) study. However, the difference between this study and the current study is that in the former, student' reading and writing performance and their attitudes were targeted as they are influenced by the use of Google Classroom integrated English language learning environment. Second, the students had the opportunity to review and benefit from the myriad of activities and strategies while acquiring vocabulary items, rather than limiting themselves to merely paper related activities. Third, the ambiance of this interactive platform; i.e., Facebook has created a community of practice among students, specifically those who are shy, introverted, and weak in terms of their language knowledge. This can promote students' level of motivation and confidence and encourage them to interact, exchange ideas with the community of learners without any type of embarrassment. This fact is supported by Challob (2018) when he stated that the online learning platforms enhanced students' English language learning as the students are more flexible, less threatened and anxious when learning online due to the time and place flexibility of the learning situation. In addition to learning English vocabularies, the use of Facebook as a learning platform can also enhance students' autonomy and motivation.

In addition, the results of the study indicated that there are several factors that positively affected their learning of English vocabulary. These factors are; the variety of teaching techniques and activities, effective group work, immediate feedback, and autonomous learning opportunities that satisfy students' needs. As perceived by the EFL students, these factors are facilitated by the use of a technology-supported learning platform. These factors came in tandem with some of the previous studies such as (Buckman, 2005; Blattner & Fiori, 2009; Abdullah, et al., 2019; Appavoo, 2019; Bilgic & Tuzun, 2020) that reflected students' acceptance of various forms of technology-supported English language learning environments. The aforementioned factors helped students promote their vocabulary knowledge due to the interactive group work activities facilitated by Facebook platform. This created a comfortable and user-friendly learning environment for the students where they socialize, interact and learn by themselves under the supervision of their teacher. This fact is emphasized by Vygotsky's (1978) theory of social constructivism. This theory of learning proposed that learning is a social process and learning can be achieved via students' self-construction of knowledge and socialization (Can, 2009). Accordingly, students' enriched their English vocabulary knowledge via their continuous interaction in Facebook platform and leads to self-learning opportunities for English vocabularies. In addition, students' familiarity with all Facebook properties and their interest in using it encourage them to be engaged and interactive in the various learning activities that enriched their vocabulary knowledge.

Moreover, the study also revealed a few factors that negatively affected EFL students' learning of English vocabularies such as; domination of the good students of the discussion and work, technical problems, and social loafing. As perceived by the EFL students, these factors hinder their learning of English vocabularies throughout FOLP they have experienced. This result is in accord with some studies such as (Appavoo, 2019; Bilgic & Tuzun, 2020).

CONCLUSION

Based on the results gained in this study, it is clearly evidenced that the use of FOLP is effective in enhancing students' vocabulary knowledge. Accordingly, Facebook could be implemented as a supplemental learning experience that provides EFL students with an array of new meaningful strategies to enhance their skills and stimulate them to learn. In addition, Facebook represents a safe and less threatening learning space for shy and low self-esteem students as it provides them with meaningful learning opportunities and a flexible atmosphere to learn together by participating in collaborative learning activities. This flexible learning space enhances students' motivation and confidence and can consequently enrich students' vocabulary knowledge. Moreover, Facebook permits for meaningful learning of words in context. Thus, the students can learn not only the lexical meaning of words but also learn how to use the words in their appropriate contexts. Furthermore, the use of Facebook as a platform of learning encourages incidental learning of English vocabularies which in turn considered more enjoyable and motivating for EFL students (Northcote & Kendle, 2010).

While the results of the current study are promising, few drawbacks should be highlighted and objectively taken in concern when dealing with the results of the research. This study has its limitations in terms of the short time duration of the study and the number of students involved. To some extent, the short time frame given was not so sufficient to deeply analyze the improvement of the students' vocabulary knowledge as it is affected by the used instructional strategy. This is due to the small time allocated for students to learn in the Facebook online community and the busy schedules that require them to do so many educational commitments. However, the use of mixed-mode research methodology, helped the researchers to diminish the drawbacks resulted from the short period of the experiment and consequently, proved the effectiveness of using Facebook in enriching students' vocabulary knowledge. To add further, the results of the study are restricted to 72 EFL students who were enrolled in their 4th-year secondary school. Therefore, bigger sample size is also needed to conduct a similar study to enhance the validity and generalizability of the findings.

Based on the findings of the current study, along-period experimental studies are recommended to be conducted to investigate the effects of using Facebook on enhancing students' vocabulary knowledge. Further studies are encouraged to investigate the factors that affect students' English vocabulary learning as perceived by teachers of English language and other practitioners in the field. Finally, further studies should concentrate on the way teachers can do to diminish the effect of the challenging factors that hider students' learning of English vocabularies in SNSs in general and in Facebook in particular.

