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Dear TOJDE Readers,

Welcome to Volume 23 Issue 2 of TOJDE.

There are 15 articles and 1 book review in the April 2022 issue of TOJDE. 37 authors from 9 different countries contributed to the issue. These countries are Australia, Bahrain, Indonesia, Iran, Pakistan, Saudi Arabia, Thailand, Turkey and USA.

PROFILING LEARNING PREFERENCES OF DISTANCE EDUCATION STUDENTS BASED ON NEURAL NETWORK ANALYSIS is the 1st article. This article is written by Mehmet FIRAT. This research investigates the learning preferences of distance education students. Data was collected from 3390 distance education students from Anadolu University, considered as one of the mega universities in the world. Results and recommendations are explained in the end of the article.

The title of the 2nd article is HOW TO IMPROVE THE QUALITY OF ONLINE EDUCATION FROM ONLINE EDUCATION DIRECTORS' PERSPECTIVES. Sadegul AKBABA ALTUN and Tristan E. JOHNSON are the authors. The aim of this research is to solicit how to improve the quality of online education from online education program directors' perspectives. The research was designed as a qualitative case study. Eight dimensions are found to improve the quality of online education as indicated in the article.

The 3rd article is written by Chinun BOONROUNGRUT, Wulan Patria SAROINSONG and One KIM. A TEN-YEAR BIBLIOMETRIC NETWORK REVIEW ON MASSIVE OPEN ONLINE COURSES (MOOCs) RESEARCH: 2011-2020 is the title of the article. This article aims to identify the MOOCs research scientific landscape as the trend from publications worldwide. the bibliometric network analysis using distance-based network mapping in VOSviewer was applied in the research. There are three main research clusters: learning system, human characteristics and higher education clusters. The results highlights that terms, such as 'learning systems', 'gender differences' and 'flipped classroom' emerged as ongoing research trends.

THE RELATIONSHIP BETWEEN UNIVERSITY STUDENTS' ATTITUDES TOWARD ONLINE EDUCATION AND THEIR STRESS DURING COVID-19 PANDEMIC is the title of the 4th article. Hale OGEL-BALABAN is the author. The aim of the study is to examine the relationship between university students' stress level and their attitude toward online education forced during the COVID-19 pandemic. The findings are discussed in terms of their implications particularly for future emergency education programs and generally for online education.

The title of the 5th article is A SYSTEMATIC REVIEW STUDY ON EDUCATIONAL TECHNOLOGY AND DISTANCE EDUCATION: THE CASE OF TURKEY, written by Gurhan DURAK, Mahmut Ali SAHIN, Ozge OZTUZCU and Ozge Banur GOKTAS. the purpose of the study is to reveal the content analysis of master's theses and doctoral dissertations in the field of CEIT between 2018-2020. According to the research findings, it is seen that quantitative methods were mostly used in the theses and dissertations examined and that mixed methods were used in master's theses more than in doctoral dissertations.

THE BUTTERFLY EFFECT OF THE DISTANCE LEARNING MA PROGRAM ON CHARACTER AND VALUE EDUCATION AT ANADOLU UNIVERSITY is the title of the 6th article. The authors are Handan DEVECI and Hatice TURE. The aim of this qualitative study is to reveal to what extent the students reflected the outcomes they gained in the program to themselves, their families, immediate environments and the society. The results of the study show that the students who attended the Distance Learning MA Program on Character and Value Education gained certain benefits for themselves, which were also reflected to their families and immediate environments as well as the country and the world. Various suggestions are offered in accordance with the results of the study.

Zeliha DEMIR KAYMAK and Mehmet Baris HORZUM are the authors of the 7th article. STUDENT BARRIERS TO ONLINE LEARNING AS PREDICTORS OF PERCEIVED LEARNING AND ACADEMIC ACHIEVEMENT is the title of the article. In this study, the barriers identified by Muilenburg and Berge in 2005 were used as online learning barriers. These are (1) administrative issues, (2) social

interaction, (3) academic skills, (4) technical skills, (5) learner motivation, (6) time and support for studies, (7) cost and access to the Internet, and (8) technical problems. The results show that gender and job status affect both academic achievement and perceived learning. In terms of students' online learning barriers, academic skills and learning motivation are predictors of academic achievement. In addition, academic skills and time and support for studies are predictors of perceived learning.

WHEN TECHNOLOGY-BASED LEARNING IS THE ONLY OPTION: EVALUATING PERCEIVED USEFULNESS OF SOCIAL MEDIA is the title of the 8th article, written by Aamer HANIF and Muhammad IMRAN. The objective of this study is to explore how the state of student's behavioral intention for social media based online learning is driven by external factors like subjective norm and self-efficacy. To fulfill this aim, this study uses a quantitative approach.

The title of the 9th article is AUTOMATED FEEDBACK AND TEACHER FEEDBACK: WRITING ACHIEVEMENT IN LEARNING ENGLISH AS A FOREIGN LANGUAGE AT A DISTANCE. The authors of this study are Ayse TASKIRAN and Nil GOKSEL. This study intends to examine if automated feedback and teacher feedback contribute to academic writing achievement and whether they differ in their effect on achievement in learning English as a foreign language in an open and distant learning context. Results show that participants tended to improve their academic writing skills by taking regular feedback, and it was observed that the writing scores increased slightly more when receiving feedback from teachers compared to automated feedback software.

The 10th article is written by Karimeldin M. A. SALIH, Abdulelah A. ALBAQAMI, Abubakar JIBO, Jaber A. ALFAIFI, Sultan A. AL AMRI, Mushabab ALGHAMDI, Mohammed ABBAS and Mutasim E. IBRAHIM. SOCIAL MEDIA UTILIZATION AND THEIR IMPACT ON MALE MEDICAL STUDENTS LEARNING DURING COVID-19 PANDEMIC is the title of the article. The results indicate that social media become interactive tools of learning in medical schools during the urgent situation such as the COVID-19 pandemic. Findings highlight the benefits of considering social media inclusion when designing medical curricula.

EFFICIENCY IN OPEN AND DISTANCE EDUCATION: A RESEARCH AT ANADOLU UNIVERSITY is the title of the 11th article, written by Bilal SARAC and Nesrin ALPTEKIN. This study is carried out to determine the activities of associate degree programs in Anadolu University Open Education System in the fall and spring semesters of 2016-2017, 2017-2018, 2018-2019 academic years. Anadolu University Open Education System associate degree programs are ranked according to their efficiency values, by the Slack-Based Measure Analysis.

The 12th article's title is SECOND LIFE IN ART AND DESIGN FROM STUDENTS' PERSPECTIVE: A CASE STUDY. Sevda CEYLAN-DADAKOGLU is the author. This article tries to determine the students' opinions related to the use of Second Life (SL) application in higher education art and design education. The results show, it is thought that Second Life will contribute to distance education by online learning.

Emine Ozgur SEN is the author of the 13th article and the title of this article is THEMATIC ANALYSIS OF ARTICLES ON FLIPPED LEARNING IN MATHEMATICS EDUCATION. This study aims to conduct a thematic analysis of articles on the use of the flipped learning model in mathematics courses. Meta-thematic analysis is adopted as the research method. The study provides comprehensive data on the positive and negative aspects of the use of the flipped learning model in mathematics courses. However, comprehensive, extensive, and long-term studies are needed to provide more clear results on the implementation of flipped learning in mathematics courses.

EXPLORING CORRELATION BETWEEN METACOGNITIVE ONLINE READING STRATEGY USE AND ONLINE READING COMPREHENSION OF EFL STUDENTS is the 14th article's title. Agus Rianto is the author of this article. The study explores the correlation between the use of Metacognitive Online Reading Strategies (MORS) and the Online Reading Comprehension (ORC) of Indonesian university students learning English as a Foreign Language (EFL). The results should be interpreted with caution since the strategy use was not assessed based on classroom observations but based on self-reports.

The 15th article is written by Sara SHAHANI, Azizeh CHALAK and Hossein Heidari TABRIZI. IMPACT OF CRITICAL THINKING INSTRUCTION THROUGH FLIPPED TEACHING ON IRANIAN EFL LEARNERS' LISTENING COMPREHENSION is the title. thevstudy investigated the effects of critical thinking instructions through a flipped teaching method on English Language learners' listening comprehension. The results of the study reveal that the flipped approach is more effective when language learners are given instructions on critical thinking.

There is a book review in this issue. LEARNING IN THE DIGITAL AGE is the title of the book. The editor of this book is Tataleni I. ASINO. The reviewers are Emin OZEN and Deniz TURKMEN.

Hope to meet again in the next issue of TOJDE.

Cordially,

Dr. T. Volkan YUZER

Editor in Chief

PROFILING LEARNING PREFERENCES OF DISTANCE EDUCATION STUDENTS BASED ON NEURAL NETWORK ANALYSIS

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ABSTRACT

The learning preferences of the learners are of prime importance in the planning of distance education systems and the design of learning environments. Learning technique and learning material preferences are considered as the two most common and referable learning preferences to understand the learning preferences profile of distance education students. This research investigates the learning preferences of distance education students. Data was collected from 3390 distance education students from Anadolu University, considered as one of the mega universities in the world. Neural Network Analyze conducted to profile learning preferences of distance education students. For this purpose, Multilayer Perception Model was applied as an artificial neural network analysis model in the analysis of data. The age of students was found as the most important independent variable on the prediction of material preferences and learning technique preferences of distance education students. The full Multilayer Perception Model of the learning preferences profile of distance education students was provided as a conclusion. Recommendations provided for future research and applications.

Keywords: Distance education, learning preferences, artificial neural network.

INTRODUCTION

Distance education gained strong advanced technology support after 20 years of the 21st century. The technology-oriented nature of distance education has made it stand out in today's rapidly digitalizing societies. Especially, during the social isolation periods of the pandemic process, this unique structure of distance education has ensured the continuation of education at all levels. What makes distance education the rising paradigm is that it is not only technology-oriented but also offers a wide range of instructional materials and learning options.

Studies on personalized learning proposals are critical for the creation of advanced E-learning systems (Zhou, Huang, Hu, Zhu and Tang, 2018). Thanks to the digital transformation of education, it is possible to record and monitor the behavior of individuals in digital environments based on digital data. The transfer of distance education processes to digital has allowed monitoring the behavior of learners who have learning experiences in these environments. In addition to this rich digital data, a completed structure can be reached when data on other learning materials and learning techniques, such as printed resources, are collected. Thus, learners' learning preferences can be profiled more accurately. This creates an opportunity to profile learners' learning preferences and to offer individualized learning environments based on these profiles (Koper, 2015). Profiling and understanding the hidden patterns of learning preferences have critical value in open and distance learning (Rivas, Gonzalez-Briones, Hernandez, Prieto and Chamoso, 2021).

RELATED STUDIES

Artificial Neural Network (ANN) analysis is one of the most appropriate methods to reveal predictive patterns in profiling the learning preferences of distance education students. MLP network is one of the most common and practical architectures of artificial neural networks (Moghadassi, Parvizian, Hosseini, 2009). MLP model is a function of predictor variables that minimizes the prediction bias of the target variables (Heidari, Sobati, vahedirad, 2016). In the related literature, MLP-ANNs have been successfully used to reveal hidden patterns and profile complicated preferences. MLP has been successfully used; in predicting students' academic performance (Oladokun, Adebajo and Charles-Owaba, 2008), modeling student retention in science and engineering disciplines (Alkhasawneh and Hobson, 2011), and the prediction of student course selection in online higher education institutes (Kardan, Sadeghi, Ghidary and Sani, 2013).

In the research conducted by Yau and Joy (2010), a mobile learning preferences model consisting of 5 dimensions was proposed. These dimensions are; level of motivation, level of distractions, location, time of day, and available time. The model aims to potentially increase the learning efficiency of individuals by matching mobile learning materials appropriate for each student.

As related research, Zhou, Huang, Hu, Zhu and Tang (2018) developed a model of full-path learning recommendation based on clustering and machine learning techniques. A model developed trained based on a feature similarity metric. A series of experiments have been carried out with this model. Results show that recommendations on learning paths significantly improve learning results in terms of accuracy and efficiency.

Veresne Valentinyi and Szalay (2020) investigated the students' preferences for online or printed teaching-learning materials. The findings showed that students use e-learning only to access teaching and learning e-content, and continue to prefer traditional learning methods and resources such as printed materials. In addition, students preferred print and printer-friendly versions of downloadable electronic materials.

In their research, Altinpulluk, Kilinc and Firat (2020) investigated the relationship between lifelong learners' preferences for learning materials and methods according to age, gender, and working status variables. Data was collected from 608 distance education students. Findings revealed that; e-books are not preferred comparing printed books, marking on the book and taking notes was the most preferred learning technique. Additionally, young learners found to study by taking notes and do not prefer to learn by searching on the internet.

Ilin, (2021) investigated how user media preferences influence engagement and motivation in online learning. 122 secondary school students participated in the research. Data were collected through web analytics and user feedback forms. It has been found that behavioral patterns reflect user motivation and learning preferences. The study assumes that these patterns can be utilized to personalize digital content delivery to increase engagement with online learning materials.

The literature on learners' learning preferences is quite rich. Based on previous learning experiences, individual abilities, environment, and interests, learners prefer a particular learning style or a learning way for their learning process (Kolb, 1984; Costa, Souza, Valentim and Castro, 2020). Smith (2001) identified two main learning preference areas in the Canfield Learning Styles Inventory that he developed with university students. The first of these is related to how easily students work with the learning tasks (verbal-non-verbal; collaborative) presented to them. The second is about self-management. Students need a starting place for a better understanding of their own learning process (Gilakjani, 2012). The learner's clear perception of their own learning preferences will allow them to become more independent as learners and play an active role in their own learning (Genovese, 2004; Gilakjani, 2012; Firat, 2021). Similarly, it is possible to reach researches on the use of the MLP model to predict learners' preferences (Oladokun, Adebajo and Charles-Owaba, 2008; Alkhasawneh and Hobson, 2011; Kardan, Sadeghi, Ghidary and Sani, 2013). However, no study has been found in the literature that analyzes the learning material and learning technique preferences of distance education students with the MLP model. Therefore, it is thought that this research will contribute to filling this gap in the literature.

PURPOSE OF THE STUDY

For the purpose of this study, MLP-ANNs were chosen because they are proven in nonlinear modeling and are resistant to noise and outliers. In this research, the learning preferences of distance education students are considered as learning material preferences and learning technique preferences.

METHOD

This research was designed as a case study. Case study is a methodologically flexible approach to research design that focuses on a specific case (Rosenberg and Yates, 2007). The focused case of this research was active graduate and undergraduate students of Anadolu University Open Education System. Anadolu University, which brings education to different continents of the world with its active-passive approximately 3 million students and 3 million graduates, is among the largest mega universities in the world (AOF, 2017). The education process is fully distance in this system. These features make the students studying in this system a good representative sample of distance education students.

Data Collection Process

Data was collected through an online questionnaire. The questionnaire consists of three parts. The first part includes questions for sex, age, and working status. Second part search to investigate the learning material preferences of distance education students. The question has multiple choices of printed books, digital books, video-animations, visuals-graphics-drawings, audio narration. The final part has a multiple-choice question. This question has eight choices of taking notes, marking in the book, drawing, and scribbling, repeating, telling to someone, listening from others, and discussing with others.

The online survey was published on the system's Web page. Students who wanted to participate by voluntary participation filled out the questionnaire. Students were free to exit the survey at any stage. Data were collected in the fall semester of 2019-2020. 3390 distance education students from Anadolu University Open Education System Programs filled the online questionnaire.

Participants' Profile

The ages of the students participating in the study ranged from 19 to 69. Age distribution of students Is provided in Figure 1.

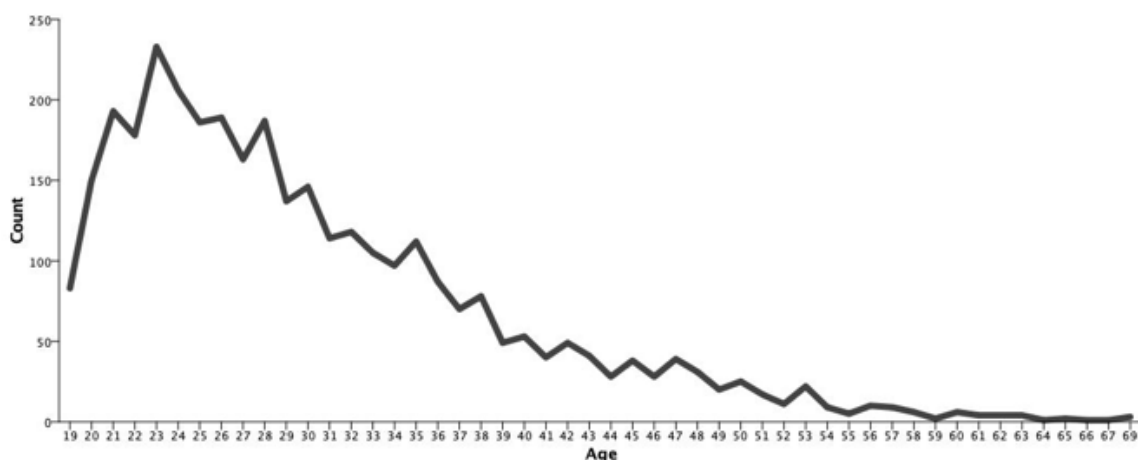


Figure 1. Age distribution of students

42.9% (1455) of the students are female and 57.1% (1935) are male. Another demographic characteristic of the students was their employment status. Statistics of students' employment status are given in Figure 2.

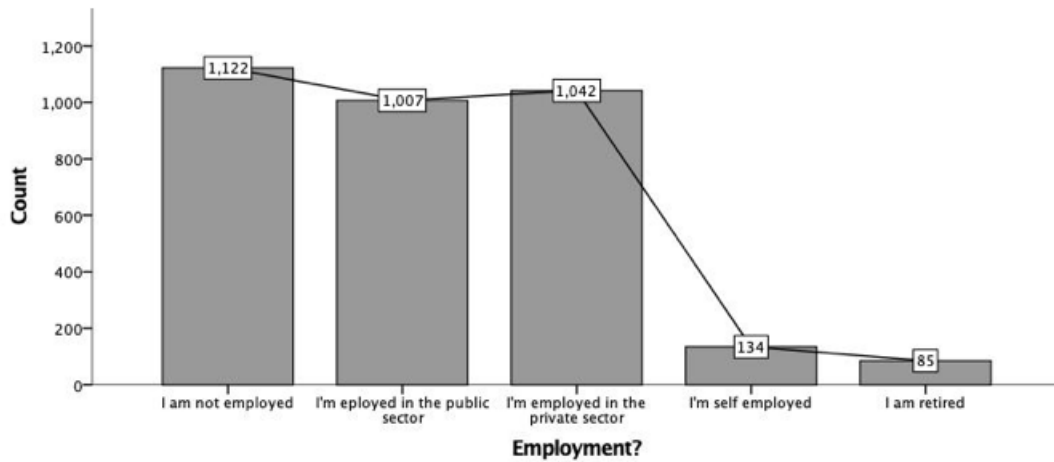


Figure 2. The employment status of students

33.1% of the students who participated in the study stated that they did not work in any job. Then, 30.7% of the students said they work in the private sector, while 29.7% said they work in the public sector. Employment status can be examined in two groups as employed and unemployed. Accordingly, the percentage of students actively working in any job is 64.4%. This data shows that the distance education students in Anadolu University Open Education System have a high rate of employment.

Data Analysis

Classification of data into different clusters or groups is one of the most important aspects in the field of data analyses. The classification of learning experiences can help to understand and identify the hidden paths behind the data. For this reason, neural networks can be used to predict the learning preferences of distance education students based on previous repeats. One of the common neural network models is the multilayer perceptron (MLP) network. MLP network is a common and practical architecture of artificial neural networks (Moghadassi, Parvizian, Hosseini, 2009). MLP is a function of predictors (inputs, independent variables) that minimizes the prediction error (Bias in MLP) of the target variables (outputs, dependent variables) (Heidari, Sobati, vahedirad, 2016). Additionally, MLP has hidden variables that contain unobservable nodes. The value of each hidden unit is a function of the predictors (Rocha, Zela, Torres, Rojas, Valderrama, and Medina, 2021). This structure has a feedforward architecture. In other words, network connections flow one-dimensionally from the input to the output. A typical network architecture for MLP is provided in Figure 3.

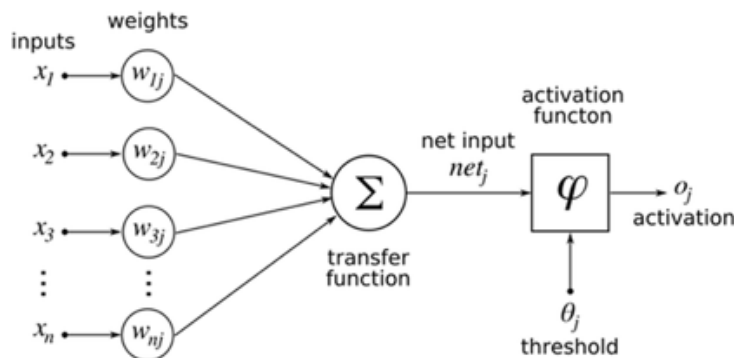


Figure 3. A typical MLP neural network architecture (Najah, 2009)

The pattern of interconnection between neurons in an artificial neural network is called the network architecture (Moghaddasi, Parvizian, Hosseini, 2009). The ages of students grouped to 19-29, 30-40, above 40 before applying MLP to collected data. In the MLP analysis, the input variables were age, sex, enrolment status, while output variables were learning material and learning techniques preferences. The artificial neural network analyzes were conducted on IBM SPSS 24 program. The activation function of was Softmax and the error function was Cross-entropy. The hidden layer activation function was Hyperbolic Tangent. The rescaling method for covariates was adjusted normalized.

FINDINGS

MLP generates a predictive model for dependent (target) variables based on the values of the predictor variables. In this research, a predictive model was proposed for learning preferences of distance education students based on age, sex, and enrolment status. Learning materials preferences and learning techniques preferences are the target variables of the model. The MLP artificial neural network model is applied for learning material preferences and learning techniques preferences separately. Before artificial neural network analysis, the percentages of learning material and learning techniques preferences are provided in accordance with students' independent variables below in Table 1 and Table 2.

Table 1. Percentages of learning material preferences crosstabulation

Independent Variables	Categories	Dependent (Output Variables)				
		Printed Books	e-Books	Visuals-graphics-drawings	Audio narration	Video-animations
Ages	Ages 19-29	50.8%	9.5%	11.9%*	9.5%*	18.3%*
	Ages 30-40	52.1%	12.6%	9.5%	9.3%	16.4%
	Above 40	62.1%*	14.3%*	8.1%	6.1%	9.4%
Gender	Female	58.6%*	7.2%	9.4%	9.8%	15.1%*
	Male	48.3%	14.0%	11.6%	8.4%	17.6%
Employment	I am not employed	57.4%	6.7%	10.2%	8.0%	17.6%*
	I'm employed in the public sector	53.3%	12.1%	10.4%	8.1%	16.0%
	I'm employed in the private sector	45.9%	14.5%*	12.3%*	10.1%	17.3%
	I'm self-employed	49.3%	13.4%	7.5%	16.4%*	13.4%
	I am retired	72.9%*	11.8%	4.7%	7.1%	3.5%

*Note. *The highest percentages of the dependent variables*

As can be seen in Table 1, printed books are the most preferred learning material. Total preference percentages for printed books are 52.7%, Video-animations 16.5%, e-Books 11.1%, Visual 10.7%, Audio narration 9%. Learning techniques preferences percentages of students are provided in Table 2. This finding shows that the most preferred materials are printed books and video animations. These two material types represent the two sides of digital and print learning materials.

Table 2. Percentage table of learning techniques preferences crosstabulation

Independent Variables	Categories	Dependent (Output Variables)							
		Discussing with others	Listening from others	Teaching someone	Drawing and scribbling	Taking notes	Searching on the Internet	Marking in the book	Repeating
Ages	Ages 19-29	9.2%*	7.7%*	13.8%*	7.1%	29.3%*	2.7%	20.6%	9.6%
	Ages 30-40	6.7%	7.7%*	8.1%	11.5%*	24.3%	3.9%*	26.0%	11.9%
	Above 40	1.8%	3.7%	5.5%	10.7%	21.5%	2.9%	35.1%*	18.9%*
Gender	Female	5.2%	6.9%	12.8%*	8.0%	32.4%*	1.2%	24.6%*	8.9%
	Male	9.1%*	7.3%*	9.6%	9.7%*	22.5%	4.5%*	23.9%	13.5%*
Employment	I am not employed	7.8%	7.8%	12.7%*	7.0%	29.9%	2.9%	22.2%	9.7%
	I'm employed in the public sector	7.1%	5.9%	8.8%	11.2%	19.9%	3.8%	29.9%	13.4%
	I'm employed in the private sector	7.4%	8.2%*	12.2%	8.8%	30.5%*	2.6%	19.8%	10.6%
	I'm self-employed	9.7%*	7.5%	6.0%	9.0%	26.9%	4.5%	23.9%	12.7%
	I am retired	2.4%	1.2%	5.9%	9.4%*	20.0%	1.2%	37.6%*	22.4%*

Note. *The highest percentages of the dependent variables

These descriptive cross-tabs are provided before the MLP model to understand the highlights of the data. Table 2 shows that marking in the book and taking notes are the most preferred learning techniques. Total preference percentages for Taking Notes are 26.8%, Marking in the Book 24.2%, Repeating 11.5%, Teaching Someone 10.9%, Drawing and Scribbling 8.9%, Discussing with Others 7.4%, Listening from Others 7.1% and Searching on the Internet 3.1%. Table 2 shows that taking notes and marking in the book are the most preferred learning techniques by distance education students.

Learning Material Preferences

The number of training cases was 2361 (69.6%) and the number of testing cases was 1029 (30.4%). The percent incorrect predictions for the training step was 47.5%, for the testing step was 46.7%. This means that the accuracy of the model is over 52% for the model. The synaptic network of the model Is provided in Figure 4.

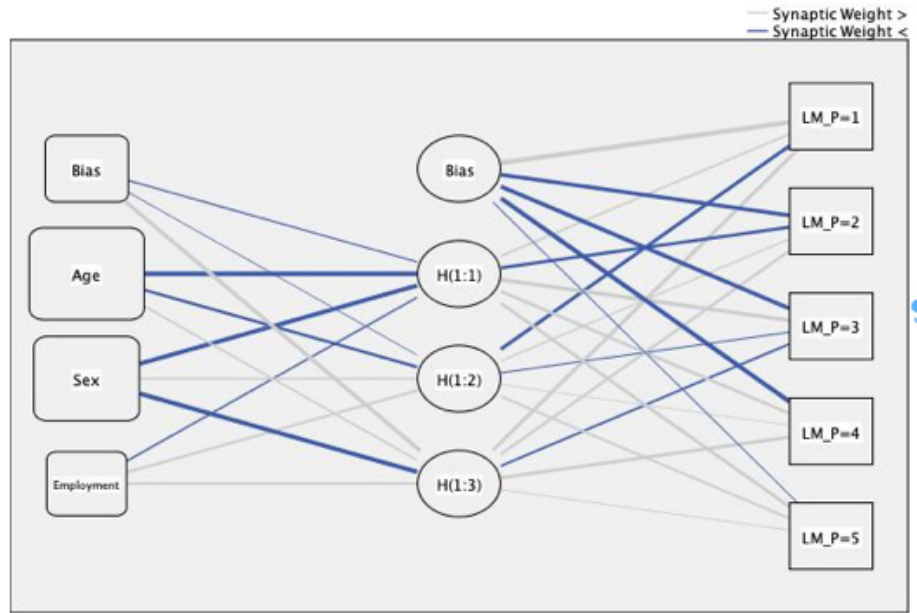


Figure 4. MLP synaptic weights for learning material preferences

Synaptic weight refers to the strength of a connection between two nodes (Byrne, 2017). In biology, it refers to the amount of influence one neuron has on the firing of another. The term is used in artificial and biological neural network research. In the Figure 1, gray connections indicates positive impacts (synaptic weight > 0), blue connections indicates negative impacts (synaptic weight < 0) on the output layer (dependent variable). The overall percent of the accuracy of the classification found 52.1% for the testing step and 53% for the training step. The parameter estimates are provided in Table 3.

Table 3. Parameter estimates for learning material preferences

Predictor	Predicted							
	Hidden Layer				Output Layer			
	H(1:1)	H(1:2)	H(1:3)	[LM_P=1] Books	[LM_P=2] e-Books	[LM_P=3] Visuals	[LM_P=4] Audio	[LM_P=5] Video
Input Layer	Age	-.720	-.314	.197				
	Sex	-.496	.180	-.602				
	Employment	-.171	.250	.267				
Hidden Layer	H(1:1)				.199	-.363	.467	.348
	H(1:2)				-.406	.147	-.086	.026
	H(1:3)				.453	.301	-.202	.386

The importance of independent variables on the prediction of output variables gives important ideas to understand the neural network. The normalized importance of age was .434, sex was .370 and employment was .196. Normalized importance is simply the importance values divided by the largest importance values and expressed as percentages (IBM, 2021). This means that age has been identified as the most important variable in the estimation of preference of learning materials. The synaptic network of sub-categories is provided in Figure 5.

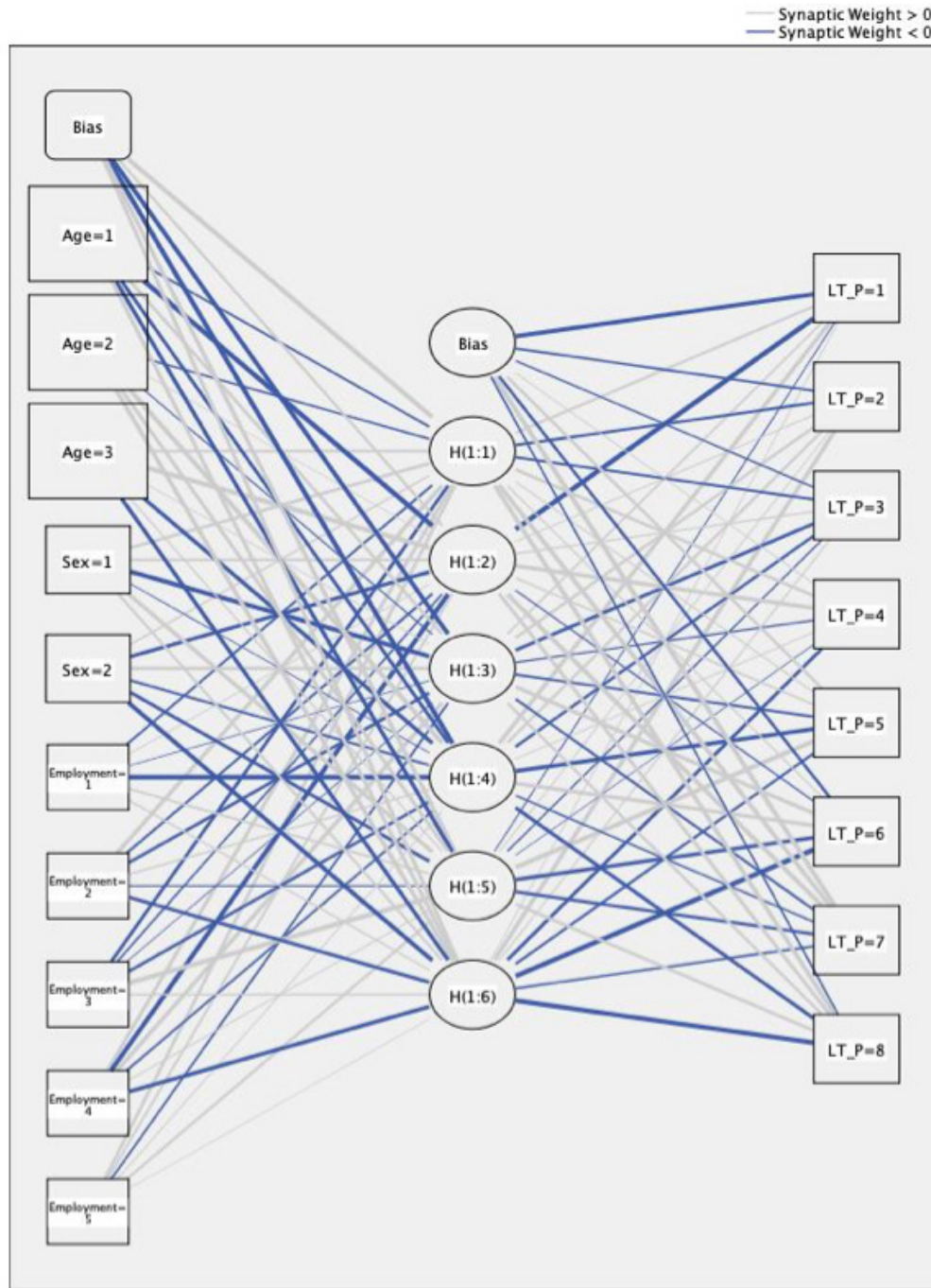


Figure 5. MLP synaptic weights for learning techniques preferences

Learning Techniques Preferences

The number of training cases was 2339 (69.0%) and the number of testing cases was 1051 (31.0%) for MLP artificial neural network analysis. The training had 71.8% incorrect predictions percent while the testing step had 69.9%. The synaptic network of the model is provided in Figure 6.