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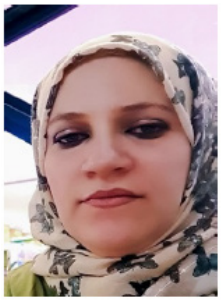

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DEVELOPMENT OF MEDICAL SCHOOL STUDENTS' ATTITUDES TOWARDS ONLINE LEARNING SCALE AND ITS RELATIONSHIP WITH E-LEARNING STYLES

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ABSTRACT

This study aims at determining students' attitudes towards distance education/online learning through a scale developed by the authors and determine the relationship between these attitudes and e-learning styles. The study carried out on students of Canakkale Onsekiz Mart University Faculty of Medicine using the online system of the university., the sample group consists 815 students from different classes, the participation rate was 89.46%. Following the explanatory factor and confirmatory factor analysis resulting structure of the scale was confirmed. Construct validity, criterion validity and internal consistency of the scale were high. Multivariate regression analysis was conducted to assess the predictive strength of the students' learning styles which were determined using the e-Learning Styles Scale for Electronic Environments for the attitudes towards online learning. Presented Medical School Students' Attitudes Towards Online Learning Scale was valid and reliable instrument to measure medical school students' attitudes towards distance/online learning. Although students' attitudes toward online/distant education were divided, it was negative on the average. The regression modeling showed that the learning styles are significant predictors for attitudes towards online education and the audio-visual learning style was determined as has the highest predictive strength for attitudes towards online education. The developed tool can be used to monitor medical school students' attitudes towards distance/online learning and will contribute to preparing medical education for a change towards distance learning.

Keywords: Faculty of Medicine, online learning, e-learning style, attitude.

INTRODUCTION

The transformation from order to disorder is a law of nature and called entropy in physics. Successful systems must constantly develop and innovate to keep their mechanism alive and respond to the requirements of the era. Ozdemir (2003) stated that to keep up with the times, the changes in the education system should be taken into account regarding the educational models used in medical education. Even if there are no continuous improvement, innovation awareness, and change within the system, non-system factors can be a driving force. The COVID-19 pandemic, which affected the entire world in 2020 and also Turkey as of March, has played such a role. Educators at every level and discipline had to adapt to the pandemic conditions and act accordingly.

The term "Distance" has been used to refer to a form of education in which learners and teachers and resources do not coexist, share the same time or place since the first day it started with the letter. The journey of distance education that started with letters and online learning that started with the internet has entered a new era with the Covid-19 pandemic, which is effective worldwide and all face-to-face education activities have been transformed into distance education and mostly online learning due to the closure of schools / universities in order to fight against the epidemic. However, distance education is "a complex process that requires careful planning, design and setting goals to create an effective learning ecology" (Bozkurt & Sharma, 2020).

At such a critical time, there has been a big change in how teaching and learning takes place and learners physically move out of school, separating the teacher and the co-learner. Education practices during the Covid-19 pandemic are expressed in different terms in different countries (for example, distance education, e-learning, online education, homeschooling, etc.). However, these terms do not fully cover those applied during interruption of education; instead it may be better to describe these applications as Emergency Remote Education. Considering that the terms used in different countries are different, these terms are derivatives of distance education as a general term. The notable difference between emergency distance learning and distance learning is that the first is an obligation and the second is an option. With such an understanding, it is very important to approach because mistakes in definitions drive us to make mistakes in practice. For example, distance education is a planned activity, and its application is based on theoretical and practical knowledge specific to the field and field. Emergency distance education, on the other hand, is about keeping education alive with all the offline and online resources available in times of crisis (Bozkurt et al., 2020)

It can be argued that the vast majority of educators who retreat to their homes with the pandemic do not have sufficient knowledge, experience and time in distance education, and in most cases, lack of infrastructure, equipment, hardware and software, therefore, distance education studies carried out under these conditions cannot be considered exactly distance education. In addition, it is important to create a learning process that "supports different types of interaction" in order to ensure both cognitive and social participation of individuals living in separate spaces in distance education (Hodges et al., 2020)

However, it can be said that the process is not a complete distance education process in this respect, both due to the social effects of the process and the lack of experience and time to effectively design an interactive design in online courses. Hodges et al. (2020), and distance education, instructional technology etc. researchers working on the fields propose to name this period as "emergency distance education" in order to distinguish it from distance education carried out under ordinary conditions. The emphasis on the concept of "teaching" instead of education stems from the fact that this urgent process is carried out under the responsibility of the trainers (Hodges et al., 2020).

Regardless of how its name is accepted at the end of the day, this process seems to pass as an exceptional period in the history of education in general and in the history of education technology and distance education in particular (Yildirim, 2020).

During the last twenty years, digital learning technologies have become widespread in almost all learning fields including health/medical education. Although digital learning technologies and accompanying innovations have been used in medical education frequently in medical education, online learning strategies for medical education is a new research topic (Ruiz, Mintzer, & Leipzig, 2006; Cook et al., 2008). Technologic developments have been forced medical schools to integrate new education models supported

by technological tools as an alternative to traditional education. These alternative education models provide students an active learning environment by allowing students more interaction with the materials (a medical device, simulated patient, or medical equipment, etc.). These education models allow students to focus more on clinical problems and aims at understanding disease mechanisms by self-directed learning and deep learning through active participation (Fieschi et al., 2002).

Although some efforts made to improve medical education by alternative learning models, the actual method employed is face-to-face learning. Several medical schools made efforts to improve the effectiveness of the education program and provide students with clinical reasoning skills through some practices such as problem-based learning activities, simulated patient cases, and evidence-based medical practices. Some medical schools carried out problem-based learning activities on digital platforms due to lack of place, time, and guiders such as human resources (Mistry et al., 2019). Some medical schools across the globe conduct anatomy, histology, and evidence-based medicine practices through distance education methods (Kazoka, & Pilmane, 2019). Not only educators and educational institutions but also students should be ready for these changes in the education system. The COVID-19 pandemic is affecting the world and also Turkey and therefore, forced especially medical schools to implement distance learning methods. The success of the change in the educational processes depends not only on the accuracy and convenience of the educational models implemented but also on understanding the learner characteristics of the medical school students. Accordingly, an accurate determination of the student profiles and learner characteristics is important for medical education and also other professional training fields (Ozdemir, 2003).

On the other hand, changes in the learning environments highlight the issue of student participation. Finn and Zimmer (2012) described students' participation in the learning environment through social, cognitive, emotional, and academic elements. Social participation includes monitoring the behaviors in a learning environment; cognitive participation includes the use of cognitive resources in complex operations; emotional participation refers to the level of emotional participation in the learning activities; and finally, academic participation refers to the observable behaviors, namely, outcomes that are directly related to the learning (Cirigliano, Guthrie, & Pusic, 2020). It is believed that more participating students are more successful compared to those with lower ones. In recent studies, direct indicators of academic participation were identified including the student's attention, completion of the given activities, the time needed for the tasks, and academic participation outside the classroom (Cirigliano, Guthrie, & Pusic, 2020).

Several studies pointed out the importance of students' participation in distance learning methods and therefore, students' participation should be encouraged (Bagriacik Yilmaz, & Banyard, 2020). In medical schools, especially in the first three years in which the basic sciences are taught, students' participation is very low. However, distance learning may improve students' participation. Schools including distinctive education procedures such as medical schools increase the value of the efforts to promote distance learning and students' participation becomes more important. In a scale development study conducted in Turkey to measure students' attitudes towards problem-based learning, a sub-scale was developed to measure students' attitudes towards problem-based learning environments on digital platforms (Kemahli, & Alper, 2006).

In a study (Kyaw et al., 2019), which included 12 studies conducted on 2101 medical students and conducted on the effectiveness of digital communication skills training, online modules were also used and they obtained evidence that digital education is as effective as traditional face-to-face training. However, in this study, clear information about students' satisfaction with this education system and their attitudes could not be obtained.

Vogelsang et al. (2018) stated in the study they conducted in Medical Faculties providing education in German that the expectations of Generation Z towards learning were different and that the expectations of Medical Education students should be investigated.

Since there are no scales measuring students' attitudes on providing all stages of the medical education through distance learning methods and since the COVID-19 pandemic made it necessary to provide medical education through online learning techniques, the authors believe that such a study could provide a strong contribution to its field of research. Accordingly, this study aims at determining medical school students' attitudes towards distance learning/online education and to determine the relationship between these attitudes and e-learning styles.

METHOD

The study is a quantitative correlational study (Creswell, 2012; Fraenkel, Wallen, & Hyun, 2012). This paper aims at determining medical school students' attitudes towards distance learning/online education and examining its relationship with e-learning styles.

The Sample

This study conducted at Canakkale Onsekiz Mart University Faculty of Medicine with the permission numbered KAEK-27/2020-2000058519 obtained from Canakkale Onsekiz Mart University Clinical Trials Ethics Committee. The data were collected during the COVID-19 pandemic. In this period, formal education in Turkey was suspended starting 16 March 2020, and since all educational activities of the universities were provided through the online education, the Ethics Committee allowed research on the condition using only online data collection tools. Therefore, the data was obtained simultaneously through online system of the university. A consent form was displayed when the students log in to the system of the university. The scales were presented to the students who agreed to participate in the research voluntarily. Accordingly, a total of 815 medical school students from different grades (from 1 to 6) were responded to the questionnaires and the data were collected accordingly. At that period, the medical school had a total of 911 students and the participation rate in the research was calculated as 89.46%. Therefore, the research sample became a purposeful sample since the data could not be obtained from the whole population (Christensen, Johnson, & Turner, 2014).

Since the collected data will be used for exploratory and confirmatory factor analysis as a part of the scale development and also for the examination of the relationship between students' attitudes towards online learning and students' e-learning styles, the dataset was split randomly into two groups. The exploratory factor analysis (EFA) file included data of 394 students and the confirmatory factor analysis (CFA) file for the examination of the relationship included data of 421 students. Based on the suggestions provided in the literature regarding the sample size for a scale development study (Arrindell, & van der Ende, 1985), the authors paid attention to ensure the data size in the EFA file was about 10 times of the number of items in the instrument. Some information regarding the participants of both groups is given in Table 1.