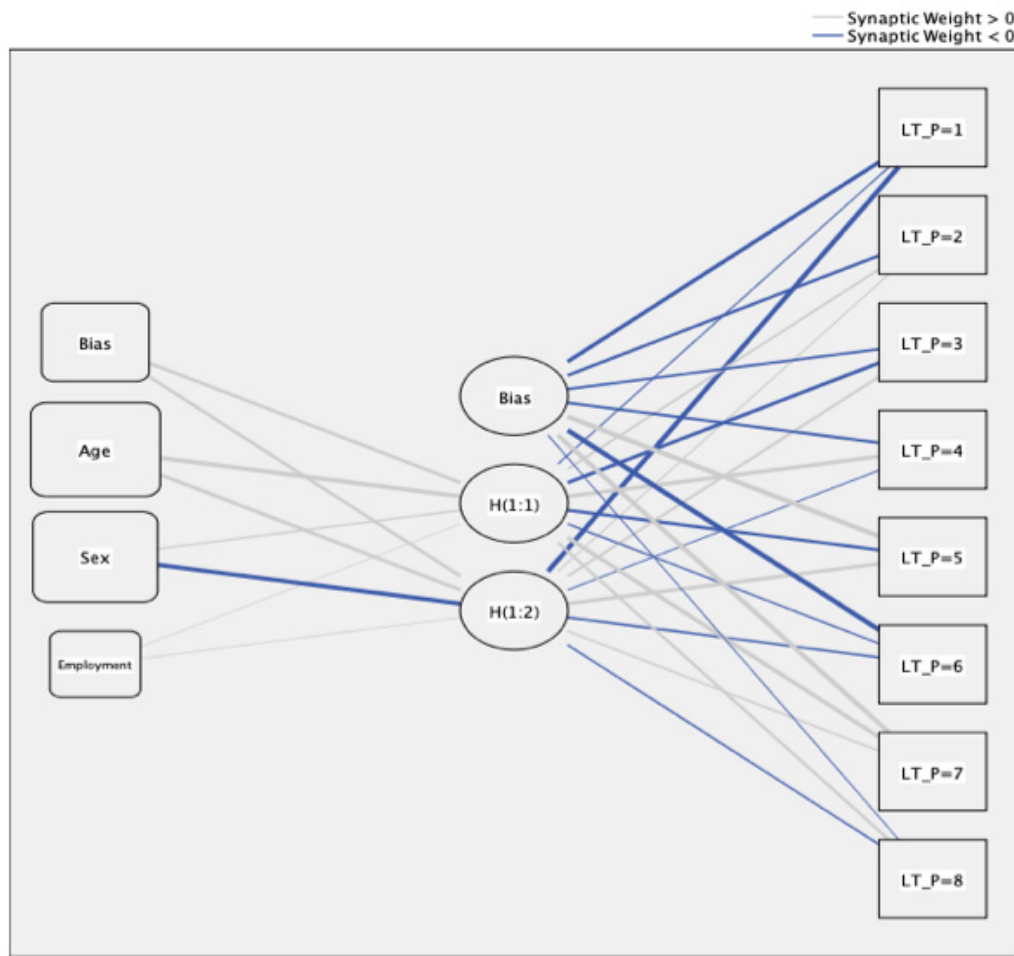


Figure 6. MLP synaptic weights for learning technique preferences

The normalized importance of age was .5, sex was .447 and employment was .054. Age has been identified as the most important variable in the estimation of learning techniques preferences. The normalized importance of gender was close to ages for learning technique preferences. It is possible to assume that both age and gender are important independent variables to predict the learning technique preferences of distance education students.

Learning Material and Learning Technique Preferences

The third MLP analysis was applied to investigate a predictive relation between learning material preferences and learning technique preferences. In the MLP artificial neural network analysis, the number of training cases was 2353 (69.4%) and the number of testing cases was 10537 (30.6%). The training step had 68.4% and the testing step had 69.3% incorrect predictions percent. The synaptic network of the model is provided in Figure 7.

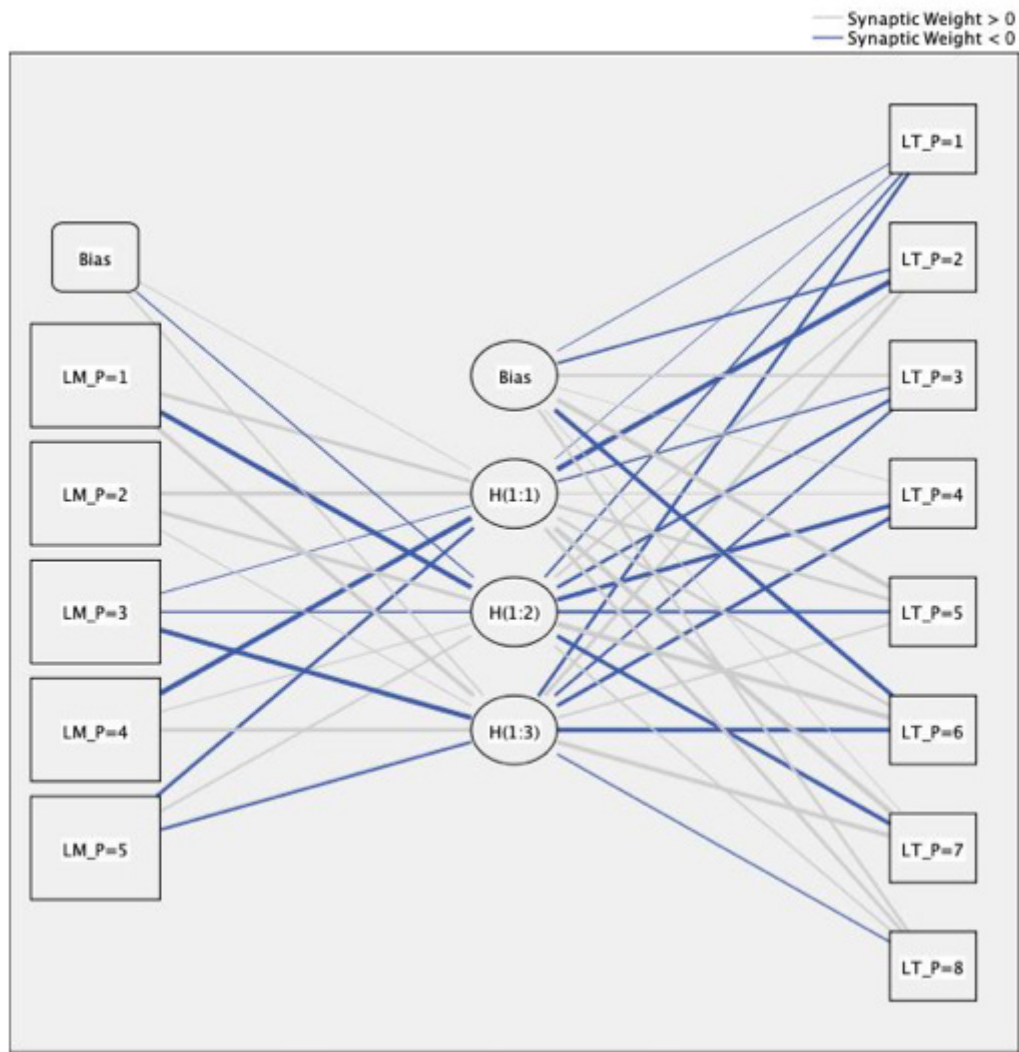


Figure 7. MLP synaptic weights for learning material and learning technique preferences

A high number of strong estimates and synaptic weights were observed between learning material preferences and hidden variables; hidden variables and learning technique preferences. The predictive stats are provided in two tables. The first table of this MLP analyzes created for input layers and hidden layers.

Table 4. Input layers and hidden layers estimates

Predictor		Predicted		
		Hidden Layer		
		H(1:1)	H(1:2)	H(1:3)
Input Layer	[LM_P=1]	.531	-.986	.788
	[LM_P=2]	.814	.667	.095
	[LM_P=3]	-.042	-.140	-.944
	[LM_P=4]	-1.014	.107	.659
	[LM_P=5]	-.430	.245	-.339

The second table of MLP neural network analysis was created for hidden layers and output layers. This table is provided in Table 5.

Table 5. Hidden layers and output layers estimates

Predictor		Predicted							
		Output Layer							
		[LT_P=1]	[LT_P=2]	[LT_P=3]	[LT_P=4]	[LT_P=5]	[LT_P=6]	[LT_P=7]	[LT_P=8]
Hidden Layer	H(1:1)	.322	1.077	.357	-.362	.024	.385	-.718	.236
	H(1:2)	-.363	-.568	-.134	.230	.160	-.085	-.404	.138
	H(1:3)	-.444	-.697	-.468	.057	-.100	.500	-.011	-.026

DISCUSSIONS AND CONCLUSION

The purpose of this research was to profile the learning preferences of distance education students with the help of artificial neural network analysis. For this purpose, the MLP model was applied to data collected from 3390 distance education students from Anadolu University Open Education System. The descriptive findings show that printed books and video animations are the most preferred learning materials. This finding supports the similar findings of Veresne Valentinyi and Szalay (2020) and shows that the habit of using printed materials is still strong in distance education students. However, the second most preferred video animation shows that a digital transformation has occurred in material selection. The second important descriptive finding was that taking notes and marking in the book are the most preferred learning techniques by distance education students. These two descriptive findings of this research support the finding of Altinpulluk, Kilinc and Firat (2020) on the highest preference of printed books and taking notes.

Combined learning preference profile model of distance education students produced with the help of MLP ANN model. MLP model applied three times for independent variables and learning material preferences, independent variables and learning preferences variables, learning material preferences, and learning techniques preferences. The findings of these three MLP analyzes integrated to design the overall profile. The visual model of the overall profile model of the learning preferences of distance education students Is provided in Figure 8.

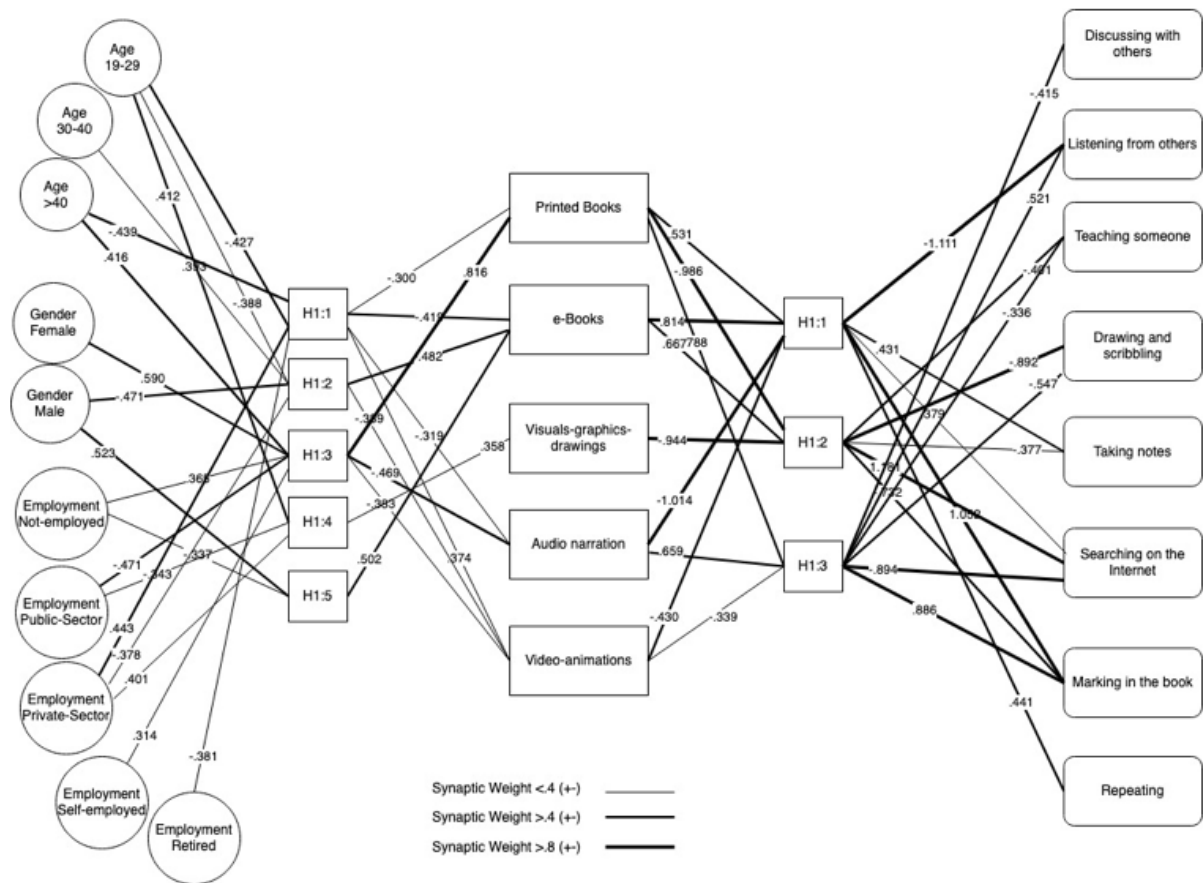


Figure 8. Overall profile model of the learning preferences of distance education students

Bias removed from the final overall model. Level of synaptic weights illustrated with the thickness of the line. The overall model covers the network of all input variables, hidden variables, and output variables. The high estimated learning preferences paths are listed below:

- Students with ages between 19-29 tend to use e-books and visual material and prefer to listen to others, drawing-scribbling, and search on the internet.
- Students aged over 40 tend to use books (printed and e-book) and audio narrations as materials and prefer marking in the books and listening from others for learning.
- Female students prefer printed books and audio materials, while Male students prefer e-books, video-animations. Both female and male students prefer listening from others, marking in the book, and taking notes.
- Employed students from public sectors tend to prefer printed books and audio materials, while students from the private sector tend to prefer e-books and visuals. Employed students from public sectors tend to prefer listening from others, marking in the book, and taking notes, while students from the private sector tend to prefer listening from others, marking in the book, taking notes, drawing, and searching on the internet.

Based on this ANN model, the learning preferences of distance education students can be estimated for each demographic feature. Thus, designing personal learning environments estimation and recommendations of further interactions in e-learning environments became more possible. Such recommendations based on learning paths can significantly improve learning results as found by Zhou, Huang, Hu, Zhu, and Tang (2018), increase engagement as found by Ilin (2021). The full model of an artificial neural network can be used to estimate the potential use of learning materials and preferred learning techniques. Based on this understanding, instructional designers, content developers, interactors, Web development teams and even administration of the distance education system can develop strategies and plans for further actions.

In future research, ANNs can be used to understand the predictive learning preference profiles of students in e-learning environments with the extended number of participants and variety of demographic information. Additionally, ANN results can be supported with learning analytics of students in the e-learning environments and their views about the network.

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HOW TO IMPROVE THE QUALITY OF ONLINE EDUCATION FROM ONLINE EDUCATION DIRECTORS' PERSPECTIVES

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ABSTRACT

COVID-19 pandemic showed once again the need for quality in online education all over the world. The aim of this research is to solicit how to improve the quality of online education from online education program directors' perspectives. The research was designed as a qualitative case study. Eight participants who were responsible for directing, managing, supervising and organizing online education programs participated to this study. The data were collected through interviews and were analyzed through content analysis. Eight dimensions were found to improve the quality of online education. These dimensions were focusing on students' needs; focusing on change in education; focusing on system as a whole; focusing on leadership; focusing on continuous improvement of online education; focusing on integrating learning and teaching theories into online education; focusing on research about online education; and focusing on quality of instructors.

Keywords: Online education, quality, quality of online education, qualitative case study.

INTRODUCTION

The demand for higher education is increasing significantly more than ever. Distance education programs along with blended programs worldwide are provided to meet such demand (La Rotta, Usuga and Clavijo, 2020; Nazneen, Alsulimani and Sharma, 2020). It is especially important to note that those demands should be met utilizing accessible and inexpensive tools and platforms. Likewise, lifelong learning policies and the usefulness of certificates at the job market opened a new window for e-learning to emerge faster. Universities such as MIT, Harvard and many others initiated consortiums to meet such demands and offered courses for lifelong learners. However, such supply did not guarantee to decrease the demand-supply inequality, and stop the significant amount of drop-out rates. The reasons could be speculative and have been studied by researchers from different angles; yet, the issue of quality remains a salient fact each program tackles with and emphasizes in their mottos.

In a recent survey by The WICHE Cooperative for Educational Technologies (WCET), it was found that quality is one of the most important factors to be improved by the institutions which offer online courses. The dimension of quality of online education programs have been raised by many researchers (e.g., Du, Li & Wang, 2018; Littlefield, Rubinstein & Brown Laveist, 2019; Marciniak, 2018; Nazneen, Alsulimani, & Sharma, 2020; Shraim, 2020; Todos, Virlan & Ghencea, 2017). Some researchers developed an online education quality assessment tool (Marciniak, 2018) and some others proposed standards to determine the

quality of online education (Todos, Virlan & Ghencea, 2017). Researchers from different fields also bring the issue/raise the awareness, draw the administrators' attention (Littlefield, Rubinstein & Brown Laveist, 2019; Marciniak, 2018; McFarlane, 2011; Shelton, 2011) to improve the quality of online education.

After reviewing 72 current Quality Online Education frameworks, guidelines and benchmarking published between 2000-2019, Shraim (2020) concluded that ISO/IEC 40180 is an international and scalable standard that could be adaptable for any online program context. Todos, Virlan and Ghencea (2017) mainly reviewed USA and European Higher Education contexts and they developed eight standards and tested them to assess the quality of online courses.

Marciniak (2018) developed an interactive assessment model to measure the quality of online higher education programs. Her model consisted of two dimensions. The first dimension was related to program components (program justification, program objectives, student profile, thematic contents, learning activities, online teacher profile, didactic material, learning strategies, learning assessment, tutorial, online classroom) and the second dimension was related to the assessment process which are assessment planning, application, and the final stage. She also mentioned that her model is addressed to the persons in charge of implementing online programs, and to program directors/coordinators.

Du, Li and Wang (2018) studied the perspectives of customers' perceptions and proposed an online education service quality evaluation model with three dimensions including 1) Service capability, 2) Service process, and 3) Service performance. Those dimensions are expanded by the authors as basic requirements, service resources, service process, service performance and characteristic innovation.

La Rotta, Usuga and Clavijo (2020) conducted a research to determine what higher education students expect from the quality dimensions of online education. After reviewing the related literature and a field work with students, an instrument was developed and applied to 120 students enrolled at a public university in Columbia (South America). Five factors were identified. Those are (1) Teachers, (2) Support academic resources, (3) Administrative support, (4) User interface and (5) Course enrollment.

Nazneen, Alsulimani and Sharma (2020) explored the factors involved in leading to student satisfaction in order to make the program a successful online program. Findings showed that high student satisfaction was associated with user-friendly interfaces and quality instructors. The content of the course was not found significant for student satisfaction. The other factors contributing to perceived online program effectiveness respectively were Course Content, Online Assignments, Interaction with Peers, Quality Instructors and User Interface.

After reviewing the literature between the years 2000-2020, the quality dimensions have been determined and given below in Table 1.

Table 1. Quality dimensions of online education mentioned in literature between 2000-2020

Online Education Quality Dimensions		
1. Access and flexibility	1. Institutional	1. Institutional and executive commitment
2. Costs	2. Managerial	2. Technological infrastructure
3. Teaching and learning	3. Technological	3. Student services
4. Interactivity and User friendliness	4. Pedagogical	4. Instructional design and course development
5. Organizational issues	5. Ethical	5. Instruction and instructors
6. Novelty	6. Interface Design	6. Program delivery
7. Speed (Bates, 2000)	7. Resource support	7. Financial health
	8. Evaluations (Khan, 2001)	8. Legal and regulatory compliance
		9. Program evaluations (Frydenberg, 2002)

1. Administrative, leadership and support 2. Ongoing program concerns and needs 3. Web Course development 4. Students' Concerns and Needs 5. Faculty Concerns and Needs (Lee & Dziuban, 2002)	1. Learning effectiveness 2. Student satisfaction 3. Faculty satisfaction 4. Scale 5. Access (Bourne & Moore, 2003)	1. Institutional readiness/ administration 2. Faculty services 3. Instructional desing/course usability 4. Student readiness 5. Student services 6. Learning outcomes 7. Retention (Lockhard & Lacy, 2002)
1. Institutional mission 2. Institutional organizational structure 3. Institutional resources 4. Curriculum and Instruction 5. Faculty support 6. Student support 7. Student learning outcomes (CHEA, 2002)	1. Faculty support 2. Student support 3. Content support 4. Course management system support 5. Technology support 6. Program support 7. Community support (Osika, 2006)	1. The number and quality of applications and enrolments 2. Student achievement 3. Student satisfaction 4. Faculty satisfaction 5. Program or institutional reputation 6. The quality of course materials (Moore & Kearsley, 2005)
1. Quality of instruction 2. Quality of administrative recognition 3. Quality of advisement 4. Quality of technical support 5. Quality of advance information 6. Quality of course materials (Haroff & Valentine, 2006)	1. Integrity and mission; 2. Governance and management; 3. Human resources; 4. Learning resources and infrastructure; 5. Financial management; 6. Student profile and support services; 7. Curricular aspects; 8. Teaching-learning and evaluation; 9. Research, consultancy and extension, 10. Quality assurance (UNESCO, 2006)	1. Material/content 2. Structure/virtual environment 3. Communication, cooperation and interactivity 4. Student assessment 5. Flexibility and adaptability 6. Support (student and staff) 7. Staff qualifications and experience 8. Vision and institutional leadership 9. Resource allocation 10. The holistic and process aspect (Swedish National Agency for Higher Education, 2008)
1. Organizational/Institutional impact 2. Course development/ Instructional design 3. Teaching and learning 4. Technology 5. Student support 6. Faculty support 7. Evaluation and assessment (Chaney et al., 2009)	1. STE 1 – Policies for quality assurance, 2. STE 2 - Course design, 3. STE 3 – Teaching-learning -student-centered assessment, 4. STE 4 - Admission, course, certification, 5. STE 5 –Academic staff, 6. STE 6 - Learning Resources and Students' Support, 7. STE 7 -Information Management, 8. STE 8 - Continuous Monitoring and Periodic Evaluation of the Course. (Todos, Virlan & Ghencea, 2017)	1. Program Justification, 2. Program Objectives, 3. Student Profile, 4. Thematic Contents, 5. Learning Activities, 6. Online Teacher Profile, 7. Didactic Material, 8. Learning Strategies, 9. Learning Assessment, 10. Tutorial, 11. Online Classroom (Marciniak, 2018)
1. Basic requirements, 2. Service resources, 3. Service process, 4. Service performance 5. Characteristic innovation (Du, Li & Wang, 2018)	1. Teachers, 2. Support academic resources, 3. Administrative support, 4. User interface 5. Course enrollment (La Rotta, Usuga & Clavijo, 2020)	

As presented in Table 1, it was obvious that administrative and institutional dimensions are stated more frequently than the other dimensions as for the quality of online education. After reviewing 13 articles and reports about what should be done to improve the quality of online education, Shelton (2011) concluded that since program administrators were responsible for identifying online education domain, they were also responsible for improving the quality of online education. In the report prepared by The WICHE Cooperative for Educational Technologies (WCET) based on a survey, quality issue is paramount and distance education programs should address the needs of students with different talents, prevent plagiarism, and offer orientation for incoming students.

Leadership is mainly defined as an act of influencing followers to realize certain goals. According to Bennis and Nanus (1997), leaders create passion to follow their vision, to reach long term goals, take risks to accomplish common goals, and challenge the current status quo. Irlbeck (2002) and Latchem and Hanna (2002) suggested higher education leaders to display transformational leadership in order to understand and be part of the change and transform the higher education programs and systems. The importance of leader's role in improving the quality of online education is emphasized by various researchers and organizations (Lee & Dziuban, 2002; Littlefield, Rubinstein & Brown Laveist, 2019; Marciniak, 2018; Shelton, 2011; UNESCO, 2006) since they are responsible for administrating, managing, maintaining and monitoring online programs. It is assumed that online education administrators'/directors' experiences and knowledge may contribute to determining dimensions of how to improve the quality of online education. It is expected that the findings of this study would be beneficial for higher education leaders, policy makers and researchers. The findings can also provide an informative base for those institutions which consider providing e-learning as well as to those who will administer e-learning programs.

PURPOSE OF THE STUDY

As online education program directors or administrators are in charge of developing, implementing, mentoring, improving the quality assurance of online programs, research results should address them (Littlefield, Rubinstein & Brown Laveist, 2019; Marciniak, 2018; McFarlane, 2011; Shelton, 2011). COVID-19 pandemic also showed the need for the quality of online education all over the world. According to Beaudoin (2003), the digital age had a tremendous effect on learning and learning environments as well as our understanding of teaching. COVID-19 conditions make the education institutions consider online learning, e-learning or blended learning as future reality. Many higher education online programs are already under accreditation process to assure the quality. The future of online education will depend on the quality of how online education is provided. Therefore, the purpose of this research is to shed light upon how to improve the quality of online education by taking online education directors' perspectives into account. The research question of this study is "what are the opinions of online education directors on improving the quality of online education?"

METHOD

This research was designed as a case within a case study. According to Gondo, Amis and Vardaman (2010) case within a case is "a specific research strategy that can be used when employing the case study methodology. This research design involves dividing a larger case into subcases. These subcases can then be used to compare both similarities and differences within and across the subcases in order to get clear insight into the larger phenomenon of interest" (p.4). Starting a case within-a-case study, it is suggested to start with identifying a bounded system. The researchers selected the quality of online education as a case and they conducted the research at a university where online education is provided. Then, four different faculties were selected based on their online education experiences, and their volunteer participation to share their experiences with the researcher of the study. It is usual to have between 4 to 10 subcases to be selected in a case within a case study research (Gondo, Amis & Vardaman, 2010).

The Site

The site in this study was an online education unit of faculties in a university. The nickname “Leylak University” will be used in the research. Leylak University is a private university located in a downtown in New England Region in the US. Leylak University started online education in 1998. Since then, many programs have been offered online. There are different online education units within each faculty at Leylak University. Each team/unit has different tasks to be achieved.

The Participants

The data were collected from online education directors who work at online education units at Leylak University. The selection of the directors was based on purposeful – criterion sampling. The criteria for selecting the participants were based on their administrative or leadership positions of at least for a year. According to Patton (1990) “nothing better captures the differences between quantitative and qualitative methods than the different logic that undergrid sampling approaching” (p. 169). Thus, Leylak University was chosen because it has tremendous experience and understanding about the online education system.

The directors were asked individually to participate in this study. They were introduced the purpose of the research in detail. They were reminded that they could refuse to participate or discontinue at any time without any further questions. In addition, they were also assured that their confidentiality would be kept and no real names would be used.

Eight participants responsible for directing, managing, supervising and organizing online education programs were asked to participate in this study. Three of the participants are female and five of them are male. The roles and responsibilities of online directors are given below in Table 2.

Table 2. Roles and responsibilities of online education directors

Participants CODE (Alphabetic Order and Gender)	Roles & Responsibilities
Dr. AM	Executive director of graduate education initiative at the faculty Oversees enrollment of the graduate engineering students Oversees student services Oversees online programs Supporting all those online programs
Dr. BF	Associate Dean for Research for graduate studies.
Dr. CF	Director of online education for the college of science Directing the development and growth of online education at master’s level. In development process responsible for coordinating, marketing, enrolment management, course development and faculty sourcing.
Dr. DM	Executive director to oversee the online system, responsible for online experiential learning group, primary investigator of STEM Project.
Dr.EM	Responsible for distance learning, manager of online unit, responsible for finding people who use technology, instructional designs, creating online program, marketing online program, selecting online program.
Dr. FM	Associate dean of graduate school. Managing the operations for the graduate school, enrolment admission, working with the faculty, students, making sure that all classes are scheduled, all facilities are correct, all online materials are in place.
Dr. GF	Director of Online program. Controls, supervises, make sure that eveything is done properly.
Dr. HM	Online program specialist. Supervises and directs all recordings of the lectures. Posts on blackboard.

Participants were pseudo-coded by initial letters. First letters represent the given name and the second letters represent gender.

Data Collection

As mentioned above the university is well known and experienced about online education and online education directors were volunteer to participate to this research. After reviewing literature and spending some time in the field, the research question of this study was determined as “what are the opinions of online education directors on improving the quality of online education”. Data were collected through semi-structured interviews and through documentation. After selecting the case and sub cases, data collection steps were determined. Data were collected mainly through interviews from eight online education directors who are working at different faculties with different responsibilities (See, Table 2). The interviews with the directors were semi-structured ones. This interview technique is also called a standardized open-ended interview by Patton (1990). The basic characteristic of semi-structured interviews is that questions are prepared beforehand (Berg, 1998). Eight online education directors were interviewed. All participants were asked the following questions: *“In general, what should be done to improve the quality of online education?”* and *“From a leadership perspective, what should be done to improve the quality of online education?”* The interviews were conducted in their offices. Each interview was regularly transcribed, typed, and indexed.

Official documents like strategic planning and the websites of the university and faculties were used as document data. According to Bogdan and Biklen (1992), documents can be personal (intimate diaries, personal letters, and autobiographies), and official (internal documents, external communication, student records and personal files). Yin (1994) goes further to add that documentation sources can also include memoranda, announcements and minutes of meetings, proposals, progress reports, internal documents, newspaper clips and articles. The university website was used to figure out the current trends, vision and mission statements.

Data Analysis

Interviews were audio taped, then transcribed, and written down regularly. Data were indexed, labeled, and coded according to the major topics. Collected data were analyzed by using the technique of content analysis. First, the data were read many times to understand and see the patterns. In order to understand the general category, open coding was used. Open coding is the process of breaking down, examining, comparing, conceptualizing, and categorizing data (Strauss & Corbin, 1990). Then, axial coding was used in order to see the subcategories of the data. Straus & Corbin (1990) describe axial coding as a set of procedures that data are put back together in new ways after open coding by making connections between subcategories. Since this study is a case within a case study, firstly, each subcase is analyzed separately, then similarities and differences are worked out. Opinions and suggestions on how to improve the quality of online education were diverse. So, researchers decided to combine those opinions and get the big picture and reflect it to the audience.

Yin (1994) discusses that triangulation for case studies is maintained by comparing and contrasting the collected information from different sources that were used during the data collection procedure. In this study, triangulation was accomplished through using source and method triangulation. The data sources collected with different techniques were compared and contrasted. Interview transcripts and documents were then compared.

Limitations of the Study

A case study research is not generalizable to any other individuals or situations. Rather, this research design assumes that each case is unique. One of the researchers who conducted this study is a professor of Educational Administration. Her research interests are diverse. They include supervision, organizational behavior, organizational health of schools, chaos theory, leadership, change, peace education, and ICT integration. In this research, her position was a visiting scholar as an outsider researcher. The other researcher who took part in this study works in the field of Instructional Technology and online education. His position can be considered as insider. The overall aim of the researchers was to find out how the quality of online education is improved from online education directors' perspectives.

FINDINGS

The following themes and subthemes have emerged about improving the quality of online education.

1. Focusing on students' needs
2. Focusing on change in education
 - a. Change the mindset about online education
 - b. Change the value of online education
 - c. Change the philosophy of online education
3. Focusing on system as a whole
 - a. Education level matters
 - b. Transferring knowledge and skills between online and offline education
 - c. Providing support for online education within the system
4. Focusing on leadership
 - a. Keep your excitement as a leader
 - b. Be a role model – show your skills
5. Focusing on continuous improvement of online education
 - a. Pay attention to legal foundation
 - b. Provide constant proof
 - c. Make quality a strategic issue and determine metrics
 - d. Create a culture of quality and support it.
 - e. Protect your brand name
6. Focusing on integrating learning and teaching theories into online education
7. Focusing on research about online education
8. Focusing on the quality of instructors
 - a. Motivate academics about online teaching
 - b. Provide appropriate resources

In the following sections, these themes will be described and narrated along with the analyzed data.

Focusing on Students' Needs

Online education directors claim that in order to improve the quality of online education, first you need to pay attention to students' needs. One of the participants told that “*Dr. GF- I would say look at it less about economics and more about the students*” and another participant also mentioned focusing on students' needs with the following statements:

Dr. AM. --*Yes if you don't, if the students don't see the relevance for what you're doing ... it was prior knowledge or prior experience, if you're not showing them how to use the knowledge their gain or the skills or gaining, if they're not practicing it. If you're not helping them see how in their day to day life, you know I can learn to like everything to do so I think those components.*

Participant Dr. DM complained that academics do not pay attention to students' needs. They pay attention to the materials more than students, who can find or create their own material. That is not the issue. He said “*They excite the students a little bit. The students can google and they can find other materials. I think materials are always conceived as the big issue for quality. And I personally don't think they are. I think you could put a sign post, and say hey this week we're going to learn about water. Go and find stuff on the web about water. And student would find really great resources.*”. Dr. EM also added that we should consider when students select the program how they are making decisions.

Focusing on Change in Education

Online education directors told that “*something is changing*”. So we need to be aware of those changes, what the online education is, how it should be, whom should pay attention more. One of the participants shared his opinion with the following statements. “*Dr. HM- Well. More people, administrators, leaders, instructors need to learn what online education is. It’s not just one thing, it’s not a narrow channel, it’s a broad spectrum. And then, they need to work with whomever is doing it to define what their definition of online education is going to be.*”

Participants also mentioned that in order to improve the quality of online education you need support and put value on the online education, change the mindset about online education and continue to reinvent the online education and reinvent the philosophy of online education.

Change the Mindset about Online Education

Based on participants’ statements, educators are expected to change their mindset about online education and are expected to be positive. One of the participants complained that online education was seen as a step child, or step sister of traditional programs”, and he said that it was not true.

Value the Online Education

Administrators/leaders or directors of online education are expected to value the online education and value what online educators or instructors are doing. Participant CF narrates the following:

They know the faculty need to be reminded of their value in their environment. So I always tell the faculty. You know, you’re not any less important in the online class than you were in the face to face class. Yes, you’ve already recorded the material and yes you’ve already written the PowerPoint slides but, now all the students are working through this. They’re not all together in one place, they’re working through it kind of over the course of a week. And they have a question for you on Wednesday night and you take the time to answer that quick this is your teaching time. This is how. You just teach differently but you’re still teaching. So I think helping the faculty understand the teaching piece. And why it’s important. And, how it’s different helps. Every. Help. You know, a rising tide floats all boats you know I think it’s kind of like if we bring it all come back to the faculty ...

Continue to Reinvent the Online Education and Philosophy of Online Education

Participants argued that the philosophy of online education needs to be revisited since online education is related with reuse and scaled up with the online education products. There is a change in understanding of education and delivery of instruction and the medium of instruction philosophy of education is also changing. Participant Dr. FM reflected his thought by the following statement;

In general, I think the internal there’s got to be a willingness to continue to reinvent I mean there’s too much of that too much of the notion that online there’s once something goes online that it’s just there, and that it’s a product that you can reuse, and scale and just tinker with and interesting to with I think the philosophy of online education will continue to evolve and in gamification. This is obviously one of the next things that you’ve got some buzzwords but chilled you’ll hear changing educate here changing online education. I know you could get engage in especially. So, they’re willing this to incorporate sort of a new philosophy in online education is essential ...

Focusing on System as a Whole

The participants mentioned that scholars at higher education institutes might think about the system as a whole. Since the education system is affected as a whole, scholars should conduct researches and explain how, at what level, at what degree online education can be used.

Higher education. Support that how can higher education leaders take that message, and support online education through all levels. I think it's easier to do again on a college scholarship basis but when we could have affected the educational system as a whole. (Dr. FM)

Education Level Matters

Online education is expensive, and leaders claim that online education is more appropriate for college level, it might be better used as supplementary material for secondary education, move to lesser extent primary education.

I think online leaders have a large role to play into in communicating. The role of online education, and, you know, it's still very expensive. Which I think is a huge huge hurdle. This is and it's and it's expensive but colleges are more in a better place to get an online education and to use it to teach at this level. But it might be better used as a supplementary material, material for secondary and move to a lesser extent primary education. But getting teachers at those levels to who already spend an enormous amount of time on their classes and engaging with their students. I think is really that the next school endeavor and health outcomes (Dr. FM).