Table 1. Demographic characteristics of the sample

Variable		EFA group		CFA and relationship analyze group	
		f	%	f	%
Gender	female	201	51	211	50
	male	193	49	210	50
Grade	grade 1	70	17.8	103	24.5
	grade 2	63	16	106	25.2
	grade 3	79	20.1	48	11.4
	grade 4	75	19	35	8.3
	grade 5	52	13.2	42	10
	grade 6	55	14	87	20.7
total		394	100	421	100

Data Collection Tools

Medical School Students' Attitudes towards Distance Education/Online Learning Scale (MATDLS)

Medical School Students' Attitudes Towards Distance Education/Online Learning Scale was developed by authors. The target group of the MATDLS is medical school students. The scale was structured as a Likert type including 40 items through a literature survey and expert opinions. Ten items of the scale were reverse coded since they reflect negative emotions and thoughts towards online learning.

Some scholars recommended conducting EFA using principal axis factoring (PAF) for a scale development study with a non-specific theoretical framework (Warner, 2008). The EFA analyze revealed that the items 4, 11, 13, 14, 15, 16, 17, 18, 19, 24, 29, 30, 32, 33, 34, 35, 36, and 37 did not provide the item correlation value (0.300 and above) suggested by scholars (Büyüköztürk, 2013). Therefore, these items were excluded from the scale. The KMO value of the EFA was 0.967, and Bartlett's Test of Sphericity was calculated as 10045.068 (sd=253, $p<0.05$). The calculated values were higher than those suggested in the previous studies (Cokluk, Sekercioglu, & Buyukozturk, 2010; Field, 2018; Tabachnick, & Fidell, 2013). A varimax axis rotation was performed to clearly define the items of the sub-scales (Ozdamar, 2013). Following the rotation, remaining items were grouped under two sub-scales: a) Attitudes Towards Online Learning (ATOL) and b) Attitudes Towards Online Medical Education (ATOME). The sub-scales and the items are presented in Table 2.

Table 2. The sub-scales determined using the "Varimax" axis rotation and the items included in these sub-scales

Items	sub-scales		name and properties of the sub-scales
	1	2	
21. Making classroom lessons through the online system contributes to personalize my study program. (Sinif derslerinin online sisteme gecirilmesi, ders calisma programimi kisisellestirmeme katki saglar.)	0.826		Attitudes Towards Online Learning (ATOL). Includes 11 items. No reverse coded items. The score that can be obtained from the scale varies between 11-55. This factor explains 36% of the variance.
26. Online education allows me to use my time more efficiently compared to classroom lessons. (Online egitim zamanini sinif derslerinden daha verimli kullanmami saglar.)	0.807		
25. I adapt easily to online education. (Online egitime kolayca uyum saglarim.)	0.781		
22. Online education contributes to the use of audio-visual materials. (Online egitim gorsel-isitsel ogelerin kullanimina katki yapar.)	0.764		
31. Online education is very rich since it's audio-visual interactive. (Online egitim gorsel, isitsel, etkilesimli olarak buyuk zenginliktir.)	0.764		
28. Online access to lecture notes about lessons/internships, makes me feel free. (Dersler/stajlarla ilgili ders notlarina online erisim bana kendimi ozgur hissettirir.)	0.762		
23. Online education is better than classroom education which has physical limitations. (Online egitim fiziksel kisitliliklara sahip sinif egitiminden ustundur.)	0.760		
27. I like being informed about lecture notes through the distance learning environment. (Uzaktan egitim ortamindaki ders notlarindan bilgi edinmekten hoslanirim.)	0.728		
20. The classroom lessons in medical education can be provided online without any loss. (Tip egitimindeki sinif dersleri bir kayip olusturmadan online olarak verilebilir.)	0.711		
38. I encourage my classmates to take online education. (Sinif arkadaslarimin online egitim almalari icin onlari tesvik ederim.)	0.700		
39. I support all efforts to extend distance education. (Uzaktan egitimi yayginlastiracak her tur cabayi desteklerim.)	0.692		

3. Doctor training can be made by distance education. (Uzaktan egitimle hekim yetistirilebilir.)	0.853	
6. The attitudes that a doctor should have can be gained online. (Bir hekimin sahip olmasi gereken tutumlar online olarak edinilebilir.)	0.838	
2. The goals of medical education can be achieved using distance education methods. (Uzaktan egitim yontemleriyle tip egitimi amacina ulasabilir.)	0.838	
5. The skills that a doctor should have can be provided online. (Hekim yetistirmek icin gerekli beceriler online olarak kazandirabilir.)	0.823	
7. The communication way of a doctor with his patient and patient's relatives can be taught online. (Hekimin, hastasi ve yakinlariyla nasil iletisim kuracagi online olarak ogretilebilir.)	0.788	Attitudes Towards Online Medical Education (ATOME).
9. Patient consultation can be taught online. (Bir hastanin nasil muayene edilecegi online olarak ogretilebilir.)	0.779	Includes 11 items. No reverse coded items.
12. Emergency medicine practice can be taught online. (Acil tip uygulamalari online ogretilebilir.)	0.736	The score that can be obtained from the scale varies between 11-55.
8. I can use the information that I gained through distance education (for example, measuring blood pressure) as a skill when I face with a patient. (Uzaktan egitimle kazandigim bilgileri (ornegin tansiyon olcme) hastayla karsilastigimda beceri olarak sergileyebilirim.)	0.707	This factor explains 35% of the variance.
10. The skills about giving bad news (such as notifying of a death) can be taught online. (Zor haber verme [olum haberi verme gibi] becerisi online ogretilebilir.)	0.674	
40. I enable doctor training through distance education if I'm the Health Minister. (Saglik bakani olsam uzaktan egitimle hekim yetistirilmesini saglarim.)	0.655	
1. Online access to lecture notes about lessons/internships is ideal for doctor training. (Derslerle/stajlarla ilgili ders notlarina online erisim hekim yetistirmede idealdir.)	0.607	