Transferring Knowledge and Skills between Online and Offline Education

With the online education experience, faculty will think about their field and review their teaching practice. One of the participants Dr. CF told that, they will understand that teaching and learning are separate things in their fields and they will think about how to teach their discipline.

I think maybe just helping faculty understand what teaching and learning is as a separate thing from their discipline. It's you know, it's one thing to know your discipline and it's another thing to understand how to teach your discipline. (Dr. CF)

Another participant, Dr. AM, also mentioned that online education also brought the knowledge and skill transfer between online and face to face education.

So online learning needs to think. You know, we do this modality because of the constraints of the learner or vice versa. On the ground (face to face) maybe we have these constraints when the online doing that is better on the ground. we have these labs, we have the simulations in class on the ground, so you will bring in on the ground class, what is the constrain for the program, and what are we doing to get the best out there for all includes to meet those constraints. So that's how I see this improving the quality. Please clarify "on the ground"

Focusing on Leadership

Online education directors as the leaders influence the instructors, curriculum developers, video recorders and academic staff in order to deliver quality online courses and continue improvement. How do those online education directors influence all those shareholders? Participants told that online education directors should keep their excitement as leaders and they should be role models by using their skills.

Keep Your Excitement as Leader

Leaders are expected to keep their excitement throughout the online education processes to motivate the others.

I could think of I think I've said more. Now I just think that. I think this basis, is very exciting and I just I think that. And I think that patients?? patience?? with this basis. This will be interesting to see how that develops and. I'm just excited to be a part of it, and. I just want to continue to try to do it a little bit better (Dr. FM).

Be A Role Model – Show Your Skill

Online education directors as leaders they should advocate of online education at the faculty or program meetings, show /exposure the online classes, best models to get their curious, start holding meetings in online environment, try to monitor online education, be a guest speaker, ask questions, use your skill to facilitate online courses, integrate online concepts into more day to day get the faculty used to that and be model for everybody in short.

I would probably say If I were in the position which I kind of him but not really I would advocate for. More ways to do what I just said. So. At a faculty meeting showed an online class. Just kind of exposure. To get to get them curious. I would probably start holding some meetings in an online environment. So that, they have to come in, and see what is that oh you can do this you can have a guest speaker come in on blackboard collaborate and you can watch it at home on your computer, and ask questions, and. So I would probably try to integrate the online concept into more of the day to day to get the faculty used to that in the chair is used to kind of thinking in that way. Be a model (Dr. CF)

Focusing on Continuous Improvement of Online Education

Online education directors told that in order to improve the quality of online education you have constantly practicing KAIZEN. You constantly have to keep working on improving what you are doing. One of the online directors, Dr. EM told that;

I think it's. It's a constant. ... I think that you have to constantly be practising KAIZEN. You know. Constant movement of product is very easy to create something, and be successful in it, and then stop. You know, just keep doing the same thing over and over again. You know, there's an old saying. A person is leaving retiring from a company and they say look at that. That's thirty years' experience leaving this company. And somebody else said. Well. Is it thirty years' experience or is that one year's experience repeated for thirty years. So, you constantly have to keep working on improving what you're doing. And you've got to be careful though that you're not just changing for the sake of change. Here. You know you've got to improve work makes sense.

Pay Attention to Legal Foundation

Online education directors mentioned searching the legal base for quality online education especially they mentioned about “Consumer Protection Laws and Regulations” and Federal Government Regulations in US. They are also expected to find out if there is a need for new regulations for quality online education.

I think. My feeling is because of, sort of consumer protection regulations, and then federal government regulations there is a lot more focus on the quality of online education, and there is on the quality of on ground – face to face-education. Faculty have to jump through a lot more hoops. (Dr. CF)

Provide Constant Proofs

Online education directors claim that you need to constantly prove your instruction quality. Because when you improve the quality of the instructional design process, not only online courses but also face-to-face courses get better. What's more, the faculty interaction gets better. Dr. CF's statement is given below.

There are you know the whole instructional design process is nobody does that with a face to face course they just say I can teach it. Yeah. You know so you know right so I think. I think the quality is there. But you're constantly proving it. You know, her personally having to prove it so I think. More than improving the quality of online education.

And I think when you get that piece in there. You improve the quality of everything because the on ground class gets better. The online class gets better; the faculty interaction gets better.

Make Quality A Strategic Issue and Determine Metrics

After COVID-19 pandemic, most of the higher education institutes try to find answer to how to improve the quality of online education. Online director Dr. AM said, *“It is simple. Prepare a strategic plan for online education and determine the metrics and technical aspects and then prove the quality of online education”*.

Create the Culture of Quality and Support It

Online education directors mentioned that in order to improve the quality of online education you need to create culture of quality and support that culture. Online director Dr. AM remarked, *“setting a culture of quality is probably the first thing to do, so people buy into or is valued”*. He also mentioned about supporting the quality culture by using incentives.”

Protect Your Brand Name

Participants mentioned that institutions where online education or teaching is provided think less about economics and more about quality. After serving quality online education, they should maintain that quality. One of the participants Dr. BF says that they should understand *“how best to infuse our values on earth? and understand the constraints and the possibilities. Before, we begin going down our road”*

Focusing on Integrating Learning and Teaching Theories into Online Education

Online education directors reported that the fundamental principles of teaching and learning need to be integrated into courses. Dr. AM and Dr. DM statements were given below:

From my perspective the fundamental principles of learning need to be integrated in the courses... No matter how cool I work or how good the sound quality is or whatever. It doesn't matter, what matters is fundamental (Dr. AM).

I do have kind of strong thoughts on this. I think the focus should absolutely be on the teaching and my team have here, and other institutions are around the content. And honestly my feeling is the content is important obviously. ...So, although we spend all our time focused on content and is that the right graphic and is this text correct, is this type of, and to be honest, I think the content is not the big concern for quality. One of my institutions we track student complaints, and consistently we would see instructor presence, expectations. The number of students who complained about the materials were always less than three four percent. (Dr. DM)

Focusing on Research about Online Education

Online education directors talked about the reviewing/following literature and conducting research over time to see the difference between online and traditional teaching, to learn different experiences in order to improve the quality of online education.

And we're seeing more and more evidence over time for research and also from experience that cultural perspective is being challenged. That's fine, we are not still there. If you look at the research and studies traditional versus online, there is no really crucial difference, but kind of a blend or a hybrid delivery where an instructor is connecting with the students, not computer or through not so distant, but those connections, interaction actually improve overall performance in courses. (Dr. DM)

Focusing on the Quality of Instructors

Participants claimed that in online education you need to focus on instructors because teaching is done by them. You need to train instructors about how to facilitate online discussion, create fun activities, bring one's personality into online classes, and be creative rather than investing only on technology. Show the academic it is all possible. As institution, bring your philosophy into online classes. Online education director Dr. DM said;

It is all about the instructor. Both the instructor presence, and then how the instructor teaches... Then how you get that into the class. So, I think, there's a lot of training there around how to facilitate discussions, and faculty often say to me you know in class I'm funny or in class I miss and then, I can't do that over here. And I think you can actually be quite witty, and intelligent in an online discussion area. But we never talk about that. It's just assumed that because we don't have eye contact with, because I'm not here. We're not going to have any fun. We're not going to have any creativity even. And I think all those things are possible. ... But let's spend six hours talking about how we can do instructor--things online that are interesting and fun. You know how your personality can go online. And what else you want to bring in. How can you personalize it? ... but again without that instructor presence, and without thoughtful instructor presence. It doesn't matter what the content, the technology is like, it's going to be a bad online class.

Motivate Academics about Online Teaching

Since teaching is done by instructors, participants mentioned that instructors must be motivated and guided during the whole process. Online education director Dr. CF stated;

You know, ignite their passion in it and help them understand what's good and what's not good. Will help do that anyway?? Because I think there's already so much regulation. That's driving quality and asking for metrics and... I think so. Really just help the faculty a little bit more.

Provide Appropriate Resources

After training, motivating and helping instructors, it is also suggested that the appropriate resources should be provided. Dr. BF put forth “We need a space with resources to experiment to identify new approaches and things”.

Supporting Instructors

Creating the quality of online education is based on how administrators value it, support it and provide appropriate resources. Administrators were expected to support and involve every aspect and every step of online education. Participant Dr. HM claimed that administrators were fully supported through administrative means along with their involvement, adoptions of the necessary skills providing the teachers and developers with necessary resources when they needed. He said, “Fully supported through administrative means through their involvement, and their adaptation, adaptation of these skills, and given the teachers and the developers the resources, and the support that they need to get it right”.

DISCUSSIONS, CONCLUSION AND RECOMMENDATIONS

The aim of this research was to find out how the quality of online education could be improved from online education directors' perspectives. Online education directors claim that in order to improve the quality of online education you need to focus on students' needs which were also mentioned in different researchers' findings (Lee & Dziuban, 2002; Bourne & Moore, 2002; CHEA, 2002; Osika, 2004; Moore & Kearsley, 2005; Chaney et al., 2009; Todos, Virlan & Ghencea, 2017; Marciniak, 2018; UNESCO, 2006). Research about the students have focused mostly on students' concerns and needs (Lee & Dziuban, 2002), student satisfaction (Bourne & Moore, 2002; Moore & Kearsley, 2005), student support (CHEA, 2002; Osika, 2004; Todos, Virlan & Ghencea, 2017;), student readiness and student services (Lockhard & Lacy, 2002; UNESCO, 2006).

Online education directors emphasized the roles of leadership for the improvement of quality of online education. Online education program directors are expected to keep their excitement as leaders and to be a role model. The importance of administrators and leaders' role in improving the quality of online education is also stated by other researchers (see, Lee & Dziuban, 2002; Littlefield, Rubinstein & Brown Laveist, 2019; Marciniak, 2018; Shelton, 2011; UNESCO, 2006)

Focusing on KAIZEN of online education was explained with paying attention to legal foundations (Frydenberg, 2002), providing constant proofs about quality, making quality a strategic issue (Todos, Virlan & Ghencea, 2017; UNESCO, 2006) and determining metrics, creating culture of quality and supporting it, and protecting your brand name.

Improving the quality of online education requires us to focus on integrating learning and teaching theories into online education (Bates, 2000; Chaney et al., 2009; Khan, 2001). In addition, as to improve the quality of online education, online education directors suggest we focus on the quality of instructors. Instructors are needed to be motivated about online teaching and should be provided appropriate resources and support (Bourne & Moore, 2002; CHEA, 2002; Chaney et al., 2009; Frydenberg, 2002; La Rotta, Usuga & Clavijo, 2020; Lee & Dziuban, 2002; Lockhard & Lacy, 2002; Moore & Kearsley, 2005; Osika, 2004).

Online education directors also advise educators to review and/or follow the related literature and to conduct research over time to see the differences between online and traditional teaching. Secondly, they urge educators to learn different experiences in order to improve the quality of online education, which is also suggested in UNESCO (2006) report.

Online education directors emphasize the need for motivating and guiding academics during the whole process of online teaching. They specifically stress on training the instructors on how to facilitate online discussions, how to create fun activities, how to bring their personality into online classes, and how to be creative. In addition, they also suggested that appropriate resources should be provided at all levels. This finding has been supported in Frydenberg's (2002) online education quality dimension and Marciniak's (2018) online teacher profile findings.

This research has yielded different dimensions than other research findings in terms of quality. The first one is the focus on change in education. In this dimension, online education program directors put emphasis on the need to support for online education, change the mindset about online education, value the online education and reinvent it. Finally, they urged a change in the philosophy of online education. The second dimension is focusing on the system. In order to improve the quality, when educators imply online education, they may start from higher education, use online education as a supplementary and use it less at elementary school levels. In addition, in order to improve the quality of online education, educators need to transfer knowledge and skills between online and offline education.

University administration and leadership is facing a new reality nowadays which is now expanding at all levels online. First of all, such administrative skills and knowledge should be provided in educational administrator training programs. Secondly, at instructional level, faculty training programs should be expanded to include online professional skills towards ensuring quality in teaching. This program could include integrating learning and teaching theories into online education, providing a mindset which covers transferring knowledge and skills between online and offline education, and focusing on determining students' needs in online environments.

Changes such as risk taking, having a vision, and transferring the system are all related to leadership. Therefore, what kind of leadership is needed to ensure the quality of online education in different contexts should be explored. Secondly, measuring the quality of instruction and assurance is both multidimensional and difficult to operationalize. Therefore, how to create a culture of quality in organizations should be explored from online education perspective.

Finally, some suggestions should be made for administrators based on the findings of this study. First, administrators should be a role model, have at least basic understanding of how online education works, and provide the necessary resources to maintain the quality of education in their organizations. Secondly, they need to motivate and support the teaching staff at all levels. Last but not the least, they need to pay attention to continuous improvement of online education both at personal, instructional, and institution levels.

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A TEN-YEAR BIBLIOMETRIC NETWORK REVIEW ON MASSIVE OPEN ONLINE COURSES (MOOCs) RESEARCH: 2011-2020

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ABSTRACT

Massive open online courses (MOOCs) have also received interest from researchers worldwide; however, there was no comprehensive review of the MOOC research. This paper aims to identify the MOOCs research scientific landscape as the trend from publications worldwide. In assessing research trends, the bibliometric network analysis using distance-based network mapping in VOSviewer was applied in this review. The 3,211 eligible articles published between 2011 and 2020 confirmed three main research clusters: learning system, human characteristics and higher education clusters. The results also showed that terms, such as 'learning systems', 'gender differences' and 'flipped classroom' emerged as ongoing research trends. In addition, these findings indicated that the overall productivity rates in the Middle East and Gulf regions were low. Besides, the authorship mapping indicated an absence of the small-world properties. A discussion of the findings and directions for further research are also provided. Based on the network analysis method, this paper presents the researchers' alternative method to review literature using an approach that possibly includes mostly published articles related to MOOCs.

Keywords: Bibliometric, MOOC, network analysis, online course, VOSviewer.

INTRODUCTION

Since 2002, open education resources have been introduced in the United Nations Educational, Scientific and Cultural Organization's forum on open courseware (Chiu, 2016; Daradoumis, Bassi, Xhafa, & Caballe, 2013). The forum has provided educators worldwide with a wide range of opportunities to improve the quality of education and facilitate better learning amongst their students. This has also allowed the designing of open licence learning in any media format, which could be placed in the public domain, can be easily accessed, are free to use, and/or with limited restrictions. Massive open online courses (MOOCs) have shown great potential to offer free and open courses, with open-ended outcomes, for a massive number of

learners from anywhere as long as they have an Internet connection (McAuley, Stewart, Siemens, & Cormier, 2010). Nowadays, learners can enrol in an MOOC system to receive learning materials, interact with the course providers and share their feedback, including knowledge with their classmates, as active learners.

Although the Internet-enhanced learning model was developed in the past century, it was only in 2008 when MOOCs became widely popular after George Siemens and David Cormier identified it as 'connectivism' and 'connective knowledge' (Zhu, Sari, & Lee, 2018). With the use of online technology, MOOCs have become increasingly effective in higher education and even lifelong learning. Since then, MOOCs have received significant attention, presenting a dramatic increase from thousands of participants in the early years of the system's development (Jordan, 2014) to at least 110 million participants engaged in 13,000 courses offered by 900 host institutes and providers around the world by the year 2019 (Shah, 2019; Si, 2020). To categorise MOOCs, Downes (2008) explained it into two main types: distributed networks for online resources via existing social media sites (cMOOCs) and well-structured pathway resources on MOOC platforms (xMOOCs).

Unsurprisingly, many researchers have shown interest in studying the effectiveness of methods, the structures of learning and learners' interaction, because most MOOC systems either still follow the structure of traditional higher education or other commercial platforms, such as Coursera and Edx. Based on the MOOC students' interaction data pool, we can gain a deep understanding of learners' needs and learning patterns and how they can better achieve their goal using the MOOC system than the traditional delivery method, thus presenting greater potential to significantly impact the current state of higher education systems around the world (Gasevic, Kovanovic, Joksimovic, & Siemens, 2014). MOOC educators understand their learners from their courses, which offer specialised learning materials, assessments and certificates for those who complete their given activities by the course deadline (Yuan & Powell, 2013). Thus, learners are required to be self-autonomous and self-motivated, because MOOCs do not monitor learners unlike in the traditional mode of learning, such as regular online courses. Thus, self-regulation is considered an important factor in becoming a successful MOOC learner (Boonrourgrut & Saroinsong, 2020; De Barba et al., 2020).

Various MOOCs aim to support society from the large impact of massive learners, not only in the area of general learning but also some specific groups of participants in many communities that face huge challenges from rapid urbanisation (Hudson et al., 2019). Those courses were designed to educate the public in terms of shaping norms and attitudes leading to social change. In this context, MOOCs reinforce the concept of democratisation of teaching, which equally provides learning opportunities regardless of social status (Aljaraideh, 2019). For example, the World Bank has allocated financial courses for the development and engagement of the related African MOOCs to improve economic skills (Boga & McGreal, 2014; Bonk, Lee, Reeves, & Reynolds, 2015) or support the provision of medical knowledge, such as in patients living with dementia. Past studies have confirmed the large-scale public health impacts of MOOCs on the society and demonstrated that MOOCs could be employed to handle other health conditions requiring attitudinal changes, such as diabetes, obesity, heart disease, cancer, stroke, addiction and some mental disorders (Robertshaw & Cross, 2016; Robertshaw & Kotera, 2020).

PREVIOUS REVIEWS ON MOOCs

During the past few years, MOOCs have undoubtedly gained huge public interest. Researchers have focussed on exploring many aspects and trends related to online educational technology. To understand the overall knowledge of our MOOC literacy, extensive reviews have been conducted in many points of time. To explore our MOOC literacy, these examples are the most cited reviews. Liyanagunawardena, Adams, and Williams (2013) explored 45 MOOC publications between 2008 and 2012 and categorised these into eight areas of interest; introductory, concept, case studies, educational theory, technology, participant focussed, provider focussed and others. Ebben and Murphy (2014) reviewed 25 articles published between 2009 and 2013 showing two movement phases: Phase I from 2009 to 2012, with technological experimentation and innovation of cMOOCs supporting the development of connectivism theory, and Phase II from 2012 to 2013 with the development of the MOOC pedagogy platform, learning analytics, assessment and the emergence of critical discourse. In addition, Hew and Cheung (2014) summarised the reasons why students enrolled and teachers wanted to teach in the MOOC from 25 eligible articles. They found that the four main

purposes of students who enrolled in MOOCs included the personal desire to extend the current knowledge, interest in MOOCs, personal challenge and the need to obtain a certificate. In comparison, the teachers' main goals were curiosity (a sense of intrigue), personal rewards and a sense of altruism. That review also indicated that 90% of drop-outs can be attributed to the difficulty of assignment evaluation, the absence of immediate feedback and a lack of students' online forum participation.

Regarding the common research review methods adopted by researchers, Veletsianos and Shepherdson (2016) investigated 183 empirical studies published between 2013 and 2015 to specifically explore the geographic distribution, publication outlets, citations, data collection and analysis methods. The publications mostly came from North America and Europe, but half of those papers were not cited. Conducting surveys emerged as the researchers' preferred method of collecting data. Deng, Benckendorff, and Gannaway (2017) confirmed that surveys, interviews and log files were researchers' data collection methods based on their review of 95 articles published between 2014 and 2016. They found that participants were well-educated and were mostly from developed Western countries. Deng and Benckendorff (2017)' review found that focus groups were less common and that studies applied a single research method to explore some outputs in MOOC research.

Rincon-Flores, Montoya, and Mena (2019) reviewed 30 articles published between 2013 and 2019 using gamification in MOOCs. The results revealed interesting findings, which highlighted the raising of innovative didactic strategies in gamification. Guajardo Leal, Navarro-Corona, and Valenzuela Gonzalez (2019) explored 20 conference papers and 70 research articles published between 2015 and 2018. The publications, which were mainly from the United States, Australia and the United Kingdom, mostly employed qualitative methods with an exploratory approach. Providing examples of reviews related to psychological factors, Ahmad and Yusof (2019) found three main motivations (enjoyment, professional development and reputation enhancement) from perspective studies on 39 instructors between 2015 and 2018.

All these example review studies demonstrated that MOOC research and concurrent trends were rapidly changing by each year since the introduction of this learning mode (Veletsianos & Shepherdson, 2016); however, those reviews only collected data in specific topics from different times and databases. Thus, they could not present a comprehensive picture of the state of MOOC research. Importantly, it could be argued that most of those reviews provided outcomes from a low number of articles compared with the huge number of publications in all related topics. Thus, to visualise an overview of the proliferation of MOOC publication terms, bibliographic network analysis is applied. The main purpose of this review is to explore MOOC research trend using research occurrence terms, co-occurrence authorship and country authorship in the past decade. Thus, the questions pursued by this review were:

1. What are the researchers' updated trends on publications related MOOCs?
2. Who are the most productive authors who published articles related MOOCs?
3. What countries are the world leader in publications and their most cited documents related MOOCs?

METHOD

Data Samples

Scopus database was chosen in this review because it was the largest abstract and citation database of peer-review literatures (Wamba & Akter, 2015). To select the eligible papers, PRISMA guideline was adopted (Beller et al., 2013). All 3,638 publications, which were indexed in the all Scopus databases, focussing on Massive Open Online Courseware with the term's 'MOOC' OR 'MOOCS' OR 'Massive Open Online Courseware' in their titles, abstracts or keywords were found; however, they were with at least one of those keywords that must be explicitly stated in their titles as the screening condition. Original research articles, and conference papers were selected. Book chapters, reviews, editorial and other types of publications were not target in this review. The samples were published between 2011 and 2020. Thus, the samples consisted of 3,211 articles in the final stage. Information about authors and co-authors including their affirmations was also collected. They were published by 279 authors and co-authors and cited by 10,280 other documents.

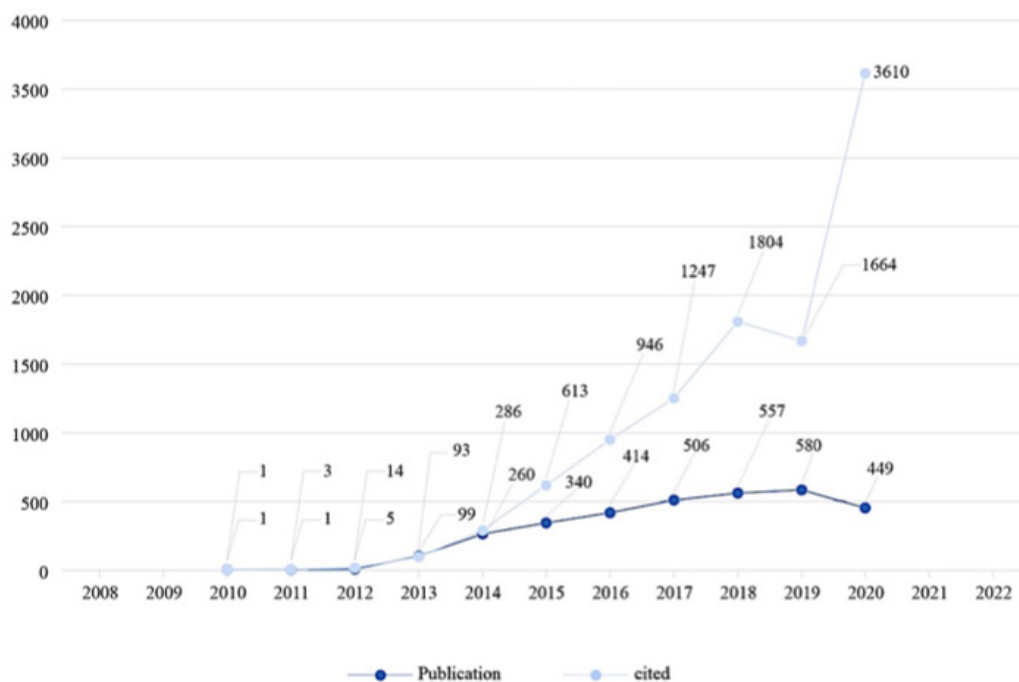


Figure 1. Frequencies of publications and their citations per year

The samples were published in 171 journals. Among these, the three preferred journals that gained the most interest from researchers were *International Review of Research in Open and Distance Learning* (6.27% of all samples), followed by *International Journal of Emerging Technologies in Learning* (2.61%) and *Computer and Education* (2.32%). These samples were mostly cited in *Lecture Notes in Computer Science* (3.41% of all cited articles). In terms of citations, the *International Review of Research in Open and Distance Learning*, which was at the top in terms of published documents, appeared as the third-ranked journal (2.30%). Scholars from the United States (24.69%), China (13.88%) and Spain (12.55%) were the top three leaders in this field. Universidad Nacional de Educacion a Distancia (Spain), Universidad Carlos III de Madrid (Spain) and Pennsylvania State University (U.S.) were the world-leading universities in terms of publishing works on MOOCs. However, the most cited published articles were from the Open University (U.K.).

Data Analysis

The bibliographic network technique was applied to visualise a map of co-occurrences that can possibly present the research topics as nodes. They might be close to one another on the map based on the network calculations. To see how VOSviewer statistics work on a similarity matrix, a cluster translation, rotation and reflection degree behind these distance-based network maps, please study in Van & Waltman (2010). In this study, authors' keywords were shown without the most frequent key term 'MOOC' and its related words. Its omitted keywords could provide a better cluster among all authors' keywords. The mapping units and their relations were represented using circles and lines, respectively, to link those units as nodes. The size of a circle was calculated based on the number of articles and terms. This study presented two kinds of mapping, including a cluster network mapping and an overlay visualisation mapping. The colours of a circle represented each cluster and its membership in the cluster mapping. The spectrum of colours represents the average publication month and year in the overlay mapping. Additionally, the relations among authors' and co-authors' network mapping were also presented based on the similarities of the documents they cited. To visualise the trends from the authors' respective schools, those who cited the same document were placed near each other on this mapping. Additionally, a country and co-country mapping, presented by the number of documents, demonstrated how researchers collaborated through their different institutions.

Notably, the layout of the bibliometric mapping could be affected by the ease of interpretation, which showed highly frequent units. Some topics could be less interpretable and unclear, as shown in the visualisation. Thus, we applied several methods to avoid any serious arbitrariness. The preliminary analysis was conducted using a variety of occurrence threshold selections, after which we selected the mapping that presented robust visibility of the main trends. The inconsistent solutions were discarded. The samples were analysed and visualised using VOSviewer v.1.16.13 in MacOS. Fractional weight and Lin-Log modularity were used for each unit's normalisation. The map of authors' keywords was calculated from a minimum of 25 occurrences per term presenting 64 thresholds from 6,001 keywords. A map of authors and co-authors included 52 authors who published more than five papers.

FINDINGS

The co-occurrence map based on authors' keywords presented three main recognised clusters which researchers have already published, as shown in Figure 2. The first cluster (green colour–upper left) mostly included the big nodes on education and terms related to the learning system, leaning analytics and e-learning. It was the biggest cluster compared to the two other clusters. The second cluster (blue–right) included thresholds related to human and human–computer interactions. The third cluster (red–lower) seemed to be narrow; however, it included terms from different approaches, which included 'distance education' and 'online education technology', and from alternative learning systems, such as 'blended learning', social media' and 'flipped classrooms'. Considerably, the first and third clusters were closer to each other, which might represent how researchers gathered terms in closely related approaches.

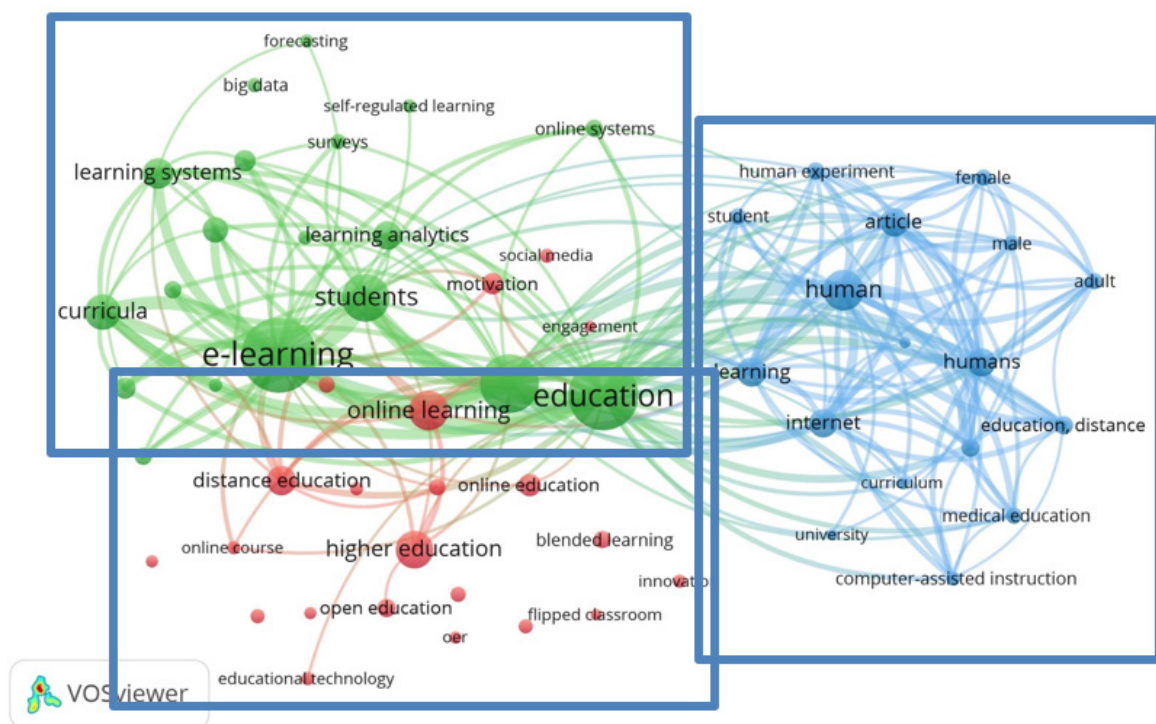


Figure 2. Map of the co-occurrences of author keywords

As presented in Figure 3, the latest terms were mostly in the first and second clusters. In comparison to Figure 2, most terms generally appeared in the database after the 2016 publication year. Learning systems and learning analytics, including big data, survey, forecasting, and self-regulated learning, belong to the newest publication terms from the first cluster. The newest terms from the second cluster clearly favour the

characteristics of the studied samples and experiment research method. Another cluster gathered the newest terms, such as ‘flipped classroom’ or ‘blended learning’, which referred to e-learning and distance learning innovation. Topics on the Internet and computer-assisted instruction were excluded from the researchers’ interests.

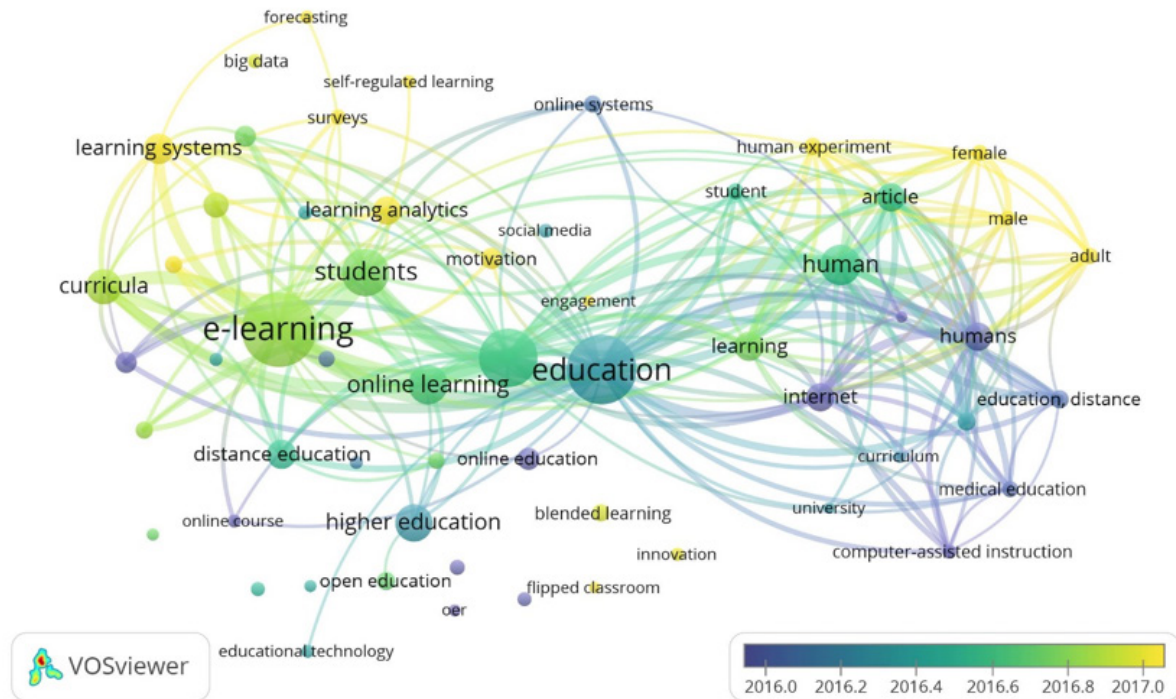


Figure 3. Overlay map of the co-occurrences of author keywords

To address the trend from the productive authors and co-authors, Figure 4 shows several unconnected distinct groups of them that could possibly represent different research directions. There were at least five clearly recognised groups of authors. Of these, the centre groups that combined two groups had the largest number of papers, although most articles belonged to the Alario–Hoyos, C. cluster (2.42% and registered in the blue cluster). Table 1 confirms his publication continuity during this decade.

We further explored the three biggest clusters. The centre position, which was compounded from their similar citation metrics, mainly included Brown, M.; Zhang, J.; Chen, Y. and Anderson, T.; and Liu, S., Bonk, C. J. and Jobklow, W. These groups studied the terms regarding students’ psychological factors, such as motivation, engagement and other related personal perspectives. In the network around Alario–Hoyos, C., which included the main works of Pritchard, D. E., Klood, C. D and Munoz–Merino, P. J., there existed a prevalence of terms related to computer program learning designs, learning analytics and learning strategies. In the network around Gasevic, D., Jokesimovic, S., Kovanovic, V. and Dowson, S., social domains and MOOC learning evaluation were found. The results of this analysis could be a shred of evidence proving that researchers’ tend to collaborate less with other researchers from different institutions across different countries. Meanwhile, this analysis also confirmed the transfer of knowledge from the researchers in the same country.