To examine the criterion validity of ATOL and ATOME sub-scales of the MATDLS, correlation analyses were conducted between the total scores of the sub-scales and student's scores on Attitude Towards e-Learning Scale and the correlation values were calculated as 0.78 and 0.72, respectively. These results considered a high level of criterion validity.

The Cronbach's alpha coefficients were also calculated to check the internal consistency of both sub-scales. The Cronbach's alpha is calculated as 0.96 for the ATOL, and 0.92 for the ATOME, and 0.97 for the whole scale. These values indicated a high internal consistency for both sub-scales and the whole scale.

The two-factor structure obtained with the EFA was analyzed with CFA. The diagram obtained with the DFA is shown in Fig. 1.

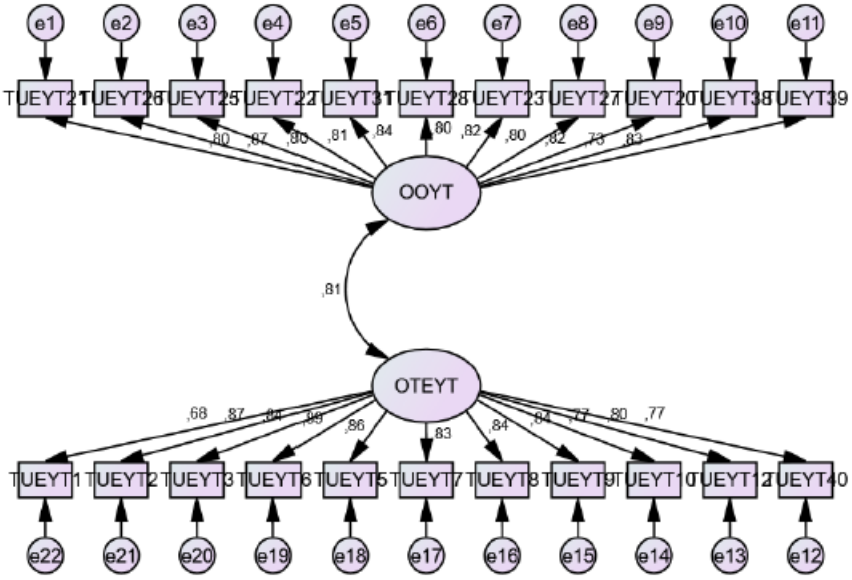

Figure 1. Path diagram (standardized values) of the confirmatory factor analysis for Medical School Students' Attitudes Towards Distance Education/Online Learning Scale (MATDLS [TUEYT in Turkish]). ATOL (OOYT in Turkish): Students' Attitudes Towards Online Learning, ATOME (OTEYT in Turkish): Students' Attitudes Towards Online Medical Education

The fit indexes of the path diagram of the CFA given in Fig.1 were calculated as X2/sd=2.99, RMSEA=0.049, RMR=0.048, NFI=0.961, IFI=0.982, CFI=0.970, AGFI=0.927, and GFI=0.933. These values are the recommended values for fitting in the previous studies (Anderson, & Gerbing, 1984; Bentler, 1990; Cokluk, Sekercioglu, & Buyukozturk, 2010; Hooper, Coughlan, & Mullen, 2008; Hu, & Bentler, 1999; Kline, 2005; Marsh, Balla, & McDonald, 1988; Ozdamar, 2013, Simsek, 2007; Tabachnick, & Fidell, 2013, Vieira, 2011).

e-Learning Styles Scale for Electronic Environments

This scale was developed by Gulbahar and Alper (2014) to determine students' learning styles in online learning environments. The scale was developed with the students registered in the distance learning program of the university. As a result of the validity and reliability analyzes, the scale was determined as consists of seven factors including 38 items. These factors are independent learning (4 items), social learning (6 items), audio-visual learning (8 items), active learning (6 items), verbal learning (7 items), logical learning (3 items), and intuitive learning styles (4 items). This was a 5-point Likert type scale. The developers of the scale were calculated the fit indexes of the confirmatory factor analysis as RMSEA=0.056, SRMR=0.047, GFI=0.90, AGFI=0.88, CFI=0.98, NNFI=0.97, and IFI=0.98. The Cronbach's alpha values for the reliability of the sub-scales were found as varied between 0.72-0.87.

General Attitude Scale towards e-Learning

This scale was developed by Haznedar and Baran (2012) to measure the general attitudes of teacher education students towards e-learning. This is a Likert type scale consists of 20 items. The scale was used as a one-factor scale when the negative items reverse coded. The reliability of the one-factor scale was calculated as 0.93. General Attitude Scale Towards e-Learning was used in the present study to determine the concurrent validity of the MATDLS scale were was developed by the authors. MATDLS and General Attitude Scale Towards e-Learning was applied to the medical school students, the correlation coefficient between the obtained data was calculated and the calculated coefficient was determined as the concurrent validity value of the MATDLS.

Analysis of Data

Before conducting EFA, CFA, and other data analysis methods, the dataset was checked and had no missing values were found. Based on the Central Limit Theorem which argues if the sample size is large enough (>30) it should represent a normal distribution, and a violation of the normality assumption will not cause a big problem (Everitt, & Howell, 2005; Field, 2018; Pallant, 2016; Tabachnick, & Fidell, 2013), we decided to adopt parametric statistical techniques for analysis.

FINDINGS

The Relationships Between Medical School Students' Attitudes Towards Online Learning And E-Learning Styles

Medical School Students' Attitudes Towards Distance Education/Online Learning Scale (MATDLS) and e-Learning Styles Scale for Electronic Environments were used in this study. MATDLS has two sub-factors, Attitudes Towards Online Learning (ATOL) and Attitudes Towards Online Medical Education (ATOME). E-Learning Styles Scale consists of independent learning, social learning, audio-visual learning, active learning, verbal learning, logical learning, and intuitive learning sub-factors. The descriptive statistics of the participating students' scores on these sub-factors are given in Table 3.

Table 3. Descriptive statistics of attitudes towards online learning and e-learning styles

Scales	N	Mean ($\bar{X}$)	Median	Mode	S
Audio & visual learning style	421	26.51	27	24	7.34
Verbal learning style	421	20.78	21	21	5.82
Active learning style	421	18.42	18	18	5.22
Social learning style	421	18.22	18	18	5.33
Independent learning style	421	12.94	12	12	3.96
Logical learning style	421	9.98	9	9	3.13
Intuitive learning style	421	12.06	12	12	3.46
Attitudes Towards Online Learning (ATOL)	421	27.02	28	33	10.07
Attitudes Towards Online Medical Education (ATOME)	421	22.83	22	11	9.71

The lowest score that can be obtained from the audio & visual learning sub-factor is 8 and the highest score is 40. The arithmetic mean of the students' scores on this factor was 26.51. The lowest score that can be obtained from the verbal learning sub-factor is 7 and the highest score is 35. The arithmetic mean of the students' scores on this factor was 20.78. The lowest score that can be obtained from the active learning sub-factor is 6 and the highest score is 30. The arithmetic mean of the students' scores on this factor was 18.42. The lowest score that can be obtained from the social learning sub-factor is 6 and the highest score is 30. The arithmetic mean of the students' scores on this factor was 18.22. The lowest score that can be obtained from the independent learning sub-factor is 4 and the highest score is 20. The arithmetic mean of the students' scores on this factor was 12.94. The lowest score that can be obtained from the logical learning sub-factor is 3 and the highest score is 15. The arithmetic mean of the students' scores on this factor was 9.98. The lowest score that can be obtained from the intuitive learning sub-factor is 4 and the highest score is 20. The arithmetic mean of the students' scores on this factor was 12.06. The mean scores for all learning sub-dimensions were higher than the half of the highest score than can be obtained from the corresponding sub-dimension. Therefore, it can be argued that all the learning styles of the students were higher for e-learning.

The lowest score that can be obtained from the sub-factor of attitudes towards online learning is 11 and the highest score is 55. The arithmetic mean of the students' scores on this factor was 27.02. This mean score is lower than half of the highest score than can be obtained from this factor but almost equal to the half. Accordingly, it can be stated that the students' attitudes towards online learning torn between positive and negative.

The lowest score that can be obtained from the sub-factor of attitudes towards online medical education is 11 and the highest score is 55. The arithmetic mean of the students' scores on this factor was 22.83. This mean score is lower than the half of the highest score than can be obtained from this factor. Therefore, it can be argued that students' attitudes towards online medical education were negative.

The predictive strength of the Medical School Students' e-Learning Styles for Students' Attitudes towards Online Learning

In the current study, the prediction of medical school students' e-learning styles for students' attitudes towards distance education/online learning was examined using multivariate regression analysis. The goodness of fit results for multivariate regression models were presented in Table 4.

Table 4. Goodness of fit for regression models

Variables	N	R^2	F	p
Audio & visual learning style	421	0.064	14.374	0.000
Verbal learning style	421	0.085	19.291	0.000
Active learning style	421	0.061	13.613	0.000
Social learning style	421	0.068	15.177	0.000
Independent learning style	421	0.112	26.224	0.000
Logical learning style	421	0.036	7.759	0.001
Intuitive learning style	421	0.089	20.373	0.000

As seen in Table 4, the models of seven variables (Audio-visual, Verbal, Active, Social, Independent, Logical, and Intuitive learning style), which are the predictors of the output variables (ATOL and ATOME) were significant (F=14.374, F=19.291, F=13.613, F=15.177, F=26.224, F=7.759, and F=20.373 $p<0.05$). Accordingly, the obtained regression models were deemed appropriate. The maximum predictive strength was obtained for the independent learning style (R^2=0.112, 11%) and followed by intuitive, verbal, social, audio-visual, active, and logical learning styles, respectively. The predictions regarding the regression models are shown in Table 5.