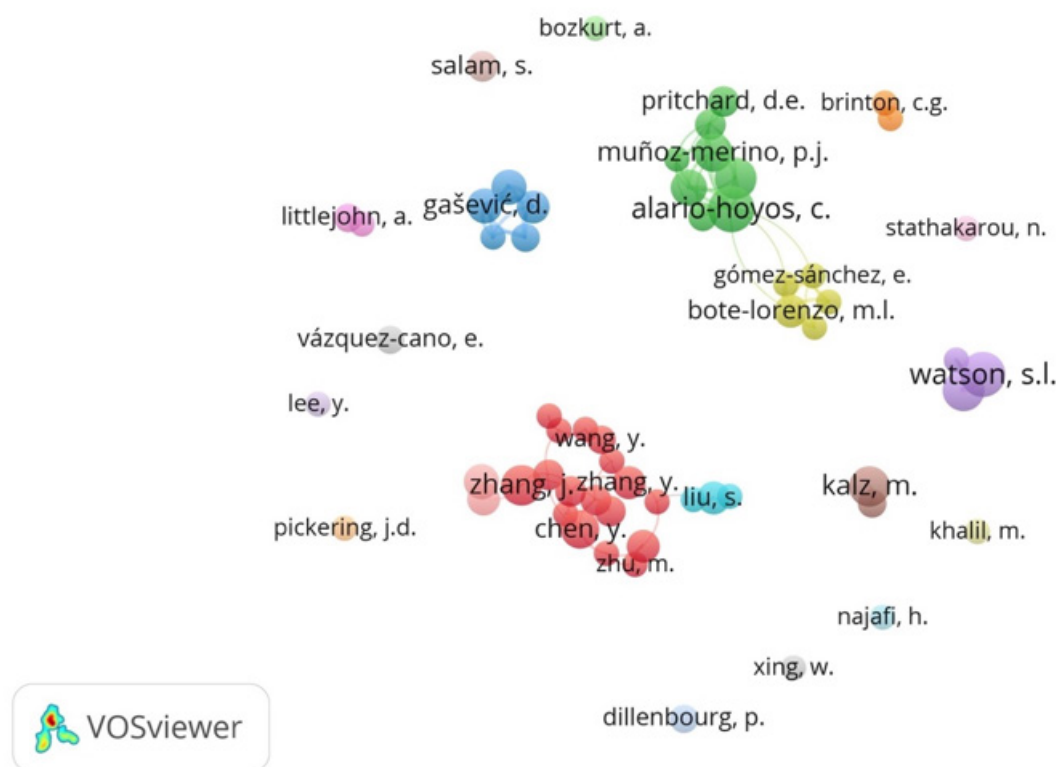


Figure 4. Authorship network mapping

Table 1. Unweighted author productivity

Presenting top productive authors					
2011 – 2015	Ndoc	2016 - 2020	Ndoc	2011 - 2020	Ndoc
Alario-Hoyos, C.	5	Watson, S.L.	15	Alario-Hoyos, C.	16
Anderson, T.	4	Watson, W.R.	13	Watson, S.L.	15
Kloos, C.D.	4	Alario-Hoyos, C.	11	Kloos, C.D.	13
Rodriguez, C.O.	4	Kalz, M.	11	Watson, W.R.	13
Sangra, A.	4	Kloos, C.D.	9	Kalz, M.	12
Acosta, E.S.	3	Gasevic, D.	8	Munoz-Merino, J.	11
Bonk, C.J.	3	Munoz-Merino, J.	8	Perez-Sanagustin,	10
Chatti, M.A.	3	Perez-Sanagustin,	8		
Gonzalez-Sanmam	3				
Jordan, K.	3				
Munoz-Merino, J.	3				

Note: A total of 19 researchers published at least three articles during 2010–2015, showing only those who were in the ranking in the later periods.

To identify the world leader in this field of knowledge, the country network presented a global overview of the leading countries based on the number of documents and citations within a ten-year period between 2011 and 2020. The leading countries throughout the time, as shown in Figure 5, presented seven classified clusters of those countries, including four major and three minor clusters. Without weighing in terms of the population in each region, counting by the number of total documents, researchers from the U.S. and China together with Taiwan, Hong Kong and South Korea (yellow) were clearly leading in MOOC research. Interestingly, Spain had published more relevant articles with other Latin American countries whilst commonwealth countries, including the U.K. (a violet node next to the U.S.), Canada, Australia and other Western Europe and Scandinavian countries, tend to collaborate closely with one another. These countries was not only the most productive in terms of number of publication, but also indicate high *h*-index. In addition, in Figure 6, we further analysed this mapping using the number of citations. This mapping visualised differences that highlighted a large number of citations from the U.S., U.K., Spain and Australia, respectively. Meanwhile, publications from China were less cited compared to the total number of all documents in the database.

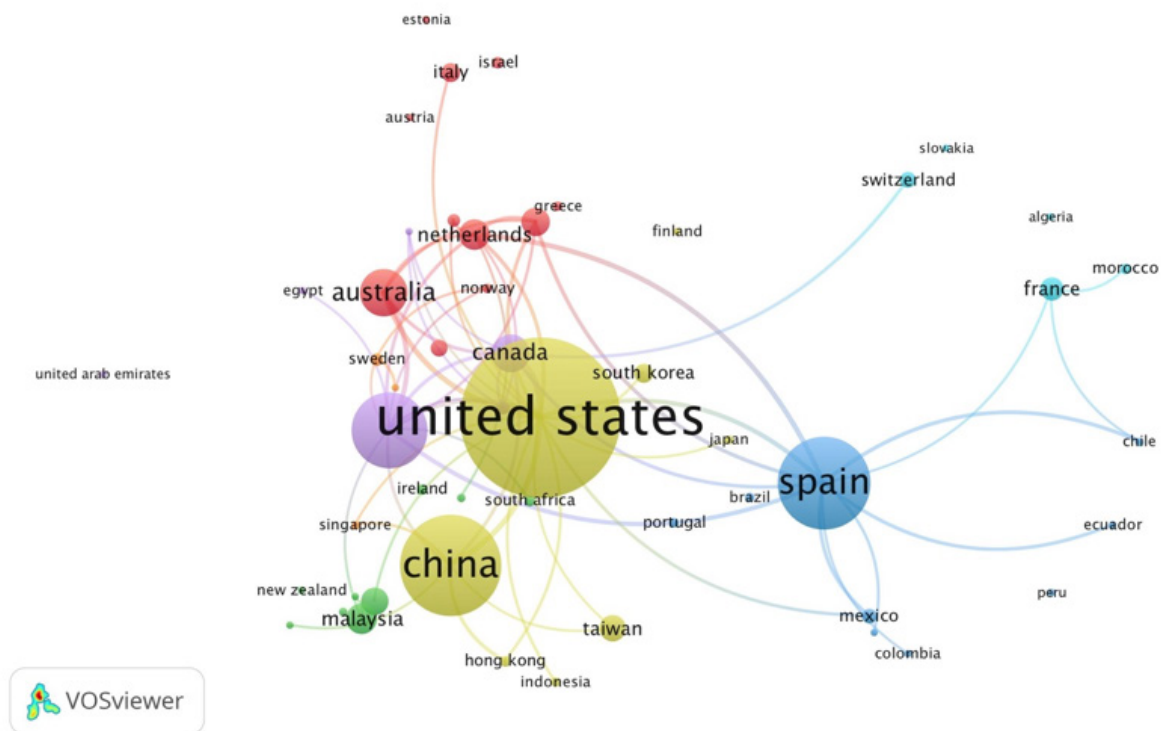


Figure 5. Co-authorship country mapping based on counting by documents

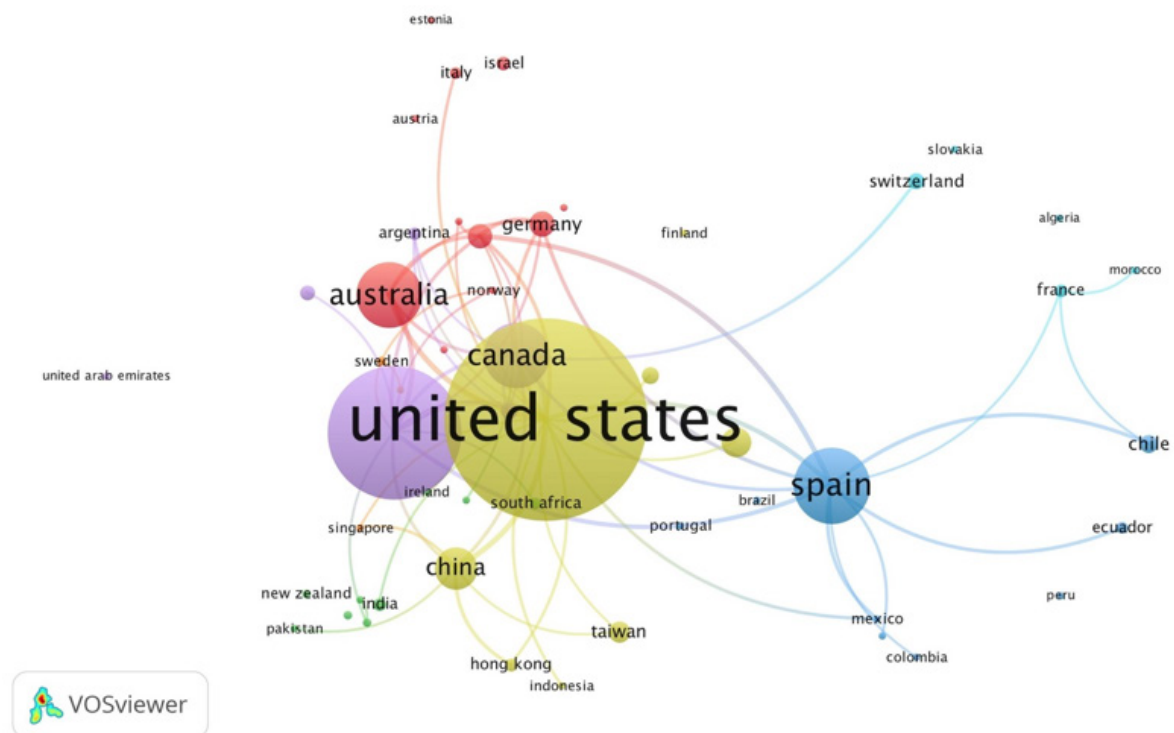


Figure 6. Co-authorship country mapping based on counting by citations

DISCUSSIONS AND CONCLUSION

Since the term MOOC was introduced in the first decade of the 21st century, it has been rapidly applied as the new educational technology in the field of education. During this ten-year period, citations on documents regarding MOOC increased amongst global researchers, indicating a rate that is almost 3 times higher than the number of publications each year. Under this online learning process, course providers receive information about learners from their interactions with the online learning programmes or platforms although most researchers declared difficulty in receiving students' information due to the limitations imposed by students' privacy regulation and data protection. Some concerns and criticisms have been raised in terms of how researchers can improve this learning mode effectively (Griesbaum, 2014). To assess the current research coverage, this review focussed on identifying the main trends, including determining the gaps regarding MOOC-related publications from the selected 3,211 Scopus-indexed journal articles from the underlying themes, authors and country references.

There was total of 71 reviews and conference reviews in the Scopus database which published up to December 31, 2020. They were mostly published reviews were in 2017 (18.30%), 2019 (18.30%) and 2015 (12.67%). According to the present findings using density mapping, it could be interpreted that those nodes in Cluster 2 and some upper nodes in Cluster 1 received highly researchers' interest to make review. Although the centre nodes was not in their early stage, they were undeveloped to be reviews. This gap of knowledge could be fulfilled by future researcher. However, there was an argument that why those research have not been remarked as an eminently reference was published a medium-to-low impact index. They did not reflect for the analysis of MOOC movement, especially the publications before 2013 (Meneses, Cano & Gravan, 2015).

The findings regarding the authors' keywords indicated three distinctive clusters as the research trend. Providing examples to draw a brief overview in those clusters, some highly interesting review articles and research papers were presented. The centered keys in the first cluster, a wide range of topics, were to improve MOOC efficiency. As we know, MOOC is an updated trend in e-learning, which seemed to be a central node in this cluster. Addressing the benefits and shortfalls of this constantly adapted format was of interest among researchers. Learning analytics, data mining or big data analytics using educational tools and techniques were involved in designed software agents meant to collect data automatically from the learners' environments (Daradoumis et al., 2013). Cross-course differences with a tendency to hoard data to curtail data sharing might be challenging for future researchers within this cluster (Reich, 2015). However, this cluster showed a potential for expansion according to a variety of providers and number of learners, based on the hypothesis that social communication can be presented through learners' social media interaction.

The second cluster contained terms that referred to learners and covered recent topics regarding age and gender & age differences. High education, University and medical education were also clearly visualised. Some high cited examples in this cluster was that Wu, Kao, Wu, and Wei (2019) reviewed that MOOC have been run by both public and private institutes to deliver instructions outside the U.S. This platform was adjusted by focusing on the development of best practices for the learners. Human and Internet linages as the cluster centrality were found, although they seemed to be outdated topics compared to other learners' demographic aspects. In terms of gender & age differences as the update trend in MOOC research, the findings presented how males and females in various cultures shared different outcomes, which included reasons for enrolling, amongst U.S. and non-U.S. users (Crues et al., 2018), intention to use amongst Indians (Govindarajan & Krishnan, 2019) and how faculty members used the MOOC amongst Jordanians (Aljaraideh, 2019).

Although the third cluster was small and disrupted, some key terms, such as 'innovation', 'blended learning' and 'flipped classroom', seemed to be updated. These terms mostly appeared in the health occupation education field between 2018 and 2019, although they were focused on higher education studies, including science, technology, engineering and maths in the earlier years (Lundin, Rensfeldt, Hillman, Lantz-Andersson, & Peterson, 2018). Nevertheless, they showed great potential to be bigger network nodes according to the number of articles in 2020. As we know, flipped classrooms are unlike traditional teacher-centred approaches in that the former truly utilises strategies and technologies that could generate active, collaborative and peer-assisted learning (Akçayir & Akçayir, 2018). Focussing on health education, using flipped classroom in 21 articles related to nursing programs yielded positive academic results, which include satisfaction and engagement (Betihavas, Bridgman, Kornhaber, & Cross, 2016). Realistic assessments are another crucial aspect of providing clinical learning experiences that students find relevant through MOOCs (Tim, 2014). A review of 118 articles in medical education reported the existence of an overall positive perception in the MOOC mode of learning (Chen, Lui, & Martinelli, 2017). Owing to its effectiveness, the sample evidence may explain why the sizes of the nodes might be affected in future trends, particularly in pharmacology and medicine (McLaughlin et al., 2014). Nevertheless, some scholars augured that the workload from flipped classroom implementations for students and instructor can be considered the main challenges.

This review explored an uncompleted small-world property in the MOOC authorship network, as shown in Figure 4. According to the introduction of the small-world network by Watts and Strogatz (1998), the present findings indicated low level clusters associated with other clusters. Moreover, there was no step to pass through the clusters. Although there were fewer ties between the clusters around Alario-Hoyos, C. (green and yellow clusters) and the clusters around Zhang, J. (red, pink and blue clusters), they did not link to each other, thus indicating an absence of small-world networks in the collaboration among authors in this field of research. Some research fields, such as accounting, exhibit small-world properties that enable the exchange of ideas among researchers (Andrikopoulos & Kostaris, 2017). However, the articles in this review confirmed that this effect has not yet happened in this research field since MOOCs was invented.

The tendency has changes with the increasing rate of publications from China and up-coming countries including Taiwan and Malaysia. Additionally, the most cited papers are from the most productive country in general (Ellegaard & Wallin, 2015), thus, it should be noted that the reason why studies from China were cited less compared to the total number of published documents (Figure 6) although China has becomes one of the world leaders after 2013 (Meneses, Cano & Gravan, 2015). It is that publications from Chinese institutes were mostly published in later years (mostly after 2015); hence, they can be expected to receive

higher citations in the future (Chai & Yang, 2014; Li, Chen, & Gong, 2017; Zheng & Yang, 2017). Remarkably, although the numbers of online learners in South Asia and South East Asia were higher than in other regions, the clearly visualized nodes only come from Malaysia, India, Singapore and Indonesia, and overall productivity rates in these regions were low. The publication rates among Middle East and Gulf countries were very low, and they were limited to researchers from United Arab Emirates where presented an absence of coordination to other foreign countries. This estimate could cause for concern with high individual publication numbers in this region.

Future Review Directions

Future review can be designed to complement the current study by addressing our considerations, which have been limited to a single-database analysis. As the data consisted of English articles from Scopus between 2011 and 2020, there may also be a chance of publication bias. This issue might produce some deviations in how we interpreted and discussed the data based on these samples. Thus, future review studies could address this inherent limitation using a sufficiently representative sample comprising articles from other databases and written in other languages.

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THE RELATIONSHIP BETWEEN UNIVERSITY STUDENTS' ATTITUDES TOWARD ONLINE EDUCATION AND THEIR STRESS DURING COVID-19 PANDEMIC

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ABSTRACT

The aim of the study was to examine the relationship between university students' stress level and their attitude toward online education forced during the COVID-19 pandemic. Furthermore, it analyzed the relationship between the use of online education instruments and attitude. Two hundred eighty-three university students enrolled in the Turkish universities completed demographic information form, use of online education instruments form, attitude toward online education scale and perceived stress scale. Correlational analyses showed that the frequency of following synchronous and asynchronous lectures, working on online course materials and attending to online discussions and meetings with the lecturers and advisors were positively related to the perceived effectiveness of online education and its perception as a means to feel connected. They also demonstrated that the stress level was negatively related to the perceived effectiveness of online education, its perception as a means to feel connected, the frequency of following synchronous video lectures and the frequency of attending to online discussions. Regression analysis demonstrated the predictive effect of the perceived effectiveness of online education on stress level. These findings were discussed in terms of their implications particularly for future emergency education programs and generally for online education.

Keywords: Online education, attitude, COVID-19, stress.

INTRODUCTION

Starting in December 2019 in Wuhan, China, the coronavirus disease (COVID-19) caused by SARS-COV2 creates a massive global health crisis (Chen Wang et al., 2020). On December 30, 2019, the first cluster of pneumonia patients was reported to the World Health Organizations (WHO) and one month later WHO announced the COVID-19 outbreak as a public health emergency of international concern, and in March 2020 it declared COVID-19 pandemic (WHO, 2020). In a short period of time, COVID-19 surpassed previous recent pandemics such as SARS and MERS in terms of the number of the total reported cases and mortality rate (Murphy, 2020). On June 5th the total number of cases reported by WHO was 6.515.796 worldwide. COVID-19 is transmitted from person to person through direct physical contact or coughing or sneezing (Rothan et al., 2020) and the symptoms occur after an incubation period lasting approximately 5.2 days (Li et al., 2020). The physical symptoms of COVID-19 include fever, cough, sore throat, breathing difficulty, vomiting and diarrhea (Carlos et al., 2020; Huang et al., 2020). In severe cases, cardiac injury, respiratory failure and acute respiratory distress are also observed (Holshue et al., 2020). COVID-19 does not only influence physical health, but also psychological health.

Because of the fact that pandemics are threatening to the survival of the human beings, they induce fear in individuals (LeDoux, 2012; Mobbs et al., 2015). During COVID-19, individuals fear from getting infected, having contact with contaminated surfaces and being close to others who might be infected. Fear of infection might lead to avoiding others and withdrawing from daily routines (Polizzi et al., 2020). Individuals have

also concerns about health of their beloved ones, especially older ones or the ones with any physical disease (Fiorillo & Gorwood, 2020). To reduce the transmission of COVID-19, governments implemented several strategies such as social distancing, isolation and quarantine (Devi, 2020). These strategies themselves and how they are communicated to the society might also increase fear responses (Brooks et al. 2020; Devi, 2020; van Bavel et al., 2020). Moreover, as a result of social distancing, individuals become apart from their family members, friends, coworkers, work spaces and educational institutions. They get also withdrawn from comforting activities and routines such as going to restaurants, meeting with friends or going to gyms which leads to the loss of sense of security, safety and stability (Polizzi et al.; 2020; van Bavel et al. , 2020). Furthermore, they switch daily between uncertainty and hope about the course of the pandemic and the socio-economic changes (Buheji et al., 2020). All of these fear-inducing experiences have consequences on psychological well-being. One of these consequences is the increase in the stress level.

Stress is defined as a state of imbalance aroused because of the individual's perception of the demands of the environment or the threats to his/her well-being to be higher than his/her ability to cope with these challenges (Lazarus, 1966; Lazarus & Folkman, 1974). Headaches, back and neck pain, changes in sleeping and eating patterns, worsening of chronic health problems, gastrointestinal problems, forgetfulness, decreased energy level and concentration, and increased use of alcohol and drugs are some of the frequently observed stress syndromes (Monroe & Slavich, 2016). Previous research has demonstrated that these symptoms are experienced during pandemics (Buheji et al., 2020; Devi, 2020). Lee et al. (2007) showed that SARS survivors suffered from stress during the outbreak. Similarly, Rabelo et al. (2016) reported stress and other psychological problems among the Ebola survivors. Stress responses were also reported during the H1N1 pandemic (McCauley et al., 2013; Taha et al., 2014). Brooks et al. (2020) reviewed previous literature on the psychological impact of quarantine on the psychological well-being of Ebola, Sars, H1N1 and other pandemics and concluded that not only the infection itself, but also the quarantine because of being infected leads to long-lasting stress syndromes. Sim et al. (2010) emphasized the importance of studying the psychological impact of infectious diseases on non-infected general population considering the high prevalence of psychological disorders among individuals who had life threatening experiences. During SARS, they reported high psychological morbidity rate including stress symptoms in non-infected individuals. These studies imply that studying the stress symptoms during COVID-19 is essential. In a very recent study, Cuiyan Wang et al. (2020) studied the psychological well-being in the general population in China within the first two weeks of the COVID-19 outbreak. Eight percent of their participants reported moderate to severe stress symptoms. The severity was found to be related to some individual factors. One of these individual factors is being a student.

After the outbreak of COVID-19, social distancing strategies have been implemented to reduce the transmission of the virus. One of these strategies was closing the educational institutions (Murphy, 2020; Cuiyan Wang et al., 2020). On July 17, UNESCO (2020) reported 140 countries implementing countrywide closure of educational institutions. Cuiyan Wang et al. (2020) claimed that this strategy created uncertainty and concerns about academic progression which might have influenced psychological well-being of the students negatively. Online learning systems instead of traditional face-to-face classes were adapted in a short period of time and this might have brought further challenges for the students. Online learning systems require integration of technology into education by the institutions, their teaching staff and students (Ali, 2020). The lack of resources for this integration might interfere with the effectiveness of online education. The education institutions might not have technological infrastructure to support the online platforms (Ali, 2020; Nadeak 2020). The teaching staff might not be ready to use the technological devices and online platforms. Even if they are ready, the curriculum might not be easily adapted to the online platforms and the practical requirements of the course cannot be implemented (Harsha & Bai, 2020). They should be provided training and support (Ali, 2020; Vrasidas, 2015). Moreover, although students might be regular users of technological devices, they may not have enough knowledge and technology skills to use online platforms (Ali, 2020). There might be a discrepancy between what young individuals are believed to do with technology and their actual technology knowledge (Ali, 2020). Furthermore, even if they are knowledgeable enough to use technology for online education, they might not have mobile devices and strong internet connectivity required for the online courses (Harsha & Bai, 2020). All of these intricacies might create a negative attitude toward online education and trigger more stress in students.

On the other hand, online education might provide some means to cope with stress during COVID-19. Working on meaningful tasks, being creative, engaging in mentally challenging activities, having purposes and planning to achieve goals are claimed to be among the ways of coping with stress (Buheji et al., 2020; Devi, 2020; Polizzi et al., 2020). These activities provide a sense of control and achievement (Polizzi et al., 2020). They help to recover from negative experiences, free-up cognitive resources to deal with changing situations and reduce the effect of stress (Bonanno et al., 2010; Fredrickson et al., 2003). Engaging in online education, students have mentally challenging tasks such as assignments, projects and exams. They have to make plans for them and work actively on them. All of these activities provide to the students purposes and a sense of control which might help them to cope with stress. Staying connected with others is another strategy to manage stress level (Buheji et al., 2020; Polizzi et al., 2020). Through online education, students stay in contact with their lecturers and classmates. They have discussions with their lecturers or conduct group projects with their classmates. In these activities, they exchange knowledge, express empathy, work for a common goal, share resources and engage in prosocial behaviors. All of these might establish a positive attitude and facilitate coping with stress.

Considering both the possible positive and negative effects of online education on students, it can be claimed that how the students' perceive online education might be an important factor related to their psychological well-being. Having positive attitudes toward online education might decrease their stress level whereas perceiving online education negatively might intensify their stress. Testing this relationship, the main aim of the present study was to examine this relationship between university students' attitude toward online education and their stress level. Moreover, considering the effect of the experience on the perception of technology assisted learning (e.g. Abbad et al., 2009; Abdullah & Ward, 2016; Lee et al., 2013) the present study also analyzed whether the frequency of using online education tools by university students is related to their attitude toward online education and their stress level. The study was conducted with university students in Turkey.

In Turkey, the first case with COVID-19 was reported on March 10, 2020 by the Ministry of Health and the first death of a patient infected with COVID-19 on March 15. On June 15, the total number of cases was reported to be 178.239 and the total number of deaths to be 4.807 (Turkish Ministry of Health, 2020). As a policy to reduce the transmission of the pandemic, the Turkish government first announced one-week-long break for the educational institutions and then started the period of online education on March 23 (Turkish Ministry of Education, n.d.). Depending on their technological infrastructure, the universities in Turkey implemented various strategies for online education. The present study covered these strategies and their relationship to undergraduate students' attitude toward online education and their psychological well-being.

METHOD

Participants

Two hundred eighty-seven undergraduate students were recruited through snowball sampling. Four participants reported that their universities did not start online education, so they were excluded from the study and analyses were conducted with the data from 283 participants (227 female, 80.2%). The mean age of participants was 22.13 years ($SD_{age} = 1.55$, $Min = 18$, $Max = 28$). One hundred fourteen participants were students at the university in which the author is lecturing. The remaining participants were students at 52 different universities across Turkey. At the time of data collection, 60% of the participants were living in Istanbul, and the remaining participants were living in 28 different cities in Turkey. The demographic characteristics of the participants were presented in Table 1.

Table 1. Demographic characteristics of the participants (N = 283)

Variable	n	%
Relationship status		
Single	175	61.84
In a relationship	108	38.16
Perceived financial status		
Good	167	59.01
Mediocre	108	38.16
Poor	8	2.83
Living condition before COVID-19		
With family members	170	60.07
In dormitory	25	8.83
With friends	44	15.55
Alone	44	15.55
Living condition after COVID-19		
With family members	256	90.46
In dormitory	---	---
With friends	17	6.01
Alone	10	3.53

Measures

Demographic Information Form

The demographic information form includes questions about the age, the gender, the perceived financial status, the university, the grade point average, and where and with whom the participants were living before and after COVID-19 outbreak.

Use of Online Education Instruments Form

The use of online education instruments form consists of questions about the extent of the participants' use of different tools provided by their universities for online education. It includes questions about whether the universities provided online education tools such as synchronous video or audio lectures during which the students can interact with the lecturer and with each other; asynchronous recorded video or audio lectures during which there is no interaction between the students and lecturers; online library resources and course materials such as lecture notes; online discussion sessions with the lecturers and classmates; and video and audio meetings with the advisors. It also measures the frequency of participants' use of the available instruments on a 4-point Likert scale ranging from 1- never to 4- very frequently. The list of the instruments was created by checking the means used by different universities for online education through their websites.

Attitude toward Online Education Scale

This scale is constructed for the present study to analyze the attitude of university students toward online education during COVID-19 days. It includes eight items on the effectiveness of online education (e.g. 'Online education is as effective as face-to-face education', 'Online education provides me opportunities

to learn on my own pace') and three items on feeling connected through online education (e.g. 'Online education makes me feel connected to my friends'). Items were rated on a 5-point Likert scale ranging from 1-I don't agree to 5- I certainly agree. A principal component analysis (PCA) was run on the 11 items with orthogonal rotation (Varimax). The Kaiser-Meyer-Olkin measure confirmed the sampling adequacy for the analysis, KMO = .92 (Field, 2009). Bartlett's test of sphericity demonstrated that correlations between the items were sufficient for PCA, $\chi^2(55) = 1455.43, p < .001$. There were two components with eigenvalues over Kaiser's criterion of 1 explaining in combination 61.52 % of the variance. The scree plot verified these two components. Three items which cross-loaded in the factor matrix were excluded. Two factors were identified. The first component consisting of 5 items represented the perceived effectiveness of online education. It had an internal consistency with a Cronbach's α of .85. The second component representing the perception of online education as a means to feel connected had 3 items. Its internal consistency was .71. The mean scores of the items in each component formed the score for that component (the perceived effectiveness of online education score and the perceived connectedness through online education score). The higher scores indicated positive attitude.

Perceived Stress Scale

The perceived stress scale was developed by Cohen, Kamarck and Mermelstein (1983) to measure stress level in different circumstances. It was adapted to Turkish by Eskin, Harlak, Demirkiran and Dereboy (2013). It includes 14 items rated on a 5-point Likert scale ranging from 1(never) to 5 (very frequently). The sum of the scores on all items formed the stress score ranging between 14 and 70. Higher scores indicate higher stress level. In the adaptation study, its internal consistency was .84; and the test-retest reliability was .87. In the present study, the internal consistency was found to be .88.

Procedure

The present study was approved by the Ethical Committee of the author's institution. The participants were contacted through e-mails or online announcements between April 20, 2020 and May, 1 2020. The consent form and the questionnaires were presented to the participants online via a survey software in the following order: the demographic information form, the use of online education instruments form, the attitude toward online education scale and the perceived stress scale. The completion of all the scales was anonymous and took approximately 10 minutes.

Data Analyses

The present study had a correlational design. All statistical analyses were performed with SPSS 24. Prior to analyses, the assumptions of the normality of the sampling distribution were tested and found to be satisfied (Tabachnick & Fidell, 2014). Due to the fact that the skewness and kurtosis values of all variables were below the critical limits, no transformation was undertaken (Field, 2009; Tabachnick & Fidell, 2014). First, descriptive statistics were run for the frequency of the use of online education instruments, the perceived effectiveness of online education score, the perceived connectedness through online education score, and the stress score. Then, to analyze the relationship between the use of online education tools, the attitude toward online education and the stress level, correlational analyses were conducted with the frequency of the use of online education tools, the perceived effectiveness of online education score, the perceived connectedness through online education score, and the stress score. Lastly, to identify the predictors of the stress level, a regression analysis was run with the stress score as the criterion and the variables correlated with it as the predictors.

FINDINGS

Table 2 presents the frequency of the use of online education instruments.

Table 2. Frequencies of the use of the online education instruments

Variable	n	%	M	SD
Synchronous lectures				
With video	266	94.00	3.24	.82
With audio	196	69.30	2.67	.94
Asynchronous lectures				
With video	258	91.2	2.88	.95
With audio	191	67.5	2.65	1.02
Online resources				
Library	243	85.90	2.11	1.03
Lecture material	261	92.2	2.70	1.03
Online discussion	226	79.9	2.56	1.06
Online video meeting	168	59.4	2.15	1.09
Online audio meeting	201	71	2.36	1.04
Meeting with advisor				
Video meeting	169	59.7	2.02	1.13
Audio meeting	190	67.1	2.02	1.06

Table 3 displays the descriptive statistics for the stress score measured with the Perceived Stress Scale, the perceived effectiveness of online education score and the perceived connectedness through online education score measured with the Attitude toward Online Education Scale.

Table 3. Descriptive statistics for the stress score, the perceived effectiveness of online education score and the perceived connectedness through online education score

Variable	M	SD	Min	Max
Stress score	45.05	7.84	19	69
Effectiveness score	2.49	.93	1	5
Connectedness score	3.23	.91	1	5

Table 4 shows the Pearson's correlation coefficients between the use of the online education instruments, the attitude toward online education scores (the perceived effectiveness of online education score and the perceived connectedness through online education score), and the stress score.

The perceived effectiveness of online education score was found to be positively correlated with the frequency of following the synchronous lectures (with video and audio), the frequency of following asynchronous lectures (with video and audio), the frequency of using online library resources, the frequency of using online lecture materials, the frequency of attending to online discussions with lecturers and classmates, and the frequency of meeting with advisors. The perceived connectedness through online education score was shown to be positively correlated with the frequency of following synchronous and asynchronous lectures with video, the frequency of using online lecture materials, the frequency of attending to online discussions, the frequency of attending to audio meetings with the lecturers, and the frequency of meeting with the advisors. The stress score was found to correlate negatively with the frequency of attending to synchronous video lectures and the frequency of attending to online discussions with the lecturers and classmates.

Table 4. Correlations between the frequency of the use of the online education instruments, the attitude toward online education scores (the perceived effectiveness of online education score and the perceived connectedness through online education score) and the stress score

Variable	Effectiveness	Connectedness	Stress
Synchronous lectures			
With video	.22***	.24***	-.17**
With audio	.22**	.13	.03
Asynchronous lectures			
With video	.15*	.15*	.06
With audio	.15*	.07	-.02
Online resources			
Library	.16*	.11	-.05
Lecture material	.24***	.15**	-.07
Online discussion	.20**	.14*	-.16*
Online video meeting	.12	.15	-.05
Online audio meeting	.11	.19**	.14
Meeting with advisor			
Video meeting	.22**	.16*	-.12
Audio meeting	.16*	.14*	-.13

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

In addition, Table 5 presents the Pearson's correlation coefficients between the stress score and the attitude toward online education scores. The stress score was found to be negatively correlated with the perceived effectiveness of online education score and the perceived connectedness through online education score.

Table 5. Correlations between the stress score and the attitude toward online education scores (the perceived effectiveness of online education score and the perceived connectedness through online education score)

Variable	1	2	3
1.Stress score	-		
2.Effectiveness score	-.31***	-	
3.Connectedness score	-.19**	.52***	-

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

As shown in Table 6, regression analysis with the stress score as the criterion; and the frequency of attending to the synchronous video lectures, the frequency of attending to the online discussions, the perceived effectiveness of online education score and the perceived connectedness through online education score as the predictors demonstrated that only the perceived effectiveness of online education score predicted negatively the stress score ($\beta = -.26$, $t = -3.46$, $p = .001$). It explained 13% of the variance in the stress score, $F(4, 212) = 7.59$, $p = .000$.

Table 6. Predictors of the stress score

Variable	Model B
Constant	55.01***
Effectiveness score	-2.06**
Connectedness score	.78
Synchronous lectures with video	-.20
Online discussion	-.59
R ²	.13
F	7.59***

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

DISCUSSIONS AND CONCLUSION

The aim of the present study was to examine the relationship between the university students' attitude toward online education and their stress level during COVID-19 pandemic. The change in the education system from the traditional face-to-face system to the online system was one of the major challenges for the university students during the COVID-19 days. The present study measured their attitude toward online education in terms of its effectiveness and its function as a tool for connectedness. It demonstrated that perceived effectiveness of online education predicted students' stress level negatively. This finding suggested that considering online education as effective might help university students to deal with the change in the education system more easily and adapt to it more successfully which in turn might contribute to their psychological well-being. On the other hand, perceiving online education as less effective might create difficulties in adapting to the new system and concerns about academic achievement which might increase the stress level of university students.

With the closure of the campuses and other facilities like the dormitories and cafeterias, students might have become isolated. Online education system might provide some means to them to feel socially connected and students who feel connected to others through online education system might be expected to have lower stress level. Supporting this expectation, the present study demonstrated a negative relationship between the perceived connectedness through online education and stress. However, feeling connected to others was not found to predict the stress level. Most of the students in the present study were living with their families who might provide them a sense of connectedness and social support which help them more to deal with their stress. Through online education, they might stay connected with their lecturers, class mates and universities, but these connections might not be the primary source for them to cope with their stress. Another possibility is that feeling connected to others through online education might fulfill the basic psychological need of relatedness and be indirectly related to well-being of students. Supporting this possibility, Holzer et al. (2021) demonstrated the relationship between the satisfaction of the relatedness need, positive emotion and intrinsic learning motivation during the COVID-19 period.

The present study also analyzed the relationship between the use of online education instruments and university students' attitude toward online education. It was found that the frequencies of following synchronous and asynchronous lectures, using online resources like library and lecture materials, attending to online discussion hours with the lecturers and classmates and having meetings with the advisors are positively related to the perception of the effectiveness of online education. The importance of the active interaction with the lecturers and lecture materials for effective online education has been previously demonstrated (Bao, 2020; Demuyakor, 2020). The present study supported this relationship further. Additionally, it suggested that not only these resources but also having active interaction with the academic advisors is also critical for the perceived effectiveness of online education. Moreover, the asynchronous lectures including the recorded videos or audios of the lecturers provide some flexibility to students. They are available to all students for a period of time in which they can learn on their own pace. They are useful especially for students who cannot attend to synchronous lectures. These might create a sense of control and lead to a more positive attitude toward online education. Asynchronous courses were claimed to be a good learning resource, especially for

adult learners and for the times of emergency (Hodges et al., 2020). The present study supported this claim by indicating its positive relationship to the attitude towards online education.

The frequencies of attending to synchronous video lectures, having course materials available online, engaging in online discussions and meeting with the lecturers, classmates and academic advisors were shown to be positively related to the perception of online education as a means to feel connected. One of the challenges of online education is the creation of a sense of connectedness and community

(Seiver & Troja, 2014; Shlossberg & Cunningham, 2016). Besser et al. (2020) claimed that sense of connectedness and belongingness is essential not only for well-being, but also for learning motivation, attention and adaptability of university students during the COVID-19 period. The present study suggested that interactive online education instruments such as online discussions with the lecturers and classmates, synchronous lectures in which the lecturers are visible and interact actively with the students, and meetings with the academic advisors might be useful for the formation of the sense of connectedness. Recently, Holzer et al. (2021) suggested similar online education tools to promote connectedness between students during the pandemic.

Online discussions with the lecturers and synchronous video lectures were found to be negatively related to the stress level of the university students. Sun et al. (2020) mentioned that Chinese university students reported that lecturers provide positive energy to them in their online lectures which help them to deal with stress resulted from quarantine. The findings of the present study supported this relationship further and extended it to a new cultural context.

In general, supporting the previous studies demonstrating the positive relationship between experience with and attitude toward the technology-based education systems (e.g. Abbad et al., 2009; Abdullah & Ward, 2016; Lee et al., 2013), the present findings suggest that the students' use of online education instruments provided by their universities is important for their attitude toward online education. Encouraging students to use these resources might be useful in creating a positive attitude toward online education which might help them to deal with their stress. On the other hand, in a recent study Cicha et al. (2021) demonstrated that the experience of the first-year university students in Poland with the distance learning process has a negative impact on their attitude toward the tools used for it. They attributed this negative relationship to the constant updates of the online learning platforms and procedures. The contradiction between their findings and those of the present study indicated the need for further research on the relationship between the experience with and the attitude towards online education during the pandemic.

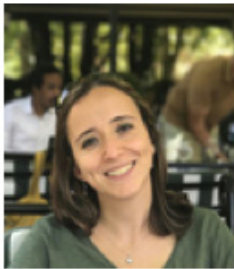
There are only a few studies in literature examining the effect of the pandemics on the education systems (Toquero, 2020). Hodges et al. (2020) stated that the educational systems implemented quickly by the universities as a strategy to prevent the spread of the COVID-19 is different than online education systems in which courses and other educational activities are designed specifically to be online. They called the former one as emergency remote teaching. The findings of the studies examining the educational systems during the COVID-19 pandemic as the present one might provide insight particularly into future emergency remote training programs, but also generally into online education systems. In the past ten years, some of the best universities in the world have changed their teaching methods and increased gradually the number of online courses. It is expected that in 2030, online courses will become more prevalent (Demuyakor, 2020). With this respect, the present study provides clues about the important online education instruments and their relationship to students' attitude toward online education.

The present study has several limitations. First of all, because of the unequal gender distribution in the sample male and female students' stress levels and attitudes cannot be compared although a recent study by Cuiyan Wang et al. (2020) showed that females experience more stress than males during the COVID-19 outbreak. Moreover, the data were collected almost one and a half months after the start of online education from mostly undergraduate students of middle and high socioeconomic background. With time and experience, the level of stress and the attitude toward online education might change. Students from disadvantaged backgrounds might experience financial and technical difficulties to have access to devices, internet connection and software necessary for online education (Alipio, 2020). These possibilities restrict the generalizability of the present findings. In addition, some other factors which might contribute to the students' well-being such as their resilience level and social support available to them, and factors which

might be related to the attitude toward online education such as previous courses taken online, technological problems which make engaging in online education difficult were not included and controlled. Moreover, the present study was a survey research in which data are based on the self-report of the participants and causal relationships can not be derived.

To sum up, examining the effect of COVID-19 pandemic on non-infected individuals is important. The present study focused on one specific group of individuals namely the university students which were reported to constitute one of the risk groups to experience stress during COVID-19 because of the shift from face-to-face education to online education. It demonstrated that having positive attitudes toward the effectiveness of online education is related to lower stress level. Moreover, it suggested that the frequency of the use of online education tools is related to the attitude toward the effectiveness of online education and its perception as a means for connectedness.

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A SYSTEMATIC REVIEW STUDY ON EDUCATIONAL TECHNOLOGY AND DISTANCE EDUCATION: THE CASE OF TURKEY

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ABSTRACT

In this study, the purpose was to reveal the content analysis of master's theses and doctoral dissertations in the field of CEIT between 2018-2020. The field of CEIT could be said to cover the fields of educational technology and distance education. A total of 156 master's theses and dissertations were examined in order to identify the keywords, academic discipline, research areas, theoretical frameworks, research designs and models, variables and related institutions. According to the research findings, it was seen that quantitative methods were mostly used in the theses and dissertations examined and that mixed methods were used in master's theses more than in doctoral dissertations. In addition, it was revealed that few of the theses and dissertations had theoretical foundations. K-12 students were mostly preferred as the type of participant, and scales and interviews were most popular as data collection tools. Moreover, the variables of academic performance and effectiveness were mostly used as dependent variables. The present study, which conducted systematic content analysis of master's and doctoral dissertations in the field of CEIT, is thought to be important in terms of revealing the current situation in the fields of Educational Technology and Distance Education and determining the research trends.

Keywords: CEIT, dissertations, distance education, educational technology, master thesis, systematic content analysis.

INTRODUCTION

Especially in the past few years, the changes in technology have put it in the center of all forms of teaching, yet in fact, the role of technology in education is claimed to date back to 500 B.C (Saettler, 1990). Although it has such a long history, it could be stated that the concept of Educational Technology (ET) has shown a rapid change especially depending on the development of computers. With the implementation of these rapid changes in the field of education, the concept of ET has started to become popular. There are many studies indicating that the concept of Instructional Technologies (IT) is used in similar meanings along with the concept of ET (Azimi & Fazelian, 2013; Gedik, 2017; Lakhana, 2014). In 2007, Association for Educational Communications and Technology (AECT) described the label of Educational Technology (ET) as follows: ET refers to the study and ethical implementation of facilitating learning and improving performance by developing, using, and administrating suitable technological processes and resources (Richey et al., 2008).

The concept of ET in Turkey could be said to have occurred in higher education with the establishment of the department of Computer Education and Instructional Technology (CEIT) and with the admission of its first undergraduate students (Durak et al., 2018). Although it seems it was separate from distance education (DE) in the past, it could be stated that today, the field of educational technology has become an area integrated with distance education. Early Multimedia educational software used in the past has now been replaced by educational software running on the Internet. This situation has begun to completely change the field of CEIT and has especially reflected in the postgraduate publications of the field. As it is known, the post-graduate level includes master's and doctorate degrees. Master's degree education can be regarded as education which allows undergraduate students to advance their education level by developing themselves and gaining experience. Doctorate education, on the other hand, includes studies which are more professional and more in-depth, and which contribute more to the relevant field. Therefore, it could be stated that in order to evaluate the postgraduate studies in the related field as a whole, it is necessary to focus on master's and doctoral studies together.

Considering the field of CEIT as a whole, its being large with a wide variety of studies make it difficult to follow current trends and to trace where the field has come from historically. Therefore, studies that reveal the historical development of educational technologies and distance education and the current trends in these areas are of great importance, and these studies provide teachers, administrators and researchers insights into these issues (Durak et al., 2018). The purpose of this study was to conduct systematic review of master's theses and doctoral dissertations carried out in the fields of CEIT in the last three years in Turkey. For this reason, the focus was more on helping people interested in educational technology and distance education in Turkey as well as on having these people more prepared for the probable difficulties in their future studies. In this respect, the relevant studies were analyzed in terms of various variables and compared with the findings of other studies in the literature; finally, the trends in the related topics were determined. In the study, the reasons for choosing the last 3 years were as follows: It was an important factor that Durak et al., in their study in 2018, examined the doctoral dissertations conducted in the same field until 2016. In addition, when the content analyzes conducted in the field in the literature were examined, it was seen that these studies generally covered the year 2018 and before; that mostly master's theses were examined; and that the studies examining master's and doctoral dissertations together were limited in number. Considering the fact that the up-to-dateness of studies conducted in a field like CEIT is extremely important, it could be stated that it would be valuable to conduct a content analysis on up-to-date studies conducted in the last three years.

Figure 1 presents a graph related to the studies conducted in the fields of ET and DE in the WOS database in the last 10 years.

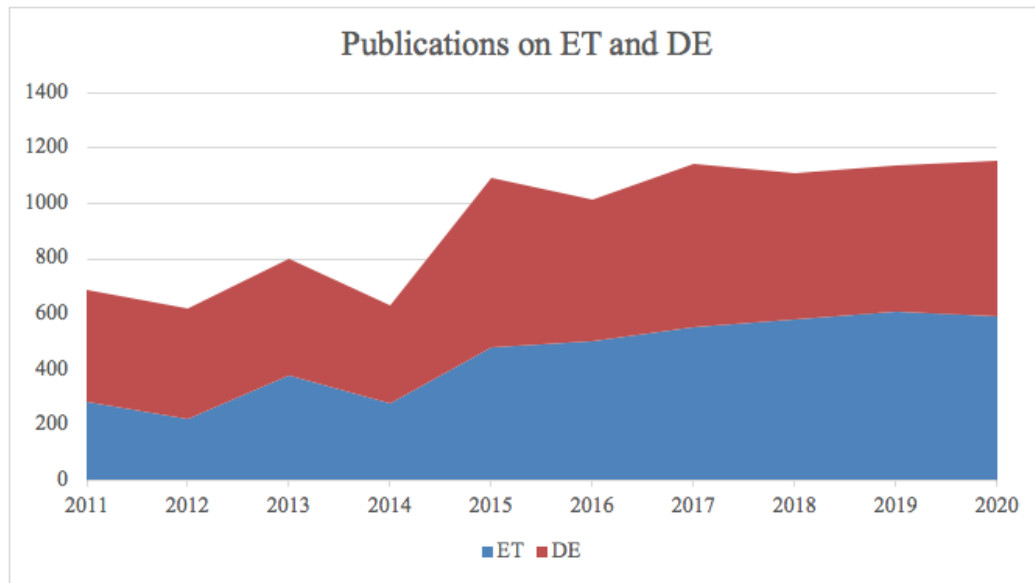


Figure 1. Number of Papers (ET & DE) in Web of Science Database

According to Figure 1, there has been an increase in the number of scientific studies on ET and DE over the years. This situation could be said to indicate that ET and DE are getting increasingly important and that they will be an inevitable part of education. The fact that CEIT is the only discipline hosting these two areas in Turkey could be said to increase the importance of analyzing the studies in this discipline. In this study, a total of 131 master's theses and 31 doctoral dissertations were examined in order to determine keywords, academic discipline, research areas, theoretical frameworks, research designs and models, variables and related institutions. In this respect, it is thought that the study examining master's and doctoral dissertations is important in terms of revealing the current situation in the field of CEIT and determining the research trends.

Within the main objective of the study the following research questions were considered:

What are the most frequent/ly

- Generated keywords,
- Chosen academic discipline,
- Chosen research areas,
- Emphasized theoretical frameworks,
- Chosen research designs and models,
- Used data collection tools,
- Targeted participant groups,
- Focused variables,
- Related institutions

in the field of CEIT between 2018-2020.

REVIEW OF LITERATURE

As a result of the literature review conducted within the scope of this study, many content analysis studies on Educational Technology, Distance Learning and other concepts considered to belong to these fields were found. Table 1 summarizes the distribution of the studies between 2009 and 2020 according to the outstanding findings, years, number of studies and research topics.

Table 1. Studies in the literature by authors / highlights / years/ number of studies & types and topics

Author(s)	Highlights of the Research Findings	Years	Number of papers / Types *	Research Topics
(Alper & Gulbahar, 2009)	Method: Quantitative Data collection tool: Questionnaire Dependent variables: Master	2003-2007	187 A	Educational Technologies
(Simsek et al., 2008)	Method: Qualitative Data collection tool: Achievement Test	1996-2006	64 MT	Educational Technologies
(Erdogmus & Cagiltay, 2009)	Model: Experimental design Participant type: K12 Student-2008	248 MT + D	Educational Technologies
(Kurt et al., 2009)	Method: Quantitative Participant type: Undergraduate Student	2002-2008	106 MT + D	Instructional Technologies
(Bozkaya et al., 2012)	Method: Quantitative Data collection tool: Questionnaire Participant type: Undergraduate Student	2008-2011	273 A	Educational Technologies
(Goktas et al., 2012)	Participant type: Undergraduate Student	2000-2009	32 A	Educational Technologies
(Celik, 2016)	Method: Quantitative Data collection tool: Questionnaire	2003-2015	100 D	Innovation
(Kilic-Cakmak et al., 2016)	Method: Qualitative Data collection tool: Questionnaire Participant type: Undergraduate Student	2014		Educational Technologies
(Durak ve digerleri, 2017)	Method: Quantitative Data collection tool: Questionnaire Participant type: Undergraduate Student	1986-2015	285 MT	Distance Learning
(Ozerbas & Egin, 2017)	Method: Qualitative Data collection tool: Questionnaire/Scale Participant type: K12- Teacher	2010-2015	361 A	Educational Technologies
(Akbaba et al., 2018)	Method: Quantitative Data collection tool: Questionnaire Participant type: Undergraduate Student	2010-2013	142 MT + D + A	Information Technologies
(Durak & Cankaya, 2018)	Method: Quantitative Data collection tool: Interview Participant type: K12 Student	2009-2018	58 A	Seamless Learning
(Durak et al., 2018)	Method: Mixed Dependent variables: Attitude/Achievement Data collection tool: Questionnaire/Scale/ Interview	2005-2015	222 D	Educational Technologies
(Kunduracioglu & Durak, 2018)	Method: Quantitative Data collection tool: Focus Group Participant type: Undergraduate Student	2011-2017	34 MT	Gamification in education
(Oztop & Ozerbas, 2018)	Method: Quantitative Model: Document Analysis Data collection tool: Achievement Test Participant type: K12 Student	2005-2018	51 MT	Digital Subject Supported Education
(Sari & Taser, 2018)	Method: Mixed Model: Survey Data collection tool: Scale Participant type: K12 Student	2004-2017	16 MT + D	Digital Citizenship
(Altinpulluk, 2018)	Method: Mixed Data collection tool: Achievement Test Participant type: Undergraduate Student	2007-2016	40 MT + D	Augmented Reality
(Dasdemir et al., 2018)	Method: Quantitative Data collection tool: Achievement Test Participant type: K12 Student	2012-2017	51 MT + A	STEM
(Bozkurt et al., 2019)	Method: Qualitative	2014-2016	738 A	STEM
(Ozen & Baran, 2019)	Method: Qualitative	2016-2018	4335 MT + D	Distance Learning

(Sunger, 2019)	Model: Design Based Data collection tool: Interview Participant type: K12 Student	2009-2018	54 MT + D	Augmented Reality
(Tosuntas et al., 2019)	Method: Quantitative Model: Survey Data collection tool: Scale	2013-2018	148 MT	Education and Instructional Technologies
(Uygun & Sonmez, 2019)	Method: Quantitative Data collection tool: Achievement Test Participant type: Undergraduate Student	2010-2017	31 MT + D + A	Mobile Learning
(Aydin et al., 2019)	Method: Quantitative Model: Survey Participant type: K12 Student	2002-2018	81 MT	Distance Learning
(Durak & Cankaya, 2020)	Method: Qualitative Data collection tool: Questionnaire Participant type: Undergraduate Student	2010-2019	180 A	Distance Learning
(Tongel et al., 2020)	Method: Quantitative Model: Survey Participant type: Undergraduate Student	2013-2018	206 MT + D	Media and Student
(Yildiz et al., 2020)	Method: Quantitative Model: Survey Participant type: Undergraduate Student	2015-2020	15	Educational Technologies
(Konan, 2020)	Method: Quantitative Data collection tool: Questionnaire/Scale	2009-2019	94 A	Programming Teaching

When Table 1 was examined, it was seen that in more than half of the 28 review studies submitted, quantitative methods took the first place. This was followed by qualitative and mixed methods. When evaluated in terms of the data tools, it was seen that questionnaire, scale and achievement tests were mostly used in the review studies. When the studies were examined with respect to the samples' levels, it was found that undergraduate students ranked first in about half of the studies, which was followed by K12 and master's students.

METHOD

This study, which was conducted to determine the trends in master's theses and dissertations published in the field of CEIT (ET + DE) in Turkey between 2018-2020, was carried out with the systematic content analysis method. The database of Turkish Council of Higher Education (TCHE) was used to reach the master's theses and dissertations. TCHE has an electronic database including all the M.A. theses and dissertations conducted in Turkey till the time of the study, and the database is accessible to all researchers. For the theses and dissertations examined within the scope of the study, a search was done within the framework of the following criteria.

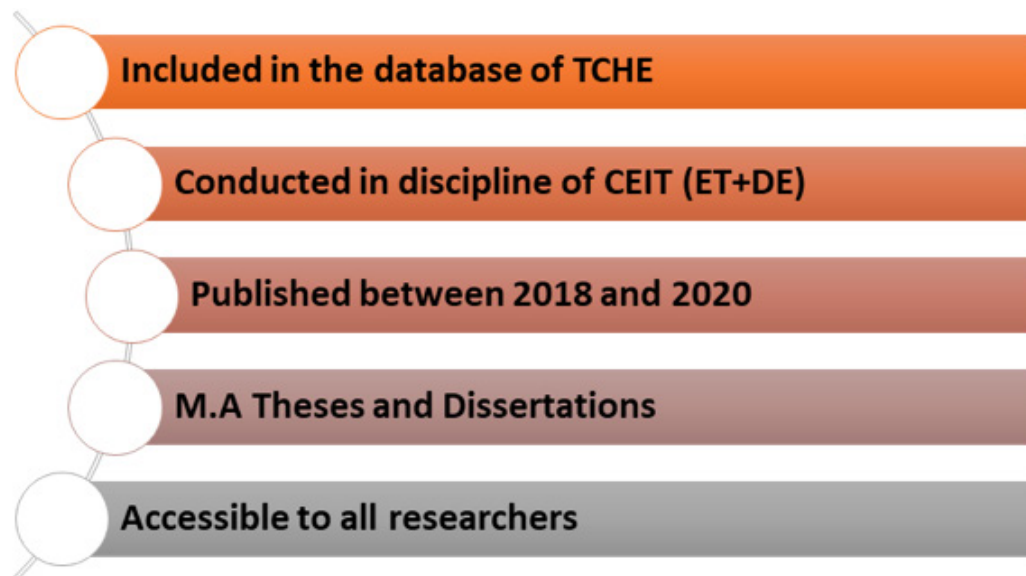


Figure 2. Search Criteria used in the study

After the search criteria of the study were determined, the filtering options in Figure 3 were used to reach the studies in TCHE database on which content analysis would be conducted, and the master's theses and doctoral dissertations to be examined in the study were reached. W

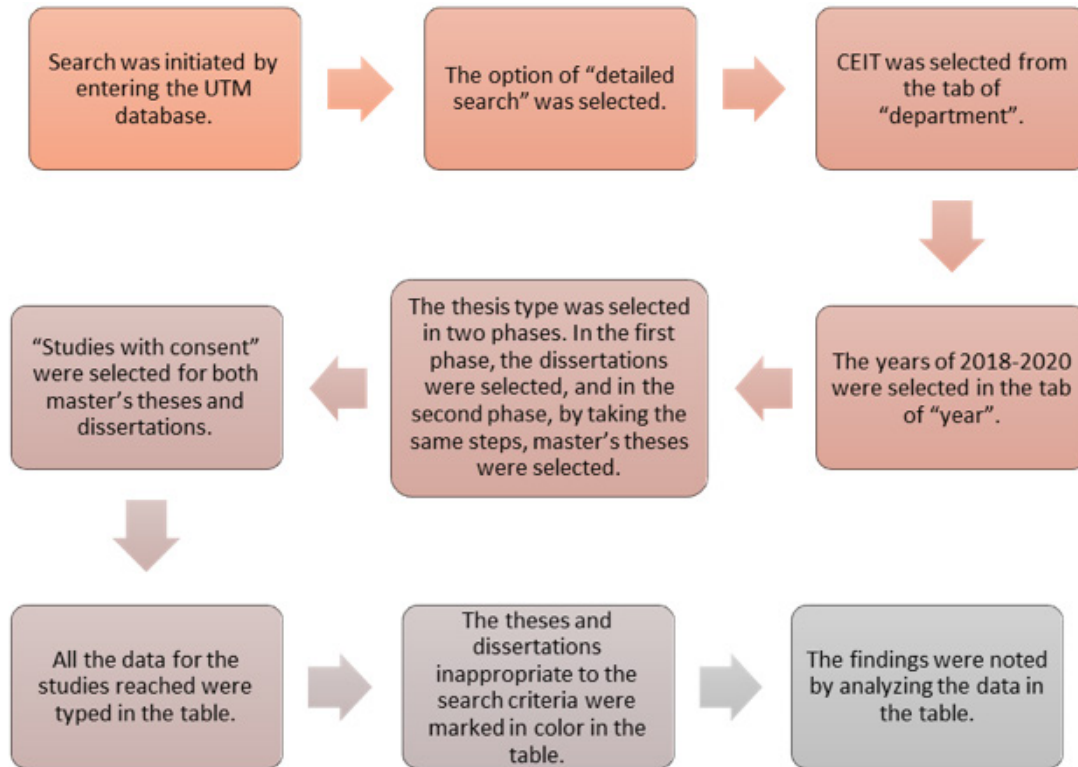


Figure 3. The Overall Process of Systematic Content Analysis

As a result of the search, 131 master's theses and 31 dissertations were reached. For various reasons, six theses were excluded from the study. Of all the 156 theses and dissertations obtained, 11 were written in English while 145 were written in Turkish. The related theses and dissertations were examined in terms of keywords, academic discipline, research areas, theoretical frameworks, research designs and models, variables, relevant institutions and data analysis methods. Descriptive statistics for the variables were examined with percentage and frequency values. These statistics were then interpreted in comparison with the results of similar studies in the literature.

Reliability

The master's theses and doctoral dissertations reached as a result of the search were put in a table according to the determined criteria in online environment. Each researcher analyzed the theses and dissertations separately and transferred their results to the table. Later, the data in the table prepared by the researchers were compared to identify the differences, and the related theses and dissertations were examined again. As a result, the inter-rater reliability of the coding was $K = .890$. According to Altman (1991), the extent of agreement for Cohen's kappa can be qualified as very good (0.81 to 1.00). Therefore, the reliability of raters can be considered to be very good. Content analysis was completed arriving at a consensus on all the findings.

FINDINGS AND DISCUSSION

This section presents the findings regarding keywords, academic discipline, research areas, theoretical frameworks, research designs and models, variables and the ordering of relevant institutions. At the same time, comparisons of the findings with those of other studies in the literature was interpreted.

Keywords

The keywords used in a total of 156 theses and dissertations examined within the scope of the research were analyzed. It was seen that 347 different keywords were used in the theses and dissertations examined. The most frequent keywords are given in Figure 4.



Figure 4. Most frequent keywords

When Figure 4 was examined, it was seen that the most frequently used word in master's theses and doctoral dissertations was Achievement. Achievement, Attitude, Online Learning, Computational Thinking and Programming were the top five keywords among the most used keywords. The fact that these keywords were among the frequently used keywords in the field of CEIT (ET + DE) could not be said to be surprising.

Academic Discipline

It was seen that the master's theses and doctoral dissertations within the scope of the study took place in four different disciplines. Table 2 presents the related disciplines.

Table 2. Distribution by Academic Disciplines

Discipline*	f	%
Education and Training	146	%93,59
Science and Technology	8	%5,13
Computer Science and Control	1	%0,64
Information and Document Management	1	%0,64

* *The names of the academic disciplines belong to TCHE*

According to Table 2, most of the studies were conducted in the field of “Education and Training”. This finding was not surprising due to the content analysis of the theses and dissertations made in the field of CEIT. These findings could be said to be largely consistent with those of a study conducted by Durak et.al, (2018).

Participants

Table 3 shows the number and percentage analyses of the participant groups in the theses and dissertations included in the study. At the same time, the sample sizes of each participant group are presented as min-max values.

Table 3. Participants

Participants	Frequency	Percentage	Sample Size
K12 Students	75	%40	3 – 19166
Undergraduate Students	37	%19	10 – 24220
K12 Teachers	34	%18	2 – 3804
Academicians	10	%5	7 – 258
Experts	8	%4	7 – 35
Institutions	7	%4	1 – 126
Adult	2	%1	15 – 865
K12 Administrator	2	%1	5 – 188
Others	15	%8	
TOTAL	190	%100	

**One study may employ more than one target group*

When Table 3 is examined, it is seen that K12 students (40%), undergraduate students (19%) and K12 teachers (18%) took the first three places. These three types of participants correspond to a very large part of the total participants. The participant types in the review studies conducted in the literature (Akbaba et al., 2018; Altinpulluk, 2018; Aydin et al., 2019; Bozkaya et al., 2012; Dasdemir et al., 2018; Durak & **Cankaya**, 2018; Durak & **Cankaya**, 2020; Durak et al., 2017; Erdogmus & **Cagiltay**, 2009; Kunduracioglu & Durak, 2018; Kurt et al., 2009; **Ozerbas** & Egin, 2017; **Oztop** & **Ozerbas**, 2018; Sari & Taser, 2018; Sunger, 2019; Tongel et al., 2020; Uygun & Sonmez, 2019; Yildiz et al., 2020) were similar to those in the present study. The data of the theses and dissertations with samples including document analysis and with samples including associate degree students, parents, master's students, employees, orthopedically disabled individuals and application users, who were all used only once as a participant type, were gathered in the group named "Others" (8%).

Data Collection Tools

The number and percentage analyses of the data collection tools in the theses and dissertations included in the scope of the study are given in Table 4.

Table 4. Data Collection Tools

Data Collection Tools	Frequency	Percentage
Scale	87	%27
Interview	64	%20
Pre-test Post-test	48	%15
Questionnaire	42	%13
Observation	16	%5
Academic Achievement Test	14	%4
Document Analysis	6	%2
Log	4	%1
Focus Group	4	%1
Web Page Analysis	2	%1
Other	35	%11
Total	322	%100

**One study may employ more than one data collection tools*

When the data in Table 4 were examined, it was seen that scale (27%), interview (20%) and pre-test and post-test (15%) were among the top three data collection tools used. In related literature, there were also some other studies supporting these findings (Durak and Cankaya, 2018; Durak et al., 2018; Konan, 2020; Ozerbas & Egin, 2017; Sari & Taser, 2018; Sunger, 2019). However, it was generally seen in the review studies that questionnaire was the most used data collection tool.

Data collection tools such as spatial visualization and mental rotation test, class participation inventory, application reliability form, material evaluation form, social validity form, robotic satisfaction test and screen-shot data which were used only once were gathered in the category of “Other” (n=35).

Leading Contributor Institutions

In relation to the theses and dissertations considered within the scope of the analysis, Figure 5 presents the number of studies of the first 10 universities which conducted the highest number of studies.

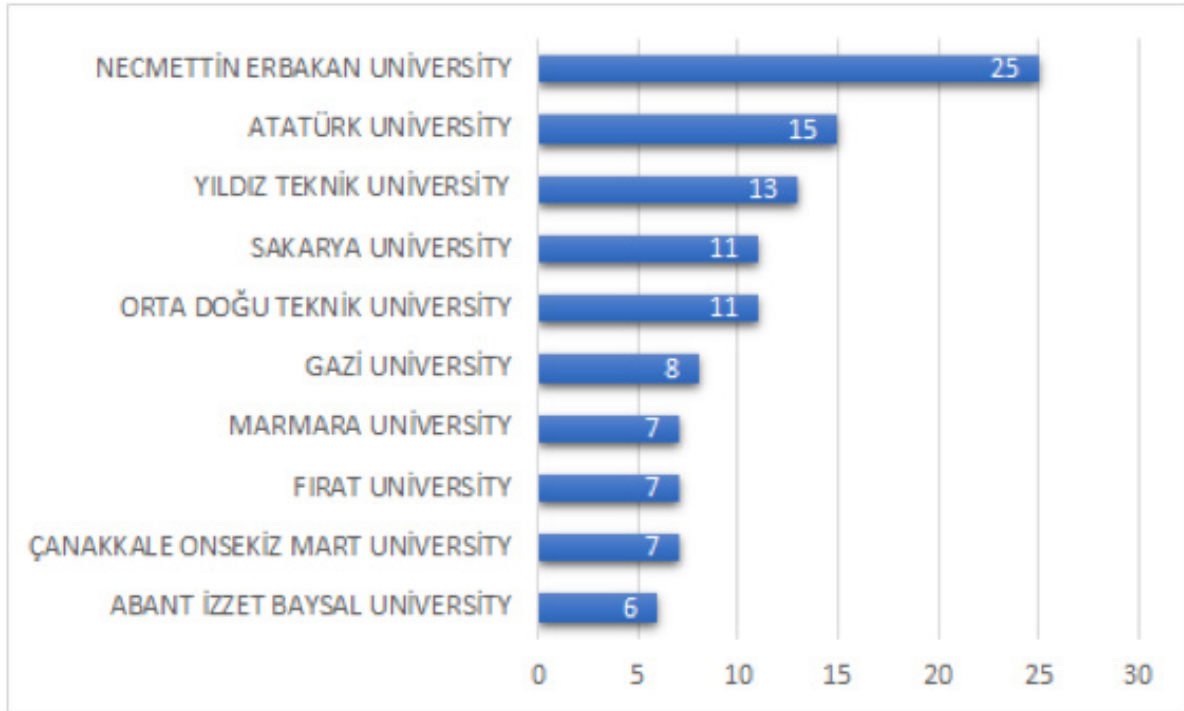


Figure 5. Leading Contributor Institutions

When the data in Figure 5 were examined, it was seen that of all the 156 studies, 25 of them were conducted at Necmettin Erbakan University, 15 of them at Ataturk University and 13 of them at Yildiz Technical University. It was an important finding that Necmettin Erbakan University, which was in the top rank, had a large share in post-graduate theses and dissertations despite being a new university established in 2010. The other universities in the list were among the universities that were included in previous review studies (Durak et al., 2018).

Tests and Analysis

Table 5 shows the number and percentage analyses of the analysis techniques in the theses and dissertations included in the scope of present study.

Table 5. Tests and Analysis

QUANTITATIVE Statistical Tests					
Descriptive (%38)		Inferential (%62)			
		Parametric (%77)		Non-Parametric (%23)	
Central Tendency (Mean/ Median/Mode)	96	t-test	78	Chi-square	29
Relative Standing (Percentage/z-score)	81	Variance Analysis (Anova/Manova/ Mancova)	54	Mann Whitney U	39
Variability (Variance/Standard Deviation/ Range)	99	Reliability Analysis (Cronbach'a Alfa)	65	Wilcoxon Test	14
Descriptive Statistics (Non- Specified)	11	Correlation (Pearson)	75	Kruskal Wallis	23
		Factor Analysis (Confirmatory/ Exploratory)	50		
		Regression Analysis	29		
		Structural Equation Modeling (SEM)	8		

When the data in Table 5 were examined, it was seen that the most used analysis method in descriptive analysis methods was included in the variability category consisting of the analyses of "Variance, Standard Deviation, Range" (n = 99). The most used analysis method in parametric analysis methods was T-test (n = 78), while the least used analysis method was the Structural Equation Model (n = 8). These findings were in line with the findings of other studies in the literature (Durak et al., 2018; Goktas et al., 2012; Kilic-Cakmak et al., 2013; Kurt et al., 2009; **Simsek** et al., 2008, 2009). The most used analysis method in non-parametric analysis methods was Mann Whitney U (n = 39), while the least used analysis method was Wilcoxon Test (n = 14).

Variables/Research Interests

The theses and dissertations examined in the study were categorized as dependent variables and listed according to frequency and percentages as shown in Table 6.

Table 6. Variables/Research Interests

Variables/Research Interests	Frequency	Percentage
Academic-Performance	45	%20,4
Effectiveness	30	%13,6
Perception	27	%12,2
Attitude	21	%9,5
Self-Efficacy	15	%6,8
Motivation	8	%3,6
Usability	7	%3,2
Addiction	7	%3,2
Opinion	7	%3,2
Competence	6	%2,7
Behavior	4	%1,8
Readiness	4	%1,8
Other	40	%18,1
Total	221	%100

When the dependent variables in Table 6 were examined, it was seen that the variables of Academic-performance (20.4%), Effectiveness (13.6%) and Perception (12.2%) variables were in the first three places. These three dependent variables correspond to approximately half of the total variables. These findings were also similar to the findings of the study conducted by Durak et al. (2018). Variables such as level of developing coding skills, Internet use, Digital Citizenship level and self-learning level, which were used three times or less as dependent variables, were collected in the category of “Other” (18.1%).