Table 5. The predictive strength of the e-learning styles for attitudes towards distance education/online learning

		β	Standard Error	t	p
Audio & visual learning style	Constant	22.512	1.004	22.43	0.000
	ATOL	0.277	0.056	4.96	0.000
	ATOME	-0.152	0.058	-2.64	0.009
Verbal learning style	Constant	16.218	0.787	20.60	0.000
	ATOL	0.109	0.044	2.50	0.013
	ATOME	0.070	0.045	1.55	0.122
Active learning style	Constant	15.045	0.714	21.06	0.000
	ATOL	0.147	0.039	3.70	0.000
	ATOME	-0.026	0.041	-0.63	0.527
Social learning style	Constant	14.489	0.727	19.93	0.000
	ATOL	0.135	0.040	3.33	0.001
	ATOME	0.004	0.042	0.09	0.926
Independent learning style	Constant	9.689	0.528	18.36	0.000
	ATOL	0.174	0.029	5.94	0.000
	ATOME	-0.064	0.030	-2.10	0.037
Logical learning style	Constant	8.718	0.435	20.04	0.000
	ATOL	0.088	0.024	3.66	0.000
	ATOME	-0.049	0.025	-1.97	0.051
Intuitive learning style	Constant	9.299	0.467	19.93	0.000
	ATOL	0.103	0.026	3.97	0.000
	ATOME	-0.001	0.027	-0.03	0.977

The constant term is significant in all predictions. Accordingly, there may some variables which may significantly predictive that not included in the regression model. Independent learning, social learning, audio-visual learning, active learning, verbal learning, logical learning, and intuitive learning styles are positive significant predictors ($p<0.05$) for attitudes towards online learning. In other words, the higher use of these learning styles, the higher the positive attitudes towards online learning. Verbal learning, active learning, social learning, logical learning, and intuitive learning styles are not positive significant predictors ($p>0.05$) for attitudes towards online medical education. The audio-visual and independent learning styles are negative significant predictors ($p<0.05$) for attitudes towards online medical education. Therefore, the higher use of the audio-visual learning style and independent learning styles indicate higher negative attitudes towards online medical education.

RESULTS, DISCUSSION AND RECOMMENDATIONS

The study presents an instrument to measure medical school students' attitudes towards distance education/online learning. The attitudes of students with different learning styles towards online medical education were compared and explained. Currently, there are no examples across the world regarding providing all stages of medical education through distance education methods. However, during the COVID-19 pandemic, medical schools had to provide education through distance education/online learning as in all formal and higher education. The results obtained in the current study presents an instrument to measure medical school students' attitudes towards distance education/online learning as well as examines the attitudes of the students in the sample group towards such education techniques and the effect of the learning styles on these attitudes. As an overall evaluation, students' attitudes towards online learning were determined as torn between positive and negative, on the other hand, they exhibit negative attitudes towards online medical education.

Harden initiated a practice, "International Virtual Medical School (IVIMEDS)" in 2002 which also called as the future of medical education and he stated that independent learning is one of the properties of CRISIS, the education model they conducted in this platform including continued medical education practices (Harden, 2005; Harden, & Hart, 2002). A sub-dimension of the Attitudes Towards Distance Learning/Online Education Scale introduced in the current study is independent learning. It was emphasized that independent learning is important for both learning processes of medical school students and sustained medical education processes that continue after graduation.

In a study carried out by Mubayrik (2020) on medical school graduates, it was found that 67% of the participants who had previously attended one of the distance education methods had positive attitudes towards distance education due to its advantages and flexibility in time. This result highlighted the importance of distance education methods on widening continued medical education to the international level.

The results of a previous study revealed that 95% of the students are motivated to online and digital medical education practices as a result of offering rich audio-visual materials or digital materials that help stimulating more senses (Kazoka, & Pilmane, 2019). In a study carried out by Yurdal (2015), among students of the Faculty of Medicine, a positive and significant relationship was found between students' willingness to learn, self-control skills, and learning in the web environment. Although this research was conducted in the same faculty, it cannot be said that students' attitudes towards online learning are positive.

Some studies suggested that pre-graduate medical education can be standardized through distance education regardless of the clinical experiences of the students (Michaelsen, 2001). The number of students enrolling in medical schools is limited to schools' clinical practice capacity. As a result of the need for more doctors, there are many medical schools across the world with such restrictions. In Turkey, currently, 117 medical schools are active and provide education. Since medical universities are fully autonomous regarding preparing and implementing the curriculums, there are no mechanisms that compare the equivalency of medical universities' curriculums. As an easy solution to this issue, accreditations of medical curriculums are not accessed in all medical schools and there is no such obligation for this yet. Under these circumstances, providing a part of curriculums through distance education/online learning may contribute to providing equivalent curriculums among different schools. However, the suitability of online education methods for medical education, especially for clinical education is a controversial issue. To the best of our knowledge,

there are no studies addressing medical school students' attitudes towards distance learning/online education. The present paper provides information as well as presents a valid and reliable instrument than can be used in future studies.

Providing all stages of medical education through distance education will improve the effectiveness of individualized education programs considering the e-learning styles of the students. Moreover, to improve the effectiveness of distance medical education, establishing relevant institutions such as "Center of Excellence for Online Medical Education" may be useful (Ruiz, Mintzer, & Leipzig, 2006).

Continuous change in education procedures and methods, as well as providing medical education through distance education methods require reorganization of the curriculums considering these techniques. Therefore, considering the fact that medical schools provided educational content that prepared for face-to-face education through distance education during the pandemic, this education becomes a controversial issue.

Students combine different learning styles in themselves uniquely. On the other hand, the current curriculums are solid and do not have any flexibility for different student profiles. Many studies indicated that medical school students have different learning styles (Kalaca, 2004; Gulpinar, 2014; Salihu et al., 2020; Javaeed et al., 2020). The findings of the present study also showed the presence of a wide range of learning styles among participants. It is highly possible that distance education/online learning can be more suitable for students with different learning styles. Accordingly, the regression modeling conducted in this study revealed that learning styles are significant predictors for attitudes towards online education. It should be noted that the audio-visual learning style displayed the highest predictive power for attitudes towards online education (β=0.277).

As suggested in several studies and taking into account the students' negative attitudes towards distance medical education, although distance education is unlikely to replace classroom education, updating of teaching philosophy, optimizing teaching, establishing flexible and diverse assessment systems can promote the reform of traditional undergraduate medical education (Zhao, Li & Feng, 2018).

In 1999, the "United States Medical Licensing Exam" (USMLE) moved to computer-based testing, and some medical school graduates in Turkey are also entered this exam. On the other hand, Lim et al. (2006) carried out a study determining medical school students' attitudes towards computer-based testing. Students of the National University of Singapore, Yong Loo Lin School of Medicine participated in that study and results revealed that 79.8% of the students preferred computer-based exams instead of paper-based exams. However, in this study, during the development of MATDLS, the items measuring the student's attitudes towards distance assessment and evaluation systems were excluded from the scale since these items were not helpful. It can be argued that the medical school student's attitudes towards distance assessment and evaluation systems are not developed yet or students may have no opinions about distance assessment of medical students.

In a study carried out by Mirmoghtadaie et al. (2019), it was found that students who have medical education through e-learning methods had no idea whether this education method increased their academic success or not. Considering the answers of the students to the MATDLS that developed in this study, it was found that the students believe that e-learning increases their academic success.

According to the MATDLS scale, while medical school students had no positive attitudes towards gaining required skills through online learning, they also had no negative attitudes. In a study carried out by Bhatti and Bertoni (2019), it was revelated that the gaps in the learning achievements, especially outcomes related with the skills that may occur as a result of distance medical education can be bridged through an online education supported with case-based discussions, skills-based training, and short lessons.

Pre-graduate medical education curricula should be designed with an approach that can continue education in crises as in Covid-19, and students and educators should also be prepared for this, however, it is not seen that the students of the Faculty of Medicine have a positive attitude towards distance education, and they have a program design that includes more practical applications despite theoretical training in the background of medical education.

In addition to theoretical applications, medical education programs that include many Basic Professional Skills applications in order to prevent students from depriving of many practical skills that cannot be compensated in emergency situations, case discussions including virtual reality, augmented virtual reality, artificial intelligence applications, online applications that will improve clinical skills should also be improved. The creation of such experiences may be of vital importance due to the low level of authentic patient encounter among clinical period (clerkship) students, where practical training is the majority. Such practices will also be useful for students to use review strategies and learning reinforcement during face-to-face training in the post-Covid 19 normalization period. Of course, this situation can be seen as a factor that encourages learning for the student. On the other hand, an instructional design that blends online learning and face-to-face education will prepare for universal education platforms and extraordinary conditions.

In addition, online education options will be offered as a complementary education option in medical education programs, and educational system components will be prepared for education programs that include distance education methods that are likely to replace face-to-face education, whose permanence is doubtful in the future.

When it is considered for educators, as some research points out (O'Doherty et al., 2018; Rhim & Han, 2020), in order to prevent such emergency distance education from being interrupted and to continue education, it would be appropriate to equip medical educators with skills on the use of technology in education in the pedagogical education received by medical educators.

Covid 19 period can be an opportunity to eliminate the differences between technology use skill levels between learners and educators, for whom the definition of Generation Z is made. Moreover, considering that healthcare professionals should be lifelong learners, it will be able to support medical students of this period in lifelong learning; it can be said that self-directed learning, independent learning skills and skills towards reaching the source of information can be improved.

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