Theoretical/Conceptual Framework

When Figure 6 was examined, it was seen that the most used theoretical foundation in the master’s theses and doctoral dissertations included in the scope of the present study was Cognitive Load Theory and Motivation Theory. These theories were followed by Computational Thinking, Diffusion of Innovation Theory, Multimedia Learning Theory, Project Based Learning and Social Cognitive Theory. However, only 12% of 156 theses and dissertations examined had a theoretical foundation. This situation is parallel to the findings of a study conducted by Durak et.al (2018), who revealed that not many theoretical foundations were used in the master’s theses and doctoral dissertations in the field of CEIT. Considering that the related study examined the theses and dissertations conducted until 2016, these results could imply that there is no change in the theses and dissertations conducted recently and that most of the theses and dissertations did not include any theoretical foundation at all.



Figure 6. Theoretical/Conceptual Framework

Research Design

Table 7 presents the percentage analyses of research methods and research designs in the theses and dissertations included in the present study.

Table 7. Research Method and Design

Method	f	%	Model/Design	f	% CUM	% TOTAL
Quantative	84	53,85	Survey	47	56	30,13
			Experimental	29	34,5	18,59
			Causal Comparative	0	0	0
			Correlational	7	8,3	4,49
			Meta-analysis	1	1,2	0,64
Qualitative	26	16,67	Case Study	20	76,9	12,82
			Content Analysis	1	3,8	0,64
			Ethnography	1	3,8	0,64
			Descriptive	0	0	0
			Phenomenology	3	11,5	1,92
			Grounded Theory	0	0	0
			Narrative	0	0	0
			Meta-Synthesis	1	3,8	0,64
			Delphi	0	0	0
			Historical	0	0	0
			Heuristic	0	0	0
			Discourse analysis	0	0	0
Mixed	40	25,64	Explanatory sequential	21	52,5	13,46
			Embedded	4	10	2,56
			Convergent Parallel	11	27,5	7,05
			Exploratory Sequential	3	7,5	1,92
			Multiphase	1	2,5	0,64
			Transformative	0	0	0
Conceptual/Descriptive /Other	0	0	Opinion Paper	0	0	0
			Literature Review	0	0	0
			Report	0	0	0
			Reflection Paper	0	0	0
			Comparative	0	0	0
			Technical Paper	0	0	0
			Position Paper	0	0	0
			Field Notes	0	0	0
			Narrative Review	0	0	0
			Systematic Review	0	0	0
Practice Based	5	3,21	Design Based Research	5	100	3,21
			Action Research	0	0	0
Data Mining and Analysis	1	0,64	Learning Analytics	0	0	0
			Social Network Analysis	0	0	0
			Text Mining	1	100	0,64
			Log Analysis	0	0	0
			Internet and Traffic Ranks	0	0	0

When the data in Table 7 were examined, it was seen that Quantitative ($n = 84$) methods were used in more than half of the theses and dissertations (53.85%) conducted in the field of CEIT. Quantitative methods were followed by Mixed ($n=40$) methods with 25.64% and qualitative ($n=26$) methods with 16.67%. Many studies conducted in the literature which preferred quantitative methods more (Akbaba et al., 2018; Alper and Gulbahar, 2009; Aydin et al., 2019; Bozkaya et.al., 2012; Celik, 2016; Dasdemir et.al., (2018); Durak and Cankaya, 2018; Durak et.al., 2018; Erdogmus and Cagiltay, 2009; Konan, 2020; Kunduracioglu and Durak, 2018; Kurt et.al., 2009; Oztop and Ozerbas, 2018; Tosuntas et al., 2019; Tongel et al., 2020; Uygun & Sonmez, 2019; Yildiz et al., 2020) support the present study. Among the master's theses and doctoral dissertations examined, apart from these three methods, Practice Based was used in five theses/dissertations and Data Mining and Analysis was used in one thesis/dissertation. Conceptual/Descriptive/Other methods were not found in any of the theses or dissertations.

In the studies conducted with the quantitative method, the most common design was the survey with 56% (n = 47), which was followed by the experimental design with 36%. In addition, it was seen that in this group, the meta-analysis design (n = 1) was used least with 1.2% and that the causal comparative design was not used. These findings are similar to those obtained in other review studies conducted in the literature (Aydin et al., 2019; Celik, 2016; Erdogmus & Cagiltay, 2009; Goktas et al., 2012; Kilic-Cakmak et al., 2013; Kurt et al., 2009; Sari & Taser, 2018; Simsek et al., 2008; Tosuntas et al., 2019; Tongel et al., 2020; Yildiz et al., 2020).

It was revealed that the case study method (77%) was used in most of the studies conducted with the qualitative method. Among the few other designs, Phenomenology (11.5%) and content analysis (n = 1), meta-synthesis (n = 1) and ethnography (n = 1) were used with 3.8%. The analysis conducted in the present study demonstrated that the descriptive, grounded theory, narrative, delphi, historical, heuristic, discourse analysis designs were not used. In the study carried out by Durak et al. (2018), it was seen as in the present study that the case study method was preferred most among qualitative methods.

In studies conducted with mixed methods, it was observed that the explanatory sequential design (n = 21) was used most with 52.5% and that the multiphase design (n = 1) was used least with 2.5%. In the review studies conducted in the related literature (Bozkurt et al., 2019; Durak & Cankaya, 2018; Kunduracioglu & Durak, 2018), the Explanatory sequential method was the most common method among mixed methods. Explanatory sequential design was followed by convergent parallel design (n = 11) with 27.5%. As a result of the theses and dissertations examined, it was seen that the transformative design was not used.

Among the theses and dissertations examined, it was seen that only the design-based research design (n = 5) was used among the designs in the Practice based method. Only the text (data) mining design (n = 1) was used among the designs within the scope of the data mining and analysis method. It was revealed that the designs of literature review, position paper, opinion paper, report, field notes, comparative, reflection paper, systematic review, technical papers and narrative review were not used within the scope of Conceptual/ Descriptive/Other methods.

The graph in Figure 6 was obtained when the methodology parts of the master's theses and dissertations examined.

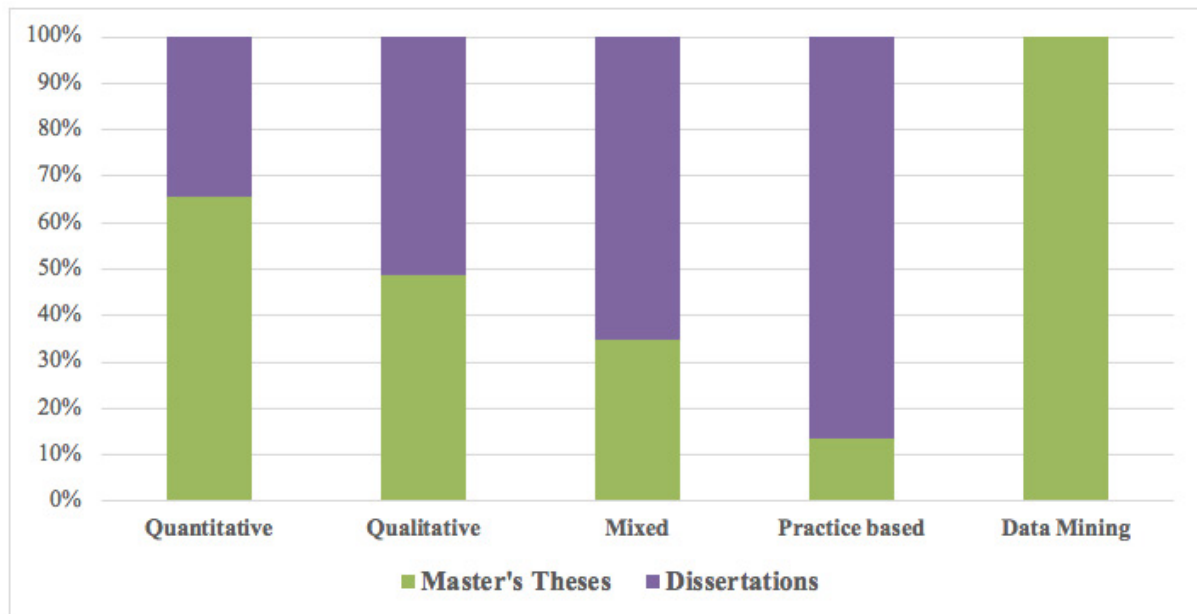


Figure 7. The distribution of research methods according to master's theses and dissertations.

According to Figure 6, quantitative methods were preferred more frequently in master's theses than in doctoral dissertations. This ratio was equivalent to each other in qualitative methods; however, when analyzed in terms of mixed methods, mixed methods were used much more in doctoral dissertations. Similarly, in

terms of practice-based methods, the ratio was higher for the doctoral dissertations. Looking at the graph in general, it could be stated that methods especially like mixed methods and practice-based methods requiring more effort than other methods were preferred in the dissertations.

When the models and designs used in a total of 156 theses and dissertations included in the scope of the present study were examined as a whole, it was seen that survey with 30.13% and experimental design with 19% constituted almost half of the total theses and dissertations. These two designs were followed by the mixed method of explanatory sequential with 13.5% and by the qualitative method of case study with 12.8%.

Limitations and Strength

Within the scope of this study, the TCHE database was searched, and 162 master's theses and doctoral dissertations with access permission which were related to the research topic examined were reached. In terms of the research topic, two studies outside of the field of education, three studies that were not conducted in the Department of CEIT and one study that did not meet the criteria were excluded from the study. The fact that the theses and dissertations without access permission were not included in the scope of the present study and that only the theses and dissertations conducted in the last three years were examined could be regarded as a limitation of our study.

This study is considered important since it tried to reveal the current situation of studies conducted in the fields of Educational Technology and distance education in Turkey by systematically examining master's theses and doctoral dissertations conducted in the last three years in the country. In this respect, it is thought that the findings of the study will be a guide for future research.

CONCLUSION

This study involves systematic analysis of master's theses and doctoral dissertations conducted in Turkey in the field of CEIT, which gathers the areas of Educational Technology and Distance Education. These theses and dissertations were systematically examined in terms of keywords, academic discipline, research areas, theoretical frameworks, research designs and models, variables and determining the related institutions. Out of 162 theses and dissertations in total, six were excluded for various reasons, and the study was carried out with 156 theses and dissertations. When the theses analyzed were examined in terms of "Keywords", it was seen that the concept of "Achievement" was prominent. This concept was followed by "Attitude" and "Online learning". Based on the fact that these three keywords had almost the same distribution in the theses and dissertations, it could be stated that the CEIT field can be considered as a unifying field of educational technology and distance education. When evaluated in terms of theoretical foundations, it was found that theoretical foundations were used in a small portion of the theses and dissertations (13%). This is not a desired situation in postgraduate studies. According to Maxwell (2013), the use of the theory helps the researcher refine goals, develop research questions, discern methodological choices, identify potential threats to validity and demonstrate the relevance of the research. In the study conducted by Durak et al. (2018), the rate of theoretical foundations used in doctoral dissertations had a value of 46%, while in this study examining master's theses and doctoral dissertations conducted in the same field for the last 3 years, it was seen that this rate increased to 13%. In order to clarify this situation, it could be sadly stated that the theoretical foundations in the field of CEIT are used less and less in postgraduate education.

When looking at the research methods in the master's theses and dissertations, it was seen that quantitative methods were used most. This was followed by mixed/triangulation methods and qualitative methods. Almost all of the theses were designed with these three methods. While quantitative methods were mostly preferred in master's theses, mixed methods are favored more in doctoral dissertations. In terms of the practice-based methods that were included in a small number of theses, the situation was in more favor of doctoral dissertations. In general, it was not surprising that methods requiring more effort and expertise were used in doctoral dissertations, especially when compared to other methods such as "mixed" methods and "practice-based" methods. This result is supported by the result of a study conducted by Durak et al. (2018),

who reported that mixed methods were used most in doctoral dissertations in the same field.

When research methods, keywords and dependent variables were evaluated together, it was easily seen that the quantitative methods' taking the first place had a natural relationship with more use of keywords like "achievement" and "attitude" and more use of dependent variables like academic-performance and effectiveness. Another result that will support this relationship is that scale and pretest-posttest were preferred among the most used data collection tools.

The most preferred participant group in the studies included K-12 students. K-12 students were followed by graduate students and K-12 teachers. It could be stated that it was an unexpected result for K-12 students to be in the first place. It is known that obtaining the necessary permissions for studies on K-12 students is much more challenging than for studies on undergraduate students.

In this study, which examined the master's theses and dissertations conducted in the last three years, it was seen that there was a gradually decreasing trend by year when the number of the theses and dissertations was analyzed. The ratios were 65% for 2018, 20% for 2019 and 15% for 2020. Among the reasons for this decrease could be said to include reduction in the number of students in the department of CEIT in Turkey and the decline in the number of master's students accordingly. Another reason for the decline in 2020 could be the influence of the pandemic. Since not all educational institutions in the country have been able to provide face-to-face education for a long time, it could be thought that researchers might have difficulty in completing their theses. Finally, in this study, the universities where the theses were conducted were listed under the title of "leading contributors". Of all the 156 studies, 25 of them were conducted at Necmettin Erbakan University, 15 at Ataturk University and 13 at Yildiz Technical University, and these universities were the first three. Especially Necmettin Erbakan University was not expected to be in the first place. Based on this situation, it could be stated that the related department of the university established in 2010 was very active in postgraduate studies.

Based on the findings of this research, the following implications could be taken into consideration in future studies:

- It will be beneficial for researchers to benefit from the findings of our study in their thesis studies in the fields of Educational Technology or Distance Education, which will make it possible to see the trends in these fields,
- This study examined only the master's theses and doctoral dissertations conducted in the last three years. This time period can be further extended with the participation of wider groups of researchers.
- Researchers are recommended to conduct studies comparing the results of review studies in the literature.
- When the master's theses and dissertations examined were evaluated in terms of methodology, it was seen that quantitative methods were generally used in MTs and mixed methods and practice-based methods more frequently in Dissertations. The use of more mixed methods in master's theses is thought to allow getting a deeper understanding and more robust research results. In this respect, thesis supervisors could direct their students towards mixed methods.
- It is not a desirable situation that among the 156 master's thesis and dissertations, only 13% of them had a theoretical foundation. In future studies, the fact that both researchers and thesis supervisors base their theses on a theoretical foundation will provide better-quality and more valid thesis studies.
- In the theses examined within the scope of the present study, it was seen that the participants mostly belonged to the K12 student group. It could be stated that studies focusing on different participants are necessary to reach broader and diverse findings in the fields of CEIT (ET + DE).
- Lastly, it is thought that universities should encourage both practical and theoretical research in the field of educational technology. In this way, positive developments can be observed in the success, attitude and expectations of students by testing the adaptation of new technologies to education and including appropriate technologies in educational activities.

BIODATA and CONTACT ADDRESSES of AUTHORS



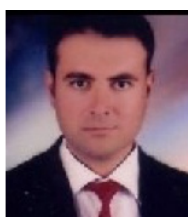
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THE BUTTERFLY EFFECT OF THE DISTANCE LEARNING MA PROGRAM ON CHARACTER AND VALUE EDUCATION AT ANADOLU UNIVERSITY

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ABSTRACT

For individuals who form the society to live in harmony, they need to acquire a set of values such as love, respect, tolerance and honesty. To create a society with individuals having these characteristics, value education should be carefully planned and implemented. Students who study in the Distance Learning MA Program on Character and Value Education, are expected to stimulate various feelings, thoughts, values and behaviours in their families, friends, colleagues and immediate environments, starting from themselves. The aim of this qualitative study is to reveal to what extent the students reflected the outcomes they gained in the program to themselves, their families, immediate environments and the society. The participants were 22 students studying in the Distance Learning MA Program on Character and Value Education at Anadolu University, Turkey. The data were collected through a data-collection form consisting of open-ended questions. Descriptive analysis was performed for data analysis. The results of the study showed that the students who attended the Distance Learning MA Program on Character and Value Education gained certain benefits for themselves, which were also reflected to their families and immediate environments as well as the country and the world. Various suggestions were offered in accordance with the results of the study.

Keywords: Character education, value education, distance learning, butterfly effect.

INTRODUCTION

Today, an observation of the incidents in families, workplaces, schools and communities, and inter-personal relationships shows that major problems are experienced in the society due to the lack of values such as love, respect, tolerance, justice and honesty. Those who throw their rubbish around, harm other's property and life, disrupt public health, use violence against animals, and make a living through corruption, and wars are only some of the examples that highlight the importance of character and value education for a society. In this respect, Mevlana's saying "Teaching wisdom and science to an ill-mannered person is similar to giving a sword to a bandit" emphasises the importance of being well-behaved above all things.

The gradual decrease in human values in social life poses an important threat to the society, and thus, necessary measures should be taken so that the education system can achieve the objective of raising active and responsible people. For individuals who form the society to acquire national and universal values, it is deemed necessary to conduct character and value education in a planned way.

One of the most significant goals of character education is to help people be good. This is a goal that should be achieved within life since the beginning of humankind. As the starting point of education is human existence, the origin of character education should thus be this very existence. In other words, character education is as old as education itself (Lickona, 1993).

Character education is described as a deliberate attempt for developing positive individual traits that affect the ways of thinking, forming attitudes and acting in real life. The word “character” comes from the Greek word “charassein” that means “to mark” or “to overwrite”. The meaning turned into “a distinctive mark” and then to “behavioural pattern of an individual” over time. Character education aims to make a significant contribution to individuals’ ability and ideals to build a good life that is beneficial to them and others (Komalasari and Saripudin, 2018).

The future of a society depends on well-trained people who have a strong character. Since people do not automatically gain a character with good morals, equipping every individual with values that help him/her make moral decisions and act accordingly is among the primary objectives of schools. In this sense, character education can be explained as the development of knowledge, skills and abilities that enable students to make appropriate choices for which they can bear responsibility (Eksi, 2003). Character or value education is an attempt to create educational and supportive constructs in schools to support the development of positive, ethical, social tendencies and competencies in young individuals, including strengthening their academic interests and achievements (Berkowitz, 2011). Value education has the potential to influence and change feelings, behaviors and thoughts of students and reveal their innate human characteristics (Tulunay Ates, 2017). Jeynes (2019) emphasize that schools and society will become stronger in various senses to the extent that an effective character education practice provides both academic and behavioral benefits.

When individuals acquaint themselves with their character and parents and teachers get to know the young individuals that they are responsible for, there will be a better future for the society. This highlights why people should have values.

The common point of the concepts used in the literature with terms such as character education, moral education and value education is teaching individuals the ability to apply moral thoughts and behaviours through democratic means, or in other words raising individuals who have attained moral maturity. Value education can be said to include everything that affects children’s value judgements and attitudes. Value education is apparent almost in every context such as rules, events, social relationships, traditions and children that surround children, in addition to the school and classroom. An important issue that character educators highlight is that the education delivered at school has a reflection in the society, and if there is no such effect, there can be moral contradictions in children (Turan, 2014). As a matter of fact, Bozkurt (2019) concluded in his research that teachers perceive values education as important as academic success, and attribute great importance to experiencing the values.

Value education has been the subject of various research studies in educational sciences and included in the course curricula in recent years; however, to yield the expected effect, the conceptual framework of values education needs to be examined closely (Sarica, 2018). Character and value education delivered through the curricula of certain courses in schools encourages students to exhibit positive behaviours in their daily lives by adopting values such as love, respect, honesty, justice and tolerance. It leads to the modelling of these positive behaviours to others who can also adopt such behaviours, and thus to the formation of a society containing people who treat others fairly and honestly. This widespread impact of character and value education can be viewed as the butterfly effect that is described as a butterfly’s merely flapping its wings, which can eventually cause a storm. The butterfly effect thus relates to the idea that the flapping wings of a flying butterfly can effect a large-scale area.

According to this approach, the application of the chaos theory, which highlights that the existence of many different variables that can cause an event and that small effects can lead to great changes in the consequences of events, to international issues will contribute to the solution of many problems (Ikiz, 2015). When Norton Lorenz presented a paper titled “Does a butterfly’s flapping its wings in Brazil cause a storm in Texas?” in a conference organised by American Science Association on 29 December 1972, this approach was introduced to the scientific literature. Although Lorenz did not aim to prove the butterfly effect in

meteorology by means of experiments, it was stated that a butterfly's flapping its wings can cause a storm as it can also calm a storm (Taskin, 2014). The reason why the butterfly effect was called with this name was because the figures and graphs this scientist prepared in his mathematical analyses vaguely resembled a butterfly. The human-oriented nature of social sciences causes the action-reaction mechanism in individual, cultural and social areas to be filtered through a different process than in mathematical sciences. Therefore, this theory that is a proposition in physics is quite rarely applied to social sciences. In the butterfly effect, small changes in the initial state of a system can lead to a chain of events that will produce large-scale changes in the system. If this idea is applied, for example, to the effect of citizenship education within social sciences on raising future citizens, then a hopeful perspective on the maintenance of democracy in the world can be developed (Ponder and Lewis-Ferrell, 2009). Accordingly, as is the focus of this study, delivering character and value education, which falls into educational sciences, through a distance learning MA program without thesis is expected to have students who attend this program to stimulate a set of feelings, thoughts, values and behaviours in themselves, their families, workplaces and immediate environments.

The Distance Learning Non-Thesis MA Program on Character and Value Education is the first and only program of its nature in Turkey, and is provided within the Open and Distance Learning System of Anadolu University. It was launched in 2017, aiming to give many individuals the chance to receive character and value education. After this training, teachers at different levels and those who work in public and private sectors as well as parents will be able to conduct effective value education in their institutions and homes. These individuals' carrying out value education either directly or indirectly would improve social order, leading to a society consisting of active citizens.

Problem

The Distance Learning MA Program on Character and Value Education is expected to deliver character and values education with a butterfly effect throughout the country, and students from different provinces, ages, professions and environments are expected to pass on their knowledge in an expanding manner. In their study on postgraduate theses on values education, Erbir and Bagci (2013), concluded that teachers and students do not have enough knowledge of values education. In addition, they emphasized that value education is not sufficiently adopted in Turkey and that this problem in the field of value education should be eliminated. In this context, the Distance Learning MA Program on Character and Value Education will hopefully contribute to solving an important problem with a butterfly effect throughout the country.

By means of this MA program, students gain knowledge about current theories and research studies related to character and value education, and scientific research methods. They are then expected to make a contribution to social life by putting into practice the knowledge they acquired in scope of their roles such as parents, employers and teachers in daily life.

In the present study, the benefits of the Distance Learning MA Program on Character and Value Education at Anadolu University for its students, their families and immediate environments were considered as a butterfly effect, and this effect was investigated.

In the literature, no studies have so far associated character and value education with the butterfly effect. In addition, since this program is only available at Anadolu University, there are no studies in which the evaluation of such a program was conducted. Simsek and Alkan (2019) stated that most studies in the literature focused on primary, secondary and higher education, and in their study, they examined the outcomes of teacher trainees in the course "Character and Value Education". Studies on character and value education, a popular research topic in the international literature, have started to be conducted in the Turkish context in recent years. These studies mostly concentrated on preschool (Ata, 2020; Catalbas, 2018; Arslan, 2019; Kocalar, 2019; Turan, 2014; Ulavere & Veisson, 2015) and middle school levels (Tekin & Bedir, 2019; Kilinc Bozkurt, 2019; Akcin, 2016; Cokdolu, 2013) while there is limited research towards the university level (Selcuk & Simsek, 2019; Silay, 2010), but not studies are available in the context of postgraduate education. This study is expected to attract considerable attention to the effect of carefully planned character and value education and its butterfly effect.

Purpose

The purpose of this study was to reveal how the students of the Distance Learning MA Program on Character and Value Education reflected what they gained in the program to themselves, their families and immediate environments and the society by means of examples from their lives. The following research questions were addressed based on this purpose:

- What are the outcomes of the Distance Learning MA Program on Character and Value Education for the students?
- What are the benefits of the program for the students' families and immediate environments?
- What are the benefits of the program for the country and the world?
- What do the students suggest for enhancing the effect of character and value education?

METHOD

This section presents information regarding the research design, participants, data collection and analysis, trustworthiness and ethics.

Research Design

Basic qualitative research design was adopted in this study that aimed to reveal the butterfly effect of the Distance Learning MA Program on Character and Value Education at Anadolu University. The primary objective of basic qualitative research is to bring out the ways in which individuals structure their lives, and the meanings they attribute to their experiences (Merriam, 2018). Accordingly, in the present study, it was aimed to identify the meanings the students of the Distance Learning MA Program on Character and Value Education attributed to the outcomes of the program in their lives, the ways they used the knowledge they gained in their lives, and the effect of the program on their families and immediate environments, the country and the world.

Participants

The participants were 22 students studying in the Distance Learning MA Program on Character and Value Education at the Graduate School of Educational Sciences, Anadolu University, Turkey in the 2018-2019 academic year. The characteristics of the sample are presented in Table 1.

Table 1. Information about the participants

Pseudonym	Age	Gender	Marital Status	No. of Children	Education	Occupation
Rabia	27	Female	Single	-	Child Development and Education	Teacher
Ipek	34	Female	Married	1	Theatre Sociology	Theatre Trainer
Guler	25	Female	Single	-	Preschool Teaching	Teacher
Meltem	45	Female	Married	2	Turkish Language and Literature	Teacher
Nevin	42	Female	Married	4	Health Administration	Midwife/Health Administrator
Gul	44	Female	Single	-	Business Administration Sociology	Qualified Public Worker
Ceren	52	Female	Single	2	Sociology	Teacher Life Coach
Emine	38	Female	Single	-	Labour economics and industrial relations Sociology (ongoing)	Teacher
Derya	59	Female	Married	2	Philosophy Accommodation Administration	Retired Teacher
Ayse	34	Female	Married	1	Preschool Teaching	Preschool Principal
Fatma	38	Female	Married	2	Theology Sociology	Qur'an Instructor
Yagmur	41	Female	Married	2	Public Administration Theology	Official at the Office of Family and Religious Guidance
Birol	42	Male	Married	3	Geography Teaching International Relations	Teacher
Ali	45	Male	Married	-	International Relations	Religious Official
Demet	49	Female	Married	3	Elementary Teaching	Teacher
Bilge	32	Female	Married	-	Turkish Language and Literature Business Administration	Teacher Turcologist
Munevver	48	Female	Married	1	Elementary Teaching	Specialist Teacher at the Board of Education and Discipline
Hamide	57	Female	Married	1	Faculty of Medicine Sociology Philosophy	Doctor
Reyhan	48	Female	Single	-	Child Health and Education Laborant (ongoing)	Specialist Educator
Eda	28	Female	Married	2	Theology International Relations	Teacher
Tansu	29	Female	Married	-	English Language Teaching, Sociology	Teacher
Nihal	45	Female	Single	-	Business Administration Restoration	Unemployed

Twenty-two students, 20 females and two males, participated in the study. Their ages ranged between 25 and 59. For marital status, 15 of the participants were married, and seven were single. Sixteen of the participants had degrees in multiple areas. They had a wide range of occupations including teacher, doctor, Turcologist, Qur'an instructor, theatre trainer, preschool principal, worker, midwife and life coach.

Data Collection and Analysis

The views of the postgraduate students were examined by means of the data collected through a data collection form with open-ended questions. The form consists of a personal information section, and four open-ended questions. Due attention was paid to make sure that the questions were in line with the research aim. The questions prepared by the researchers were presented to experts for their feedback to ensure that they relate to the topic under investigation and provide the information needed. The data were collected in the 2018-2019 academic year. The researchers informed the participants about the data collection form. They were asked to write their views on the form and send it to the researchers via e-mail.

The research data were analysed through descriptive analysis. In descriptive analysis, data are analysed based on pre-set themes, and research questions can be taken as the based in determining the themes (Yildirim & Simsek, 2011, p.224). Accordingly, in this study, the data were analysed with reference to the themes that were previously determined based on the research questions. In the process of data analysis, the data were firstly categorised according to the themes. These data were then coded with statements that were thought to express the participants' views. The codes were organised into a table. These codes that are shown in a table in the findings section were presented along with direct quotations from the participants' actual statements.

Trustworthiness and Ethics

With regard to research ethics, necessary permissions were taken from the Ethics Board of Social Sciences Research and Publication, Anadolu University, on 26 April 2018 with the protocol number "43563". The participants were informed about the research aim and the fact that the participation was on a voluntary basis. Pseudonyms were used to keep the identity of the participants anonymous. Expert opinion was received with respect to the data collection tool. The research data were examined by two independent researchers to ensure trustworthiness. In addition, to enhance trustworthiness, direct quotations from the participants' statements were used to support the findings.

FINDINGS

In this section, the findings revealed as a result of data analysis are presented. The findings were explained under four main themes that are "The Outcomes of the Distance Learning MA Program on Character and Value Education for Students", "Benefits of the Program for Students' Families and Immediate Environments", "Benefits of the Program for the Country and the World", and "Suggestions for Improving the Effectiveness of Character and Value Education".

The Outcomes of the Distance Learning MA Program on Character and Value Education for Students

The findings showed that the outcomes of the Distance Learning MA Program on Character and Value Education for the students were "acquiring knowledge", "being tolerant", "gaining various skills", "improving family relationships", "developing multiple perspectives", "enhancing professional development", "enabling individual development", "raised awareness related to values" and "self-acquaintance". The findings regarding the outcomes of the Distance Learning MA Program on Character and Value Education for students are presented in Table 2.

Table 2. The Outcomes of the Distance Learning MA Program on Character and Value Education for Students

Acquiring knowledge
Being tolerant
Gaining various skills
Improving family relationships
Developing multiple perspectives
Enhancing professional development
Enabling individual development
Raised awareness related to values
Self-acquaintance

Nihal explained her view that the Distance Learning MA Program on Character and Value Education expanded her knowledge by saying, *“My knowledge was limited to the books I read and the information I came across on web sites, but now I have learned on topics of my interest from the research studies of experts who invested years in their areas.”*

Ali and Nevin stated that they became more tolerant thanks to the program they attended. Emphasising that he became more tolerant, Ali said *“Thanks to our education, our relationships with our family, students and immediate environment are more positive now, and we started to be more understanding and tolerant towards each other.”* Nevin explained that she was more tolerant after she started the MA program by saying, *“As my level of education increased, I became more modest and tolerant as a result of this training. I felt like I was at the bottom of the ladder. My tolerance has grown thanks to this education.”*

Of the students who participated in the study, Tansu, Ipek, Guler, Nevin and Fatma indicated that the program they attended taught them various skills such as research, reading, critical thinking, empathy, self-control, working in a planned way, and communication. By saying, *“This program reminded me what empathy was. It reminded me that students have their own world and I need to see things from their perspective.”*, Tansu asserted that the program taught her to show empathy. Guler stated that her reading and research skills improved thanks to the program, and said *“I have got a lot of attention since I started this program. Most people around me got interested in it since it is a topic that concerns all sections of the society. And people started asking more questions, which led me to read and do research more.”* Demet thought that the program taught her the questioning skill, and said the following: *“I first questioned myself about whether I neglected the people at home. I reviewed my rapport with my children. I started to observe how my family members approached certain events. I tried to do my best to identify what values we internalised as a Turkish family, and what values we lack.”*

Nevin explained in the following her view that the program she attended enhanced her family relationships:

“My approach towards my children changed. I used to utter statements like an order when I asked them to do something. But these statements turned into those starting with ‘if you want’. I realised that I was able to better understand my husband and had better communication with him. The program also helped me perceive the sources of the programs in family and produce smart and fair solutions to these problems.”

Thinking that the education she received brought her multiple perspectives, Derya said, *“I believed this program would relate to philosophy and axiology. And it did. The contents of the courses included the views and sayings of philosophers. Since I had a background due to my major, I developed new perspectives.”* As Derya’s views show, students can relate the contents of the courses within the distance learning MA program on character and value education to their own areas, and thus can be enabled to develop multiple perspectives.

Ceren, Ipek, Eda, Ali, Yagmur, Reyhan, Birol and Hamide pointed out that the character and value education MA program contributed to their professional development. While Ali said *“As a religious official, I started to think about how I can be more beneficial to people in terms of character and values, and I started to make an effort in this direction.”*, Eda said *“This program contributed to me in many ways. For instance, it changed my perspective to teaching and encouraged me to be more beneficial and sensitive for my students.”* Yagmur described the contribution of the education to her professional development by stating the following:

“This education helped me gain a lot professionally and it will continue to do so. As religious officials, we try to provide people proper guidance about religion. This education enabled me to adopt more effective and beneficial approaches in my seminars on value education. Moreover, since I started receiving this education, I have got positive feedback from my supervisors and colleagues about my seminars.”

Ceren asserted that the education she received contributed to her professional development. Ceren explained her view that thanks to the MA program on character and value education, she used scientific knowledge in her practices on values, by stating the following: *“As a teacher, I already had experience working with my students on values. Now, with this education, I do what I do based on scientific knowledge.”* Similarly, Ipek argued that because the knowledge she acquired from her MA education enabled her to link her major with values, the program supported her professional development. In this respect, Ipek said the following: *“Thanks to this education, I gained the ability to think and critique about the effect of plays written and exhibited in theatres, which is my area. Also, I’m considering writing critics about some of the plays I watched, after examining them. I think this is the most important benefit of the program for me.”*

Emine asserted that the MA program made a contribution to her personal and professional development. Emine thought that the education she received made various contributions to both her and her students, as she was more sensitive about values and included these values in my classes. She said: *“It enabled me to approach values with more care, and use them in my classes with more emphasis. In this way, it helped me be more beneficial for my children. Not just about school or teaching, it also contributed to my personal development in general.”*

Guler described the contribution the MA program made to her personal development as follows: *“As an educator, I found the chance to develop myself by starting this program. I also became more selective in my perception.”* On the other hand, Gul talked about the contribution of the program on her feeling more responsible towards living species and the nature, and her own individual development, by saying *“This program made positive contributions to my development. It created a person who has self-respect, show respect to different views and lifestyles, is tolerant, can better understand the nature and living species, and most importantly can understand that she is not only responsible for herself.”*

Hamide who reported that she raised her awareness towards values thanks to this education said: *“In my profession as a doctor, I learned that medical ethics is prior to treatment. It helped me feel myself valuable. It created awareness about values, going beyond the fact that things don’t just exist or they don’t just occupy a place in space.”* With regard to her view that the MA program raised her awareness, Meltem said: *“This program helped me realise the mistakes I made about my children. It helped me gain new perspectives.”* Birol highlighted his similar view by saying, *“My awareness about how important character and value education is has increased and I have understood that this education is quite important for the society. As I practice my profession, I includes value education in a more systematic and planned way.”*

Tansu and Gul stated that the education they received contributed to their self-acquaintance. Tansu expressed her view by saying, *“Thanks to this education, I’m developing new skills such as questioning myself, understanding the reasons underlying my behaviours, and perceiving others’ values.”* while Gul said:

“It helped me make better sense of my characteristics that constitute my personality, and brought me new perceptions of myself and other people. The way I move around, walk or think, or in other words the way I live changed significantly. Of course, I had certain characteristics and values due to my age, but I had no idea how I used them and reflected them to my behaviours.”

The findings revealed in this study show that the Distance Learning MA Program on Character and Value Education achieved different outcomes on the side of the students who participated in the study. In other words, the Distance Learning MA Program on Character and Value Education made contributions to its students for initiating the butterfly effect in character and value education.

Benefits of the Program for Students’ Families and Immediate Environments

The findings showed that the benefits of the Distance Learning MA Program on Character and Value Education for the students’ families and immediate environments included “raising awareness in their environment”, “reflection of teacher development to children”, “creating a sharing environment with the

family and immediate environment”, “setting an example for the family and immediate environment”, “guiding the family and immediate environment”, “contributing to the strengthening of the relationships in the family and immediate environment”, “contributing to the strengthening of the communication in the family and immediate environment”, “enabling behavioural change in the environment”, “conveying values”, “creating awareness in parents”, “producing peaceful solutions” and “ensuring happiness”. The findings regarding the benefits of the Distance Learning MA Program on Character and Value Education for students’ families and immediate environments are presented in Table 3.

Table 3. Findings Regarding the Benefits of the Program for Students’ Families and Immediate Environments

Raising awareness in their environment
Reflection of teacher development to children
Creating a sharing environment with the family and immediate environment
Setting an example for the family and immediate environment
Guiding the family and immediate environment
Contributing to the strengthening of the relationships in the family and immediate environment
Contributing to the strengthening of the communication in the family and immediate environment
Enabling behavioural change in the environment
Conveying values
Creating awareness in parents
Producing peaceful solutions
Ensuring happiness

One of the participants, Yagmur, pointed out her observation that the character and value education program raised awareness in her environment, and said, *“I don’t have the exact figures about the contribution of the program. But I can say this: Now, I, my family and social environment are aware of the importance of character and value education.”* In a similar view, Ipek indicated that she shared the knowledge she gained in the MA program with her family, which led to an awareness and sensitivity in them with respect to current issues, by saying *“With this program, we became more sensitive about current issues. We started to interpret and realise what’s happening around us. This created an awareness both in the family and the environment.”*

Tansu, who is a teacher, observed changes that were reflected to both her and her students by means of the education she received, by stating the following: *“I believe that it will lead to a positive change in the youth of this country as it affected how I delivered my courses and my approach to my students. In this way, with the spark of this program, I have more faith in making the whole country and the world a more liveable place again.”*

Ayse, Meltem, Emine and Yagmur highlighted the new sharing environment with their families and immediate environments as a result of the program. In this regard, Meltem said, *“We listen to the classes with my husband. We make comments together, and share ideas with each other. As our children are old enough, we also discuss certain topics with them.”* Emphasising that family is important in value education, Yagmur expressed her thoughts as follows:

“When I consider that family forms the basis of the society with its mission for future generations, it seems apparent to me that the ideal approach would be to start value education in family. There is no doubt that character and value education showed its effect in my family as well. I have children who go to high school student. When we are with them, we can explain the importance of our need to values. We share things together. In fact, my daughter started calling me a ‘values police’. Concepts such as honesty, diligence, being straightforward, compassion and justice are among the values we frequently talk about.”

Ayse touched upon her exchange with colleagues, and said *“I thought about how I could be of more use to my environment, family, and profession. I conveyed what I learned in the program with my teacher colleagues in our chats.”*

Rabia emphasised that the knowledge she acquired in the MA program enabled her to set an example to her environment. She explained her view that the education she received helped her guide the immediate environment by saying the following:

"I comprehended the importance of setting an example with this program, now I'm trying to do so. I internalised the values and I shared what I learned with most of my friends. For instance, my niece used to exhibit some aggressive behaviours. I talked to his parents and told them they needed to change their own behaviours to set a model. When his parents were a model to him, there was a decline in my niece's aggressive behaviours."

Similar to Rabia, Guler also reported her effort to set a model for her environment: *"I feel a responsibility over my shoulder since I received this education. Not just as a teacher, but also as an individual, I try to be a role model."*

Fatma and Bilge stressed that they guided their families by sharing them the knowledge they acquired in the program. Accordingly, Fatma says:

"Of what I learned, I share those that impressed me with my family. Their perspective to events changed positively. For instance, my daughter understood the importance of responsibility as a value. She is more aware of her responsibilities at home and school. She says she realised that she is more successful in inter-personal relationships when she fulfils her responsibilities."

Birol, Ceren and Bilge thought that the education they received in the program helped them carry out practices of value education in a systematic and planned way, and guide their friends in this respect. Birol said: *"I think I deliver more planned, proper value education to my students. After this education, I have better understood what approach to adopt and how to act in teaching them values. I think that I have contributed to my colleagues at school as well, and guided them."*

Ali explained how the education enabled the strengthening of relationships in his family and immediate environment by saying, *"Thanks to this education, our relationships with family, students and immediate environment turned out to be more positive. We started to be more understanding to each other and show empathy in our interactions."* Based on Ali's view, the program can be said to enable enhancing the development of inter-personal relationships in the family.

Bilge thought she supported her students' strengthening their communication with their families and social environments as she used the knowledge she acquired, and said:

"I started to evaluate my family and students from this angle, and tried to be beneficial for them, as much as I could, by informing them about values and using approaches to value education. In this way, I supported my students' development through the values I aimed to teach them. I observed positive changes in their communication with their families and social environment."

Ayşe expressed her view that she could achieve behavioural changes in her environment following her education, by saying *"I think I can make a contribution to both myself and my environment. Even if we can touch someone's heart, there will be hope. Nobody should say he or she can't change. Everybody can change with goodness, patience and education."*

Derya, a 59-year-old participant, mentioned the role of character and value education in conveying values, and said: *"By teaching these values to my to-be-born grandchildren and reinforcing them, I will ensure that they will be individuals beneficial for both themselves and the society."*

Demet who reported to have turned what she learned in the program into practice in her teaching asserted that she could create awareness in parents. She said:

"In this process, I made the greatest progress in my students' parents. I informed them about the values included in the program. I tried to share everything I learned in the program in our visits to parents every two weeks. In this week's visit, I will first thank them for their help about non-waste nutrition in the scope of an environment project in the class. I will then make a presentation to them about how the values of prudence and generosity can be treated and supported at home."

Hamide stated that with the effect of this program, she would be able to contribute to using peaceful ways in finding solutions to problems, and explained her view by saying, *"Every living human-being belongs to the*

world and the universe. Human is as fragile as a porcelain and as strong as a rock. So is life. We need to be part of the solution, not destruction. I believe this education will bind up the wounds.” Likewise, Ali referred to the importance of this program for ensuring a peaceful environment as follows:

“I thought of tiny little bodies buried under bombs weighing tons, people who died of hunger without a bite of bread, those who walked barefoot for miles to drink a glass of water, so many people who lost their lives from illness, etc. They always say peace, peace, peace in the international press, or social media, but wars cannot be stopped. In this sense, the fact that character and value education is provided in Turkey, though a bit late, at the postgraduate level is of great importance.”

Tansu asserted that the Distance Learning MA Program on Character and Value Education indirectly enabled the people around her to be happy through herself. She explained how the program brought happiness to her environment by saying the following:

“Sharing something that I saw or heard in a class with my family, asking them ‘Look, did you know about this?’ attracts their attention. The fact that I have self-confidence as I learn new things and that I can apply them makes them happy. Because this indeed creates a butterfly effect. You make a connection with someone you don’t know on a computer screen and indirectly that connection is spread to the ones around you. Knowledge gains value as it is shared, and everybody is happy.”

The students who participated in the study described the benefits of the distance MA program on character and value education for their environment as raising awareness for values and current issues, creating a sharing environment, setting an example for and guiding people around them. In addition, the students stated that this program contributed to the strengthening of communication and relationships in their families and immediate environments.

Benefits of the Program for the Country and the World

The findings revealed in this study show that the Distance Learning MA Program on Character and Value Education led to various effects in the country and the world. The participants thought that this program they attended had benefits for both the country and the world by “contributing to social development”, “raising individuals who have adopted values”, “contributing to social solidarity and continuity”, “raising global citizens”, “contributing to the improvement of human relationships”, “training teachers”, and “helping others”. The findings regarding the benefits of the Distance Learning MA Program on Character and Value Education for the country and the world according to the studies are presented in Table 4.

Table 4. Findings Regarding the Benefits of the Program for the Country and the World

Contributing to social development
Raising individuals who have adopted values
Contributing to social solidarity and continuity
Raising global citizens
Contributing to the improvement of human relationships
Training teachers
Helping others

According to Ayse, the Distance Learning MA Program on Character and Value Education would help form a society that adopts values, and thus contribute to social development. In this respect, she says *“If the value of this program is appreciated, I think that peaceful societies in which individuals may have the same or different values but show respect to and care about each other, show empathy, are sensitive and merciful, not warriors, can be created.”*

Rabia had the opinion that most of the students attending this MA program were teachers and parents, and since they were responsible for raising at least one individual, the program would contribute to raising responsible who had adopted values. Reading her opinion, she said, *“If individuals who are education have*

quality characteristics, this will move the society forward. In this program, most of my friends are either teachers or parents. They all raise at least one individual. This program has a great contribution of us. We can be beneficial for both ourselves and those who are around us." Based on Rabia's view, the program can be said to have a contribution to social life.

Birol, Nihal, Ayse and Gul emphasised that this program would contribute to individuals' adopting values. Ayse verbalised her view on the effect of the program on raising individuals adopting values by saying, *"In the global world, everything is rapidly changing. It is important to preserve certain values as we adapt to this change. Therefore, I think that peaceful societies in which individuals show respect to each other can be created by means of this program."* Similarly, Gul made reference to this effect of the program by giving an example from her own life: *"It created a person who has self-respect, show respect to different views and lifestyles, is tolerant, can better understand the nature and living species, and most importantly can understand that she is not only responsible for herself. If you asked me to give an example, I would say 'me', I'm an example."*

Nihal expressed her view that the program would help raise individuals who have adopted values by saying the following:

"Today, parents can't spend enough quality time with their parents and unfortunately, they can't reflect these values to them, either. I think that by attending this program individuals can contribute to raising young individuals who know what they want, can express themselves respectfully, are planned, punctual, hard-working and solution-oriented."

For Reyhan, this program contributes to social solidarity and continuity. The adoption and preservation of the values that keep people together as well as their transfer to future generations ensure the continuity of societies. Regarding her view, she said the following:

"I think that the inclusion of character and value education in educational curricula is of great importance for a country. I think that it would contribute to reinforcing values that keep a society together and make people feel like they live as part of a nation, maintaining unity and solidarity thanks to values, and their transfer to future generations."

Fatma pointed out that the Distance Learning MA Program on Character and Value Education had an important place in raising global citizens. Fatma's view that this program can contribute to raising global citizens is as follows: *"It is one of the most necessary trainings for becoming a global citizen in the world. This MA program aims to educate individuals who have characteristics like reflecting values into their lives and not being prejudiced. In this context, this program has an important place in raising global citizens."*

Demet explained her view that this program would make a contribution to improving human relationships by saying, *"Rapid developments in technology, globalisation and excessive workloads caused a disconnection in human relationships. To eliminate these negative consequences, this is an effective educational program."*

Demet stated that there were teachers among the students who attended the Distance Learning MA Program on Character and Value Education, and highlighted that the program trained teachers as well. She explained the importance of teachers' attending this program as follows: *"Values are binding, and commitment brings power. Individuals who have values and a character move forward themselves, their families and most importantly their country. So, this program is important in that it trains the teachers who will raise such individuals. That is to say, this program will enlighten individuals, families, the country and the world."*

Demet also asserted that she showed her students a visual that she had seen in the program, and her students took action to help after seeing that visual. In this regard, she said the following:

"I showed my students the picture of an African boy that had been used in our MA class and that affected me so much. We created a discussion platform about helping each other with my students who saw the visual. They exchanged ideas about what they could do. They decided to organise a charity bazaar in the class and at school. Since that day, they have been selling objects like book markers, bracelets, buckles that they made themselves. They earned about two hundred liras. When they save more, they will send this money to Africa for a water well. Their determination made me really happy."

This finding shows that a visual included in the course materials of the program created a butterfly effect, motivating students to act for those who are in need by adopting the value of helping each other. On the other hand, the participants of the study pointed out that the Distance Learning MA Program on Character and Value Education would have contributions to the improvement of human relationships, and social development, solidarity and continuity. Furthermore, they stated that the program would support the process of raising global citizens who are respectful to differences and have adopted values.

Suggestions for Improving the Effectiveness of Character and Value Education

The students who participated in the study offered suggestions for improving the widespread impact of the education they received in the Distance Learning MA Program on Character and Value Education, in other words the butterfly effect of the program. These suggestions included “teaching a course on character and value education in all faculties”, “training all teachers for character and value education”, “providing character and value education in all stages of the education system”, “teaching a course on character and value education in teacher training programs”, “making character and value education the priority area”, “opening an MA program with thesis and a PhD program on character and value education”, “collaborating with different ministries to carry out character and value education”, “training parents for character and value education”, “starting a nation-wide campaign on character and value education”, “a new undergraduate program specifically for character and value education”, “making character and value education an area of expertise in various institutions”, “organising character and value education through modular training”, “holding non-formal and distance education programs on character and value education”, and “conducting multi-disciplinary scientific studies on character and value education”. The findings with regard to the suggestions for improving the effectiveness of character and value education are presented in Table 5.

Table 5. Suggestions for Improving the Effectiveness of Character and Value Education

Teaching a course on character and value education in all faculties
Training all teachers for character and value education
Providing character and value education in all stages of the education system
Teaching a course on character and value education in teacher training programs
Making character and value education the priority area
Training parents for character and value education
Starting a nation-wide campaign on character and value education
A new undergraduate program specifically for character and value education
Making character and value education an area of expertise in various institutions
Organising character and value education through modular training
Holding non-formal and distance education programs on character and value education
Conducting multi-disciplinary scientific studies on character and value education
Opening an MA program with thesis and a PhD program on character and value education
Collaborating with different ministries to carry out character and value education

Ipek suggested that all faculties should have a course on character and value education. She said: *“I think that having character and value education as a separate course in all faculties will be useful for university students. For instance, there should have been a course in which theatre and value education are combined in addition to courses such as ‘Playscript Analysis’ and ‘Structural Analysis’ in the faculty I graduated from.”*

Rabia who indicated that all teachers should be trained for value education said, *“Character and value education should be attributed more importance so that we can live happily together. I’m glad that I’m part of this program. I think that all teachers should receive a training like this.”*

Meltem stated that character and value education should be provided in elementary schools, and Guler indicated that it should be in all school stages. Meltem said, *“I do think that it should be taught as a course*

in elementary schools. In fact, it should be before all other courses. Happy children means a happy society.”, while Gulsum said, *“Character and value education should be delivered in all schools in a planned and implicit way.”*

Referring to the necessity of a course on character and value education in teacher training certification programs, Meltem also said, *“I would want to receive a course on character and value education as I received my teacher training. I would at least have an idea about how children can be better raised. We are told in detail how to teach courses, but the spiritual part remains missing, I think.”*

Nevin had the opinion that character and value education is a priority area in the whole country, and she said, *“It is beyond a necessity, and if character and value education can be at the second place of the emergency list, it will be beneficial individual and global happiness. In other words, character and value education should be seen as a priority, right after vital life signs.”*

Emphasising the collaboration between ministries to provide character and value education, Gul stated, *“Not only I would want character and value education to be taught as a course, but also for it to be taught in different institutions. More people could be reached through a collaboration between the ministry of national education and other ministries.”*

Bilge drew attention to the need to train parents for character and value education, and said the following: *“In teaching values, the education given in schools is not enough. That’s why trainings should be held for parents, considering that the values they exhibit and their attitudes and behaviours are the main determinants of children’s personality development and values.”*

Munevver brought forward her idea about providing parents value education by saying, *“If families as the smallest unit of the society are given value education, we as the society can raise individuals who are happy, hopeful, educated and look at the future with hope, and make sure that many more values can be developed in our children and society.”*

Ceren mentioned a nation-wide campaign on this issue by saying, *“I think there should be an educational campaign for character and value education. We should do this for future generations and social welfare. In this sense, this program is a significant attempt for our society.”*

Fatma thought that character and value education should be taught as an undergraduate program to be provided to a wider audience. Regarding her view, she said the following: *“I think it will be beneficial for this discipline if it is provided in a program at undergraduate level. Our society, youth and old alike, need character and value education, and an undergraduate program would be of use in meeting this need.”*

Yagmur thought that the graduates of the non-thesis MA program on character and value education should be able to work as experts in different institutions, and this area should be accepted as an expertise. She pointed out, *“Those who graduate from this program should be given the chance to get an ‘expert’ title. So that we can do more effective work both in our institutions and in the field.”*

Biröl suggested that modules should be prepared for character and value education, and these modules can enable this education to reach the society. He said: *“By means of protocols with public and private institutions, the basic parts of this education should be made available through modular trainings. There should be a plan for the experts of this field to reach every section of the society, and this plan should be put into practice.”*

Munevver mentioned the benefits of providing value education through distance education, and drew attention to the usefulness of giving large crowds value educations in this way, by saying the following: *“If value education is supported with non-formal and distance education systems, I believe, there will be improvement in many areas in the society. I think it should be delivered not just in schools but also other institutions and even workplaces. It can be face to face, but the alternative in the form of distance education is also a change for those who have limited time.”*

The findings showed that conducting inter-disciplinary research on character and value education would help take this area to a larger population. Hamide who state a similar view said, *“I would want the character and value education to be associated with other disciplines and see collaborative scientific studies. Disciplines like medicine, finance, law, etc.”* Likewise, Emine referred to the need for more studies in this area by saying, *“I think there should be more research studies, not just for our country but the whole world, it is important that we have more studies and also PhD dissertations.”*

Ipek and Tansu suggested that character and value education should also be in the form of an MA program with thesis and a PhD program. Ipek expressed her view as follows: *"I think this program should also be at the postgraduate level, like a PhD program."* In this sense, Tansu said the following: *"I would like to have this education in an MA program with thesis. This is because we attend the classes in certain hours every weekday, write forum posts, do our homework, read articles, learn certain computer applications, and at the same time we prepare a term paper. I would want to have the opportunity to do a distance learning MA program with thesis in this area."*

Muneverver thought that character and value education should be provided to employees in all public institutions. She said the following: *"I think value education course should be delivered not just in schools but also other institutions and even workplaces, to employees and administrators. I mean, values are important in the family, in daily life and at work, or in the society, and they should be taught to every individual."*

The participants offered suggestions towards enabling this education to reach larger populations so that the Distance Learning MA Program on Character and Value Education could have a butterfly effect. The participants pointed out that character and value education should be provided to teachers, families and all students from elementary school to university level. Moreover, they thought that reaching more people through distance education and conducting inter-disciplinary studies by making associations between various disciplines and character and value education were important for informing the whole society in this respect.

DISCUSSIONS AND CONCLUSION

The aim of this study was to reveal how the students of the Distance Learning MA Program on Character and Value Education reflected what they gained in the program to themselves, their families and immediate environments and the society based on their views and examples from their lives. The results of the study showed that the students who attended the Distance Learning MA Program on Character and Value Education gained certain benefits for themselves, which were also reflected to their families and immediate environments as well as the country and the world. Based on the findings regarding the benefits of the program for the students and their environment, it can be said to have led to a butterfly effect in the society.

The Distance Learning MA Program on Character and Value Education was observed to have contributions to the students such as acquiring knowledge, being tolerant, gaining various skills, improving family relationships, developing multiple perspectives, enhancing professional development, enabling individual development, raised awareness related to values and self-acquaintance. As Ravinger (2006) indicates, by equipping them with values, individuals are enabled to share responsibilities, be more sensitive to their environment and the living species, regulate and develop themselves, and thus improve their relationships in social life. According to the findings obtained in this study, the MA program concerned makes important contributions to the enhancement of social life by providing students with values such as tolerance and fairness.

Simsek and Alkan (2019) found that the character and value education course provided various gains for teacher candidates, similar to the findings of this study. In their study, they reported that the students who took the character and value education course achieved outcome such as showing empathy, avoiding prejudices, having new perspectives, accepting differences, understanding the importance of value education, appreciation and respect. Moreover, the teacher candidates stated that they learned various concepts such as values and character. Likewise, in the present study, the students reported to have acquired knowledge and certain values during the program.

In the study, the Distance Learning MA Program on Character and Value Education was also observed to have benefits for the students' families and immediate environments. Taskan (2011) explained the butterfly effect with the example of a snowball, and emphasised that it covers time travel. Accordingly, when a small snowball starts rolling from the top of a hill, despite the weakness of the initial conditions, the snowball can turn into an avalanche. A small change or action can grow with a chain effect. Time is what is need for the effect to turn into an avalanche or a storm. Considering the effects of the program on their families and immediate environments according to the views of the students who participated in this study, these effects may expand over time and provide significant contributions to the society in terms of value education.

The Distance Learning MA Program on Character and Value Education had benefits for the students' families and immediate environments such as raising awareness for values and current issues, creating a sharing environment, setting an example for and guiding people around them, and strengthening of the relationships and communication. In their study, Gurdogan Bayir et al. (2016) concluded that teacher candidates realised they should be a model for value education while practising their teaching profession, and emphasized that this awareness should be gained properly in pre-service training. According to the results of the present study, being a model can also be regarded as important in value education, and the Distance Learning Non-Thesis MA Program on Character and Value Education can be said to enable students to be a model for their immediate environments in terms of values. As is also reported in the findings, the program can be beneficial for the students' families and immediate environments in terms of bringing about behavioural change, conveying values, raising parents' awareness, producing peaceful solutions, and ensuring happiness.

The participants pointed out that most of the students attending the program were teachers, and thus the program also trained teachers in this respect, having an indirect reflection to the development of these teachers' students. In this regard, it can be argued that the program can make contributions to important changes in individuals and the society through its butterfly effect.

In the study, the Distance Learning MA Program on Character and Value Education was also found to have various benefits for the country and the world. The participants stated that this program they attended was useful for contributing to social development, raising individuals who have adopted values, contributing to social solidarity and continuity, raising global citizens, contributing to the improvement of human relationships, training teachers, and helping others. Based on the finding that the program can bring about benefits for both the country and the world, the outcomes of this program can be said to create a butterfly effect through a transformation in the family, immediate environment, and local and global contexts. This can be illustrated in a story. A farmer settles in a large plain that he likes. Other farmers follow him, and one of them opens a supply store, and then a grocery store is opened right next to him. These shops become a meeting place. In time, a village emerges with the arrival of buyers, sellers and agricultural workers. The existence of the village makes it easier to market agricultural products and more farms are established around the village. The increase in agricultural activity paves the way for the development of industry, and the village grows further and turns into a city. Throughout the process, the flat plain has been transformed with a series of positive developments (Cobanoglu, 2008). As in this example, small events and gains can continue to growth, and can lead to big effects. In this regard, according to the findings of this study, the Distance Learning MA Program on Character and Value Education has outcomes that can contribute to development, solidarity and continuity of individuals, societies, countries and consequently the world.

The students who participated in the study offered various suggestions for enhancing the butterfly effect of the character and value education, considering the benefits of the training they received for themselves and their environments. They drew attention to the significance of character and value education by stating the view that it should be taught in all faculties, teacher training programs and all stages of formal education. Beachum et al. (2013) reported that teacher candidates supported the idea of including topics related to character education in undergraduate teacher training courses. In her study, Kurtdede Fidan (2009) found that according to teacher candidates, teaching values should be regarded as the primary duty of schools, which would contribute to solving value conflicts in schools.

In fact, every individual in a society is in the same boat. Values are the fuel, and also vital equipment, of this ship. Schools are the cabins and teachers the captains in this ship. For a society to survive, children should apprehend the importance of values, and then value education should be conducted in a planned way without leaving it up to chance. In other words, in line with the findings of this study, value education that is provided in a planned manner will have a significant contribution to social life. The importance of schools and teachers cannot be denied in planned value education practices. Similar to the findings of this study, teacher candidates in Genc et al. (2015) also offered suggestions such as having a course on value education in instructional curricula, and holding in-service trainings for teachers in this respect. Likewise, Ozyurt (2015) concluded that a value education program developed with a school-based curriculum development approach was effective in achieving goals. Otten (2001) stated that value education that is integrated to the school can help students deal with conflicts and enhance their responsibilities, while improving the society

through their active participation. Kuzu Jafari and Demirel (2019) found that most of the preschool teachers participated in their study thought that the value education they implemented had long-term effects. In other words, value education that is provided in formal educational institutions starting from early ages can have significant impacts in students.

In the study, the participants suggested that all teachers should be given character and value education to make this education widespread. Tokdemir (2007) found that most of the history teachers did not have theoretical knowledge on values and value education, but believed that values were an important part of education, tried to teach various values to students and had positive attitudes towards value education. It can thus be argued that even though teachers do not have sufficient knowledge, they are willing to receive training related to value education.

Providing families and parents character and value education is another finding reported in this study. Based on their findings, Tosun and Uyanik Balat (2017) suggested that mothers should be given more detailed information about value education, and trainings for families should be held. In Gurdogan Bayir et al. (2016), teacher candidates perceived the problems experienced in value education as those stemming from teachers and those from families. Erkus (2019) reported that the character education in elementary schools was inadequate, most problems in character education were due to families, and it should be conducted in every possible context, particularly the family and school. The suggestion that character and value education should be given to teachers and families can be a solution to the problems stemming from these parties. A further suggestion mentioned was providing character and value education to not only teachers and families, but also employees working in public institutions, and making this area as a field of expertise in various institutions.

Although early ages and formal education are important in character and value education, it is also of great significance to provide this education at later ages and through distance education. In this regard, the participants in the present study mentioned providing modular training, non-formal education and character and value education through distance learning in their suggestions. In Deveci (2015), university students stated that a society with happy, peaceful and honest people can be created through value education via distance learning. Thus, a contribution can be made to the process of forming a developed society consisting of citizens who control their behaviours. Based on the results of the present study as well, it can be argued that character and value education delivered through distance learning would reflect to students' immediate and distant environments starting from themselves.

In a report during the COVID-19 pandemic, Rogers (2020) stated that she used video lessons and various materials to help teach positive character traits online, these materials were useful for character development, and character education via distance learning was important in dealing with the pandemic. Likewise, the participants of this study asserted that there can be a collaboration between different ministries as educational environments are used. They also offer suggestions towards ensuring a widespread effect across the country such as making character and value education a priority area, and starting a nation-wide campaign on character and value education. Ustunyer (2009) found that according to educators, character education was an urgent need and an important area for the society.

The participants suggested that undergraduate, MA (with thesis) and PhD program should be opened, and collaborative and multidisciplinary studies should be conducted with respect to character and value education. These findings make one think that the students appreciated the value of character and value education, and academic life and scientific knowledge for individuals and the society thanks to the Distance Learning MA Program on Character and Value Education that they attended. Silay (2010) asserted that there should be more research on character education at higher education, and policy-makers should encourage postgraduate studies with in-depth focus on morality and values. Furthermore, in the study, it was also suggested that non-governmental organisations and higher education institutions should collaborate on studies related to character education.

When the findings revealed in the present study are evaluated in overall, the following suggestions can be offered.

- Character and value education should be provided in all formal educational stages including preschool, primary and high school, and higher education.
- A course on character and value education can be taught in teacher training programs.

- Character and value education can be turned into an area of expertise in various institutions.
- A new undergraduate program can be initiated specifically for character and value education.
- The number of MA programs (non-thesis and with thesis) on character and value education can be increased.
- A PhD program on character and value education can be opened.
- Scientific research on character and value education can be increased.
- Activities related to character and value education can be held for various target populations through non-formal education and distance learning.
- Activities related to character and value education can be organised for teachers and parents.
- Practice-oriented research studies can be conducted for providing parents and teachers character and value education.
- Topics such as peer teaching and parental involvement can be investigated in research studies to enhance the butterfly effect of character and value education.

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STUDENT BARRIERS TO ONLINE LEARNING AS PREDICTORS OF PERCEIVED LEARNING AND ACADEMIC ACHIEVEMENT

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ABSTRACT

This research investigates the effects of online learning barriers on students' perceived learning and academic achievement. In this study, the barriers identified by Muilenburg and Berge in 2005 were used as online learning barriers. These are (1) administrative issues, (2) social interaction, (3) academic skills, (4) technical skills, (5) learner motivation, (6) time and support for studies, (7) cost and access to the Internet, and (8) technical problems. In addition to online learning barriers, gender and job status are other variables of the study. The research was conducted with 622 online learning students and designed on a quantitative cross-sectional survey model. The analysis results show that gender and job status affect both academic achievement and perceived learning. In terms of students' online learning barriers, academic skills and learning motivation are predictors of academic achievement. In addition, academic skills and time and support for studies are predictors of perceived learning.

Keywords: Online learning, student barriers to online learning, perceived learning, academic achievement.

INTRODUCTION

The developments in technology have caused many changes in people's routines from shopping to eating and brought about radical changes in education. Some of these changes in education affected in-class practices, and some caused the instruction to move to different environments. Online learning is one of the best examples of these applications.

Online learning is applying online technologies that are considered to train a person (Horton, 2000). Learning online is encouraged and supported by online learning resources and components (Khan, 1997). In online learning, at least 80% of the learning content needs online presentation. (Allen, Seaman, Poulin&Straut, 2016). While online learning enables institutions and instructors to reach new learners at a distance, increases convenience, and expands educational opportunities (Hill, 2002; Hofmann, 2002; Schrum, 2000), it offers students such advantages as accessibility, flexibility, equality, collaboration, and active learning (Bennett & Bennett, 2002; Phipps &Merisotis, 2000; Hofmann, 2002). Online learning allows participants regardless of their age, gender and education level to participate in online learning activities, even those whose performance may be "restricted" by accessibility needs (Rizvi, Rienties& Khoja, 2019:32). It is widely accepted that online learning has significant advantages . Results of some research in the literature indicated that course design, interaction with course instructors, learner motivation, time management, and comfortableness with online technologies impact the success of online learning (Song, Singleton, Hill, &Koh, 2004; Swan, Shea, Fredericksen, Pickett, and Pelz, 2000).

Changing the primary learning environment and using online technologies in online learning have also brought about some barriers. These barriers, especially perceived by the students, negatively affect students' success in online learning. In the literature, it is possible to find many research on the negative aspects of online learning. It is seen that factors such as the necessity of having information about technology and how to use it, technical problems, a perceived lack of sense of community, time constraints, lack of academic and social support, lack of online learning readiness, feeling alone and isolated (Hillesheim, 1998; Song, Singleton, Hill & Koh, 2004; Vonderwell, 2003; Vonderwell & Zachariah, 2005; Woods, 2002; Stodel, Thompson & MacDonald, 2006; Maguire, 2005; Lloyd, Byrne & McCoy, 2012; Cho & Berge, 2002; Ali & Magalhaes, 2008; Simuth & Sarmany-Schuller, 2010; Horzum, DemirKaymak & CananGungoren, 2015; DemirKaymak & Horzum, 2013; Horzum, 2007) are considered as negative features.

Barriers to online learning have also been the subject of research in different cultures and at different levels of instruction. It is also observed that barriers to online learning vary across cultures (Horzum, DemirKaymak & CananGungoren, 2017). The problems commonly faced in online learning can be listed as follows; technical infrastructure needed for such an environment, the need to have knowledge and skills for the technology used, technical problems encountered, students' lack of readiness and feeling lonely in the absence of academic and social support for learning in a new environment (Broadbent, 2002; DemirKaymak & Horzum, 2013; Holmes & Gardner, 2006; Horzum, 2007; Horzum et al., 2015; Lynch, 2002; Simpson, 2002). Barriers encountered in such learning environments are commonly divided into two as student's barriers and institutional barriers (Hillesheim, 1998; Maguire, 2005). While numerous studies have discussed barriers to the successful implementation of distance education, many are based on examining instructor's experience, a distance learning environment, or a type of distance learning program (Muilenburg & Berge, 2001:7). Muilenburg and Berge (2005) conducted one of the most comprehensive studies summarizing the various study findings and parts on this topic. In the study, Muilenburg and Berge (2005) aimed to uncover the barriers online learners face as a crucial element of online learning. They explained the barriers to online learning using the eight-factor scale they developed. The eight factors were (a) administrative issues, (b) social interaction, (c) academic skills, (d) technical skills, (e) learner motivation, (f) time and support for study, (g) cost and access to the Internet, and (h) technical issues (Muilenburg & Berge, 2005). When the literature related to online learning barriers was examined, it was found that there was research addressing online learning barriers related to students and faculty and their impact on learning outcomes. However, there was not any quantitative study examining students' barriers to online learning and their impact on academic performance (objectively) and perceived learning (subjectively) at the same time as learning outcomes. Therefore, the current study considered online learning barriers including gender and occupation status and examined their impact on academic performance and perceived learning.

PURPOSE OF THE STUDY

This study aims to show how and to what extent students' perceived online learning barriers influence their learning. For this purpose, students' learning was examined by measuring perceived learning levels subjectively and with grade point average objectively. The study sought answers to the following two research questions;

1. Do student barriers to online learning, gender, and occupational status predict academic achievement?
2. Do student barriers to online learning, gender, and occupational status predict perceived learning?

METHOD

The current study was designed on a quantitative cross-sectional survey model. A cross-sectional survey, one of two main types of surveys, collects data to make inferences about a population (the universe) of interest at a given time (Lavrakas, 2008). Although the time required to collect all the data can take one day to several weeks or more, the information is only collected at one point in time (Fraenkel, Wallen, & Hyun, 2012). The current study used a cross-sectional survey model because it aimed to make inferences about a population of students in online learning at one point in time.

Participants

The participants of the research consisted of online learning students from a public university in Turkey. An online survey was prepared and sent to the students via their learning management system. Thus, an e-mail was sent to all the participants with information about the research and its purpose. In the e-mail, the students were asked to accept the link and fill out the form if they agreed to participate in the research. In this way, only voluntary students participated in the study. So convenience sampling was used in the research. 719 students responded to the survey. After examining the responses, 622 out of 719 questionnaires were used as valid for analysis. The sample of the research consisted of 622 online learning students studying in a public university in Turkey. 193 participants (31%) were college students, 268 participants (43,1%) were graduate students and 157 participants (25,2%) were postgraduate students. 235 students (37,8 %) were female, 383 students (61,6%) were male. 4 participants did not respond to these variables and left it blank. The students were between the age of 18 to 60 with the average age of 28.83. While 470 students (75,6 %) had a full-time job, 139 students (22,3 %) indicated that they were unemployed. 13 participants did not respond to this variable and left it blank.

Data Collection and Analysis

The Scale of Student Barriers to Online Learning (SSBOL)

In the current research, Turkish version of the scale “Student Barriers to Online Learning” (SSBOL) was used. SSBOL was developed by Muilenburg and Berge in 2005 and was adapted to Turkish by Horzum, DemirKaymak and CananGungoren (2017). SSBOL consists of 45 items as 1–5 Likert scale (from “no barrier” to “a very strong barrier,” respectively) and eight factors. The eight factors are (1) administrative issues, (2) social interaction, (3) academic skills, (4) technical skills, (5) learner motivation, (6) time and support for studies, (7) cost and access to the Internet, and (8) technical problems. Internal consistency Cronbach’s Alpha coefficient of the scale was found $\alpha = .96$ in the current study.

Perceived Learning Scale

The Perceived Learning Scale (PLS) was developed by Rovai, Wighting, Baker and Grooms (2009). The scale was adapted to Turkish by Albayrak, CananGungoren and Horzum (2014). In this research, Turkish version of PLS was used. The scale consisted of 9 Likert items and three factors. The factors of the scale are cognitive, affective and psychomotor. This scale can be used as one factor with the total score. In the current study, it was used with a single total score. The internal consistency Cronbach’s Alpha coefficient of the scale was found $\alpha = .86$ in the current study.

Other Variables

In this study, gender, job status and academic achievement were postulated as other variables. Each one of these variables was included in the questionnaire as questions. As for academic achievement, participants were asked “what is your last GPA?”. Students answered the question by writing their grade points on their transcripts and GPA scores were used as a 4.0 scale.

Procedure

To collect data, the scales were converted to an online survey form and after obtaining the necessary permission from Distance Education Centre of the university, the link for the survey was sent to the students by e-mail. Participation was voluntary and the participants were kept anonymous. For the validity and reliability of the study, submitted answers with proven validity and reliability were used in the study. Incomplete or incorrectly filled forms were not included in the analysis.

For the statistical analyses, correlations and linear regressions were used to evaluate how well online learning barriers, gender and job status predicted achievement and perceived learning. For the assumptions of the regression analysis, the Durbin–Watson, VIF and Tolerance values were examined. Durbin–Watson value was found to be 1.738 in the research. Moreover, tolerance values ranged from .373 to .923, and VIF values range from 1.083 to 2.684. Durbin–Watson value was close to 2, and nonautocorrelation between variables is indicated. All tolerance values are greater than .20 and VIF values are less than 5; no multicollinearity problem is indicated. In addition, the skewness and kurtosis values for the continuous variables in the study ranged from -1 to 1. These analyses were conducted using SPSS 21.

FINDINGS

Participants' perceived learning scores ranged from 9 to 45 (\pm SD; 30.75 \pm 5.10), and academic achievement scores ranged from 0,33 to 4 (\pm SD; 2.19 \pm 0.79). For the factors of student barriers to online learning; the scores of Administrative Issues (AII) ranged from 11 to 55 (\pm SD; 29.11 \pm 10.52), the scores of social interaction (SI) ranged from 6 to 30 (\pm SD; 14.23 \pm 5.69), the scores of academic skills (AS) ranged from 6 to 30 (\pm SD; 11.43 \pm 5.91), the scores of technical skills (TS) ranged from 6 to 30 (\pm SD; 10.31 \pm 5.58), learner motivation scores (LM) ranged from 5 to 25 (\pm SD; 11.25 \pm 5.14), scores of time and support for studies (TSS) ranged from 5 to 25 (\pm SD; 11.83 \pm 5.33), scores of cost and access to the Internet (CAI) ranged from 3 to 15 (\pm SD; 6.47 \pm 3.41), scores of technical problems (TP) ranged from 3 to 15 (\pm SD; 7.28 \pm 3.62). . Table 1 presents the means and standard deviations of the factors of students' barriers to online learning that are administrative issues (AII), social interaction (SI), academic skills (AS), technical skills (TS), learner motivation (LM), time and support for studies (TSS), cost and access to the Internet (CAI), technical problems (TP) together with cumulative grade score (CGP) and perceived learning (PerL).

Pearson's correlations were used to assess the bivariate relationships between online learning barriers scores and academic achievement and perceived learning. There is no significant correlation between the barriers to online learning and academic achievement and perceived learning (see Table1). While academic achievement has the highest correlation with learner motivation (-0,223), and the lowest correlation with technical problems (-0,048), perceived learning has the highest correlation with academic skills (-0,305) and the lowest correlation with technical problems (-0,223).

Table 1. Pearson's correlations between student barriers to online learning, cumulative grade scores and perceived learning.

	AII	SI	AS	TS	LM	TSS	CAI	TP	CGP	PerL
AII	1	,595**	,417**	,385**	,462**	,458**	,405	,562**	-,054**	-,212**
SI		1	,516**	,402**	,558**	,512**	,434**	,490	-,106**	-,245**
AS			1	,737**	,627**	,519**	,582**	,456**	-,204	-,305**
TS				1	,626**	,519**	,638**	,463**	-,147**	-,233
LM					1	,601**	,544**	,473**	-,223**	-,268**
TSS						1	,593**	,532**	-,165**	-,285**
CAI							1	,632**	-,144**	-,204**
TP								1	-,048**	-,190**
CGP									1	,206**
PerL										1
M	29,11	14,24	11,4357	10,3119	11,2524	11,8328	6,4743	7,2862	2,1984	31,0213
SD	10,53	5,70	5,91553	5,58891	5,14294	5,33976	3,41567	3,6225	0,79893	4,6309

Note. Asterisks indicate significant correlations: * $p < .050$, ** $p < .010$; AII= Administrative Issues, SI= social interaction, AS= academic skills, TS= technical skills, LM= learner motivation, TSS= time and support for studies, CAI= cost and access to the Internet, TP= technical problems, CGP= cumulative grade scores average, PerL= Perceived Learning, , M = Mean, SD = Standard deviation.

After investigating correlations, two separate linear hierarchical regression analyses were performed in which the variables of academic achievement and perceived learning were taken as dependent variables.

Firstly, a multiple linear hierarchical regression analysis was conducted to evaluate how well the variables predicted academic achievement scores. The regression model contained gender, job status and online learning barriers factors scores as predictors of academic achievement scores. In hierarchical regression, the first block consisted of gender and job status, and the second block was student barriers to online learning—the result of this analysis is presented in Table 2.

Table 2. Hierarchical Regression analysis with academic achievement as the outcome variable and student barriers to online learning, gender and job status as predictor variables.

Predictor	B	S. E.	Beta	T	Significance
Block 1 ($R^2 = 0,036$; $\Delta R^2 = 0,032$; $F(521) = 9,751$; $p < 0.001$)					
Gender	-,284	,074	-,171	-3,823	0.000
Job status	0,269	0,084	0,143	3,184	0,002
Block 2 ($R^2 = 0,102$; $\Delta R^2 = 0,084$; $F(513) = 4,673$; $p < 0.001$)					
Gender	-0,289	0,073	-0,174	-3,946	0.000
Job status	0,245	0,083	0,13	2,941	0,003
All	0,004	0,004	0,052	0,936	0,350
SI	0,006	0,008	0,044	0,753	0,452
AS	-0,02	0,009	-0,143	-2,116	0,035
TS	0,012	0,01	0,084	1,229	0,220
LM	-0,028	0,01	-0,177	-2,807	0,005
TSS	-0,011	0,009	-0,075	-1,272	0,204
CAI	-0,017	0,015	-0,071	-1,096	0,274
TP	0,019	0,013	0,085	1,439	0,151

Note. Predictors were entered in two steps. In step 1, gender and job status and in step 2, factors of student barriers to online learning were entered. Gender: 0= female, 1= male; Job status: 0= Unemployed, 1= Full-time. All= Administrative Issues, SI= social interaction, AS= academic skills, TS= technical skills, LM= learner motivation, TSS= time and support for studies, CAI= cost and access to the Internet, TP= technical problems.

In the first block, F was significant between academic achievement and gender and job status. : F change (521) = 9,751, $p < .001$, R^2 change = 0,036. The second block's F change was significant and R^2 change increased compared to the previous block: F change (513) = 4,673, $p < .001$, R^2 change = 0,065. In the second block, gender, job status, academic skills and learner motivation were significant predictors of academic achievement.

There is a significant effect of gender on academic achievement. Females have higher achievement scores than males. As gender does, job status also has a significant impact on academic achievement. Students that are employed have higher achievement scores. The second block of the analysis shows that academic skills and learning motivation significantly affect academic achievement. It does mean that students who have less barriers to academic skills and learning motivation are more successful. Besides, other online learning barrier factors were not significant predictors of academic achievement.

Secondly, perceived learning for online learning was analyzed with a hierarchical regression model as a dependent variable. In the first block, gender and job status were analyzed. In the second block, student barriers to online learning were examined as predictors of perceived learning.

Table 3 presents hierarchical regression analysis with perceived learning as a dependent variable and gender, job status and factors of student barriers to online learning as predictor variables.

Table 3. Hierarchical Regression analysis with perceived learning as an outcome variable and student barriers to online learning, gender and job status as predictor variables.

Predictor	B	S. E.	Beta	T	Significance
Block 1 (R2 = 0,034; $\Delta R^2 = 0,031$; F(592) = 10,393; p. < 0.001)					
Gender	-0,864	0,406	-0,09	-2,130	0,034
Job status	2,109	0,470	0,190	4,489	0,000
Block 2 (R2 = 0,152; $\Delta R^2 = 0,137$; F(584) = 10,150; p. < 0.001)					
Gender	-1,084	0,391	-0,113	-2,772	0,006
Job status	1,836	0,448	0,166	4,093	0,000
All	-0,015	0,023	-0,034	-0,664	0,507
SI	-0,023	0,044	-0,028	-0,531	0,596
AS	-0,160	0,048	-0,201	-3,303	0,001
TS	0,018	0,052	0,021	0,342	0,732
LM	-0,035	0,052	-0,038	-0,669	0,504
TSS	-0,152	0,047	-0,173	-3,213	0,001
CAI	0,047	0,081	0,034	0,578	0,563
TP	0,017	0,071	0,013	0,235	0,815

Note. Predictors were entered in two steps. In step 1, gender and job status and in step 2, factors of student barriers to online learning were entered. Gender: 0= female, 1= male Job status: 0= Unemployed, 1= Full-time. All= Administrative Issues, SI= social interaction, AS= academic skills, TS= technical skills, LM= learner motivation, TSS= time and support for studies, CAI= cost and access to the Internet, TP= technical problems.

In the first block, F was significant between gender and job status: F change (592) = 10,393, p < .001, R2 change = 0,034. The second block's F change was significant and R2 change increased compared to the previous block: F change (584) = 10,150, p < .001, R2 change = 0,152. In the second block, gender, job status, academic skills, time, and support for studies were significant predictors of perceived learning.

According to the results of analyzing, gender has a significant effect on perceived learning. Females have higher perceived learning scores than males. Job status also has a significant impact on perceived learning. Students who are employed have higher scores of perceived learning than unemployed students. In the second block of the analysis, it was found that academic skills, and time and support for studies have a significant effect on perceived learning. It can be seen in Table 3 that students who have less barriers of academic skills, and time and support for studies have higher perceived learning scores. Besides, other online learning barrier factors were not significant predictors of perceived learning.

DISCUSSIONS AND CONCLUSION

Results of the research show that gender and occupational status are predictors of learning, as both academic achievement and perceived learning. Most research show that females outperform males in school (Zembar& Blume, 2011). On the contrary of face to face learning, in online learning, many researchers have mentioned that there is no statistically significant mean difference between genders in terms of achievement (Lu, Yu & Liu, 2003; Ory, Bullock & Burnaska, 1997; Sierra & Wang, 2002; Yukselturk&Bulut, 2007; Yukselturk&Bulut, 2009; Yukselturk& Top, 2013). Several researchers found that female and male students experience online environment differently, and gender was reported as a significant variable (Caspi, Chajut&Saporta, 2008; Yukselturk&Bulut, 2009; Nistor&Neubauer, 2010; Nistor, 2013; Yukselturk& Top, 2013; Wladis, Hachey& Conway, 2015; Cai, Fan & Du, 2017). Astleitner and Steinberg's (2005) research suggested that gender effects are insignificant at all levels of the postulated model. Nevertheless, in the current study, gender was found to be a significant variable for achievement . Females have higher scores than males. So, the current study is not consistent with the literature claiming that females are more successful than males. There could

be different reasons for this. The first is measurement of the academic achievement by survey instudents. Students were asked what their final GPA was. But achievement scores are not checked to see if students' overall total scores are true or not because research capabilities do not allow it. Moreover, in Turkey, exams in online learning are generally administered in multiple-choice format and scored.. Sufficient time is required to master multiple-choice tests used for lower-order skills. The percentage of unemployed females among the participants of the current research is much higher than that of males. This implies that females could devote more time to study. In this regard, it is expected that females who have a high level of perseverance will be more successful. Nevertheless, it could be emphasized that the need for future studies is foreseen for gender and achievement. In addition, more in-depth studies could be conducted on the source of gender finding in achievement

In terms of perceived learning, gender was found to be a significant value for perceived learning in this study. As in their study, Rovai and Baker (2005) mentioned that females had a higher perceived learning level than males.

Yukselturk and Top (2013) emphasized that learners' occupational status is a significant input characteristic for online learning, like gender. Lu, Yu and Liu (2003) could not find significant results on job status in web based learning in their research. On the other hand, job status was found to be a predictor of academic achievement and perceived learning. In this research, this interesting result shows that students who are employed learn more. The choice of online education can be explained as people have a job so they cannot receive face-to-face education. For that reason, they can be making more efforts to be more successful.

In examining the influence of barriers to online learning on academic achievement, it was found that barriers related to academic skills and learning motivation were predictors of academic achievement in online learning. Barriers related to administrative issues, social interaction, technical skills, time and support for studies, cost and access to the internet and technical problems were not found as predictors of academic achievement in online learning. The relationship between barriers students face in online learning and perceived learning achievement was analyzed. Barriers related to academic skills, and time and support for study were found to significantly influence perceived learning. Student barriers other than academic skills, and time and support for study were not observed as predictors of perceived learning.

Results on student barriers to online learning indicate that students who have fewer barriers related to academic skills, are more successful in academic achievement and perceived learning. Those with fewer barriers related to academic skills were more successful in terms of learning. Academic skills influence achievement and perceived learning.

Student barriers to learning motivation on online learning have been found as predictors of academic achievement. Many studies indicate that learning motivation affects achievement (Brophy, 2010; Hudley& Gottfried, 2008; Schunk, 2007). Many studies also indicate that learning motivation affects achievement, especially in online learning (Merisotis& Phipps, 1999; Moore &Kearsley, 2012). This result is consistent with the literature.

Finally, barriers related to time and support for studies were found as a predictor of perceived learning. Perceived learning is a subjective indicator of learning, and barriers related to time and support for studies are related to how we perceive environmental factors. For that reason, students' perceptions of environmental factors (time, family, social, etc.) determine their perceived learning levels.

The study results indicated that gender and job status are predictors of both academic achievements and perceived learning. On the other hand, when student barriers to online learning as predictors were investigated, it was indicated that barriers related to academic skills are one of the predictors of both academic achievements and perceived learning, learning motivation is one of the predictors of academic achievement, and lastly barriers related to time and support for studies is one of the predictors of perceived learning.

Based on the study's conclusions, it could be recommended that future studies investigate student barriers to online learning with other dependent and independent variables or investigate these barriers with the same variables by measuring different instruments or gathering data from different students. Besides, the current study has some limitations about the nature of the study, participants and instruments. The first limitation is about the academic achievement variable. It was surveyed with one question "what is your latest GPA?". It could be measured with an achievement test or identified as details with transcripts. But it was preferred

because of the difficulty of implementing achievement tests online and getting personal information. Another limitation is including variables to analyse barriers to online learning. The current gender and job status were included; it could be other variables that affect online learning barriers. For future studies, different variables could be investigated. The last limitation is how the perceived learning scale was used. Factors of perceived learning scale were not used one by one; it was used as one factor with the total score.

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WHEN TECHNOLOGY-BASED LEARNING IS THE ONLY OPTION: EVALUATING PERCEIVED USEFULNESS OF SOCIAL MEDIA

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ABSTRACT

During unusual times involving discontinued face to face sessions in formal education settings, mobile learning (m-learning) involving social networking sites has become a popular alternative since students are always in possession of handheld electronic devices. When connection through technology was the only option due to social distancing in current pandemic, students who were already active extensive users of social networks found online learning as a new way of getting formal education. The objective of this study was to explore how the state of student's behavioral intention for social media based online learning is driven by external factors like subjective norm and self-efficacy. To fulfill this aim, this study uses a quantitative approach to study the factors that mediate the decision behavior of students towards social media employed as a learning platform and use of m-learning involving social networks. A sample of management science students (n= 255) from four universities participated in the research. Analysis of data suggested that subjective norm and self-efficacy were significant predictors for student participation in e-learning initiatives involving social media and networks. The proposed serial mediation model revealed that self-efficacy and perceived usefulness in that order were playing a positive significant role in student use of social networking for learning. No significant differences were observed between either gender when self-efficacy, perceived usefulness, and use of social media in education were considered.

Keywords: E-learning, m-learning, social media, serial mediation, technology based learning.

INTRODUCTION

The use of electronic and digital communication technologies has revolutionized student learning and has helped in playing a vital role in changing perceptions towards e-learning. Learning evolved from behaviorism through cognitivism, moving on to social constructivism thereby taking a path from knowledge that was communicated to one that was negotiated and then became collected knowledge (Kundi & Nawaz, 2010). Considering the positive aspects of e-learning specifically in the context of being asynchronous and location independent, it easily accounts for different learning styles due to its ability to distribute personalized content in a more comfortable and adjusted learning environment (Zaric et al, 2018). A noteworthy increase in learning and academic effectiveness is possible by employing e-learning when it is put into practice by giving importance to requirements of the learners (Bennet, 2008; Hakak et al, 2019). Self-regulated learning and material that supports it clearly are key aspects of online learning. Face to face learning is preferred when shared understanding is needed when communicating or when interpersonal relations are vital (Paechter & Maier, 2010). Self-regulated learning skills among students are essential for successful adoption of e-learning

programs because students will not be subject to teacher-dependent instructional methods (McConnell, 2017). Popularity of multimedia based e-learning systems cannot be ignored. According to Dongson & Zhou (2003), e-learning delivery with interactive multimedia helps learners develop better understanding and they perform in a manner comparable to classroom learning. Rapid changes in educational world are causing rapid changes to the learning and teaching strategies of higher education institutions (Almaiah et al, 2020; Vershitskaya et al, 2020). Many have started to provide virtual learning opportunities and others are employing the Internet to deliver online educational content in addition to traditional methods of education (Erich & Vargolici, 2008). However, it was also suggested that use of ICT based education alone was insufficient to improve educational outcomes (Kirkwood 2009). Expectations of students with regards to learning and assessment were equally important. Similarly, the practices and beliefs of the faculty regarding teaching and assessment were important due to their impact on the learning process experienced by the students. Bowers and Kumar (2017) studied teacher and social presence in online learning environment and found that it was stronger in such an environment as compared to traditional classroom.

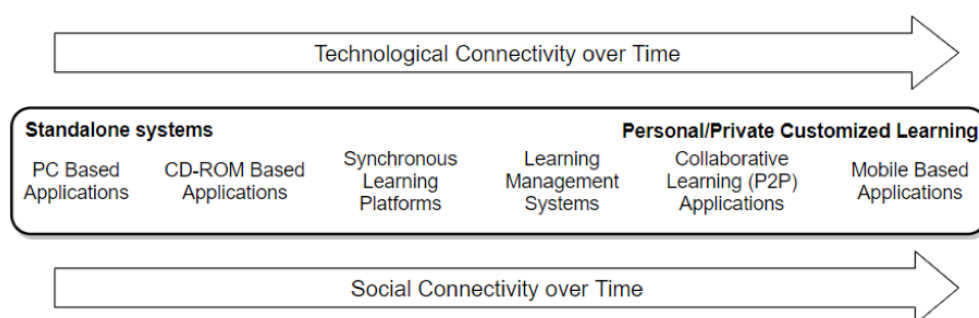


Figure 1. Evolution of Learning Systems over Time

Technological advancements in Internet and then mobile technologies have revolutionized learning systems by increasing both technological and social connectivity over the years as seen in Fig 1. The present era of the Internet has transformed social interactions to new levels. Immediate access to information is available through mobile devices having great potential to change the way students are learning and educating themselves beyond the classroom. Social media is extremely popular among young college students. Websites and corresponding mobile applications like Facebook, WhatsApp, Instagram, Twitter, Snapchat and YouTube are among the most common ones these days (Al-Abdullatif & Aladsani, 2021). Among college students, sharing of ideas and information through social networks is emerging in the educational context as well. While students of engineering and computer sciences are expected to learn new technologies in their academic curriculum, students of management sciences are not left behind when uses of mobile technologies for learning are considered and explored. These students readily understand the benefits of social media assisted technology-based learning (Vate-U-Lan, 2020). Identifying the role of factors affecting technology adoption for learning is the central idea of this research.

This research study is based upon the theoretical framework of the Technology Acceptance Model (Davis, Bagozzi & Warshaw 1989) and explores how the state of student's behavioral intention for social media based online learning is driven by external factors like subjective norm and self-efficacy. These factors associate with and influence perceived usefulness of technology and thereby motivate subsequent use of technology for learning purposes. The next section begins with an account of the past researches conducted in this area and identifies the proposed hypotheses to be tested. The methodology, description of the data, and results of the analyses are presented. Finally, the discussion on results is provided and the paper concludes with mentioning implications and limitations of the research.

REVIEW OF PRIOR RESEARCH

It is important to understand how learning theories have evolved over time as technology developed over the years. Three main learning theories, behaviorism, cognitivism, and constructivism were widely known before the impact of technology on learning changed everything (Schunk, 1996). The traditional approach of teaching and learning is an approach where the teacher is in control and a source of information. This approach is still practiced in higher education institutions but the development of technologies has made the student responsible for his activities and learning. Fig 2 shows the key features of learning theories.

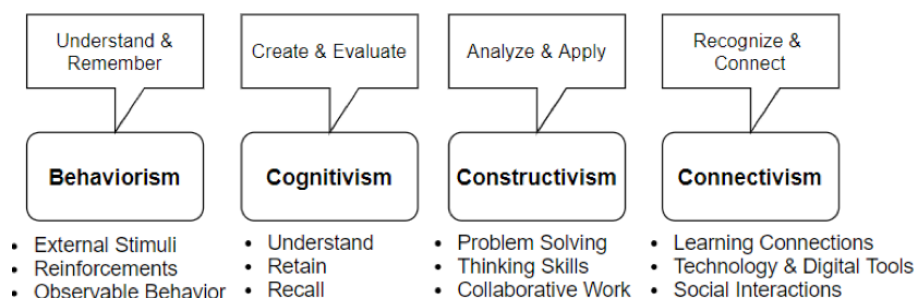


Figure 2. Learning Theories

A key reason is the limitations of the three mentioned learning theories, that they do not address learning which takes place through usage of technology. Moreover, these theories are not focused on the value of what is being learned. Learning or actionable knowledge can be present within an organization or a database (outside an individual) and is targeted on making and connecting specialized information sets which enable our learning (Siemens, 2004). Connectivism was proposed by Siemens (2004) characterizing it as the theory of the digital age which considers the presence of computer networks and contemplates the knowledge and abilities as a consequence of reciprocated interconnection of information and individuals. Technology has brought students closer than before to multiple knowledge sources previously unreachable and they can interact with other teachers and connect to students located anywhere. It is due to technology that a large number of people have been connected to continuing education and lifelong learning opportunities. It was previously unthinkable that anyone could be allowed to enroll in a course for learning. However, technology-based education made this possible. Massive open online courses (MOOCs) are based extensively on mutual interconnections between learners as a way of imparting modern education making connectivism very relevant as it influences those taking these courses and trying to apply it in teaching and learning (Bell, 2011; O'Connor, 2014).

Advances in information and communication technologies have reached new heights consistently. Mobile phone penetration in the masses is increasing in every country. Linking this development with technology-based learning, mobile technologies and the widespread use of smartphones among students has made mobile learning (m-learning) a significant educational technology element in higher education. Since students are connected to each other through social networks, m-learning makes it promising for students to learn, cooperate, and share ideas and educational material with each other using this technology. Use of social networks in education has been widely researched and it has been proven that teaching and learning undertakings in educational segments can be enhanced by using social networks and e-learning tools (Balakrishnan, 2014; Rennie & Morrison 2013; Al-Emran et al, 2016).

Since social media has integrated itself into everyday lives, scholars have argued for its integration as an educational tool in order to mediate and enhance instruction delivery and promote active learning in students (Tess, 2013). However, some pedagogical issues or institutional constraints are likely to limit and restrict social media use in classrooms and instructors may not be inclined to integrate them in their teaching practices (Manca, S., & Ranieri, 2016). Although perceived basically for non-academic use, students were positive using Facebook instructionally as compared to the faculty. However, time brings rapid changes towards technological attitudes as evident by progress made in the last few years, and it can be stated that social media will have a greater role to play in education (Roblyer et al, 2010; Klimova & Poulova, 2015).

Advantages gained by using mobile devices in student learning are primarily quick access to information and offering ways of communication and collaboration in different ways to fulfill student needs. Mobile devices coupled with social media and networks have shaped prospects for interaction and collaboration. Other uses include social media for content creation and sharing besides communication and working with web-based tools having continuous connectivity (Ortiz & Green, 2019; Gikas, J., & Grant, 2013). Use of social media for cooperative learning was studied and significant relationships were found between perceived usefulness and collaborative learning with intent to use social media for learning (Al-Rahimi & Othman, 2013). Hence, use of social networking sites (SNS) and social media with related technologies for learning is identified as a variable of primary interest in this research.

The issue of technology based learning to be accepted as a way of imparting education in universities then becomes a matter of technology acceptance with a requirement to explore factors that cause users to accept and utilize newer technologies for learning. The Technology Acceptance Model (TAM) suggests a number of factors influencing the decision about how and when users will use the new proposed technology (Davis et al, 1989; Shao, 2020). However, in case of technology based learning systems, as already mentioned, some additional factors need to be considered. Technology based systems require a study of variables from cognitive and social domains with knowledge of learner's personal characteristics in their design and employment (Siadaty & Taghiyareh, 2008). Therefore, it follows that technology acceptance depends upon a number of factors that need to be researched. TAM proposes two primary concepts (Davis, 1989). First, perceived usefulness (PU) is the extent to which a learner believes using technology will increase his or her learning. Secondly, perceived ease of use (PEOU) implies that using technology for learning will be free of mental and intellectual effort. TAM has been widely explored in the educational field to evaluate the effect of PU and PEOU on student learning through acceptance and use of e-learning initiatives (Park, 2009; Park, Nam & Cha, 2012).

The present study uses a theoretical framework based upon TAM to explore the approach of technology acceptance as behavioral aspect of technology adoption. The same has been studied in different researches in the past in different contexts. Factors affecting attitude toward utilizing social media through factors like PEOU and PU were identified (Woojin Lee et al, 2013). For example, in an Australian study, the findings indicated that perceived usefulness and management support were significant in explaining technology adoption (Talukder, 2012). As far as personal factors were concerned, student self-efficacy was found to be an important variable to understand user's acceptance of e-learning and the attitude towards its adoption (Park, 2009). Social factors have been reported to influence technology acceptance (Niehaves et al, 2012). Rupak (2014) studied technology adoption behavior of social network sites and support the technology acceptance model for their evaluation process. In the cooperative learning environment, the ability to share information impacts intent and attitude toward technology acceptance and adoption (Chung and Veugel, 2013). Another study related to use of mobile learning confirms the validity of the technology acceptance model and highlights student attitude as the most important construct to use technology (Coelho Junior et al, 2019; Park et al, 2012).

External factors have been studied and found to be important determinants of technology adoption. This research focuses on the relationship of self-efficacy and subjective norm towards technology adoption. Self-efficacy (SE) has been identified as a commonly occurring external factor of TAM in literature. Computer Self-Efficacy (CSE) is what an individual believes is their ability to undertake a certain task using the computer (Kher, Downey, & Monk, 2013; Vekiri & Chronaki, 2008). There is a commonality between computer literacy and anxiety as the constructs having an influence in terms of positive or negative self-efficacy because those who perceive computers as too complex and think they are not able to use computers will avoid those (Lee & Huang, 2014). On the contrary, users of computers in early life have much lower computer anxiety and hence a greater technological self-efficacy (Shank and Cottec, 2014). This advocates that learners having higher technological self-efficacy are more certain to adopt e-learning and computer supported education (Celik & Yesilyurt, 2013; Chang et al, 2014; Pellas, 2014).

Subjective Norm (SN) relates to the influence a person has on his or her perception or thinking caused by people close to him or her about performing a certain behavior (Venkatesh et al., 2003). In case of e-learning in an educational context, it is about the influence of family and friends on a student's inclination to use e-learning. Subjective norm could also be considered like an environmental or peer pressure which a student

feels or considers to practice e-learning (Agudo-Peregrina et al. 2013). It is commonly observed in real life that a person gets influenced by people who are valued. Similarly, if a student is influenced by closer ones into adopting e-learning in addition to regular classroom education, he or she is very likely to give due importance to these suggestions and will consider using e-learning initiatives. Here, an intrinsic motivator in form of subjective norm influences student behavior by making a positive attitude towards use of e-learning (Park et al, 2012). To generalize this argument, it could be concluded that affirmative beliefs about use of technology-based learning and its applications in real life could be brought about by people who are close, respected and valued. Decisions regarding technology adoption among males and females have been linked to subjective norm, attitude towards technology and usage behavior.

Although the relationship between SE and PU has been studied in the past and an average medium effect size has been reported by Abdullah & Ward (2016), this research explores the serial mediating effect of SE and PU (in this order) on use of social media for learning. To the best of the author's knowledge, this serial mediation model and corresponding relationships have not been explored in previous studies and therefore considered a significant contribution of this research. Previous researches have reported findings highlighting both significant differences and no differences among males and females as far as technology adoption and use was concerned (Ramirez-Correa et al, 2015). Relevant hypotheses have been developed and are presented in the next section.

RESEARCH HYPOTHESIS

Given the theory and evidence from the literature above, it is hypothesized that SN is related to use of social media for learning through SE first and then PU. Integrating the two models with mediation through SE and with mediation through PU suggests a three-path serial mediation model, depicted in Figure 1 (Hayes, 2013). It was tested whether self-efficacy and perceived usefulness sequentially mediate the relationship between subjective norm and social media use for learning. Moreover, the hypotheses that PU, SE and SN scale scores are significantly different across gender and program groups is also presented. The following hypotheses are being proposed according to the previously stated objectives:

- H1: The relationship between subjective norm (SN) and use of Social Media (USM) for learning is mediated by self-efficacy (SE).
- H2: Perceived Usefulness (PU) mediates the relationship between subjective norm (SN) and use of Social Media (USM) for learning.
- H3: The relationship between subjective norm (SN) and use of Social Media (USM) for learning is sequentially mediated by self-efficacy (SE) and perceived usefulness (PU).

METHOD

In order to achieve the research objectives, quantitative research method was applied to collect data for further processing and analysis. This study utilizes cross sectional survey research design involving data collection from university students through a group administered questionnaire. The data for analysis was collected from students who were using social media and the internet for learning in addition to routine classroom education. The questionnaire used in this research was adapted from Park, Nam & Cha (2012) and Park (2009).

Participants

To undertake data collection, an online questionnaire was used and 301 usable responses with no missing data were received. A stratified sampling approach was used to select management science students from four universities in the Islamabad and Rawalpindi region. This data was considered statistically adequate for analysis purposes. Considering the requirements of sample size, the acceptable sample size limit would require a 10:1 ratio between responses and variables to be analyzed (Hair & Anderson et al, 2010). Hence, the original sample size of 301 for this research was considered appropriate as it was more than the minimum

requirement of 220 cases for this research. For closed ended questions, five point Likert-scale was used. The reliability statistic (Cronbach alpha) was 0.91 indicating high internal consistency. Amongst the respondents, 68 percent were males and 32 percent were females. The institution and program-wise distribution of participating students after data screening is given in Table 1.

Table 1. Demographic Features of Respondents

Variables		f	%
Institution	Public Sector	117	45.9
	Private Sector	138	54.1
Program	Undergrad Year 1 & 2	48	18.8
	Undergrad Year 3 & 4	70	27.5
	Graduate (Masters)	137	53.7
Gender	Male	175	68.6
	Female	80	31.4

The autonomy of individual respondents for this research was given due consideration by the researchers and all participation in the survey was voluntary. Confidentiality of participants and informed consent were specifically ensured. All participants were informed that their identity and individual responses were to be treated as anonymous and utilized only for the purpose of this research.

Data Preprocessing and Screening

From the 301 collected responses, 43 cases (28 males and 15 females) were removed owing to unengaged responses to the Likert scales (stdev < 0.50) leaving a sample size of 258. Multivariate outliers in the data were checked using Mahalanobis distance and three cases were identified and removed as outliers (Tabachnick & Fidell, 2013) leaving the total number of cases to 255 as the final sample size for further analysis. All data analysis was done using SPSS® software and mediation analysis was done using the PROCESS computational tool (Hayes, 2012).

FINDINGS

The mean, standard deviation, correlations, and reliability (Cronbach alpha) values for the study variables are given in Table 2. The Pearson's correlation coefficient values between the constructs under study represent all moderate to strong positive and statistically significant associations. There is no negative correlation as expected in this study. Since these are self-reported measures, common method bias was considered and evaluated through Harman's single-factor test approach (Podsakoff et al, 2003). Since the items did not significantly load onto a single factor, it was ascertained that there was no common method bias in the collected data.

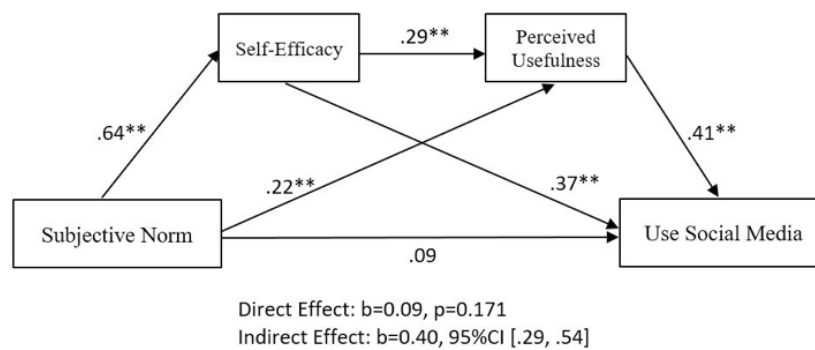
Table 2. Correlation Matrix for the Variables

Variables	(1)	(2)	(3)	(4)	M	SD	(α)
(1) USM	1	.584**	.642**	.396**	3.61	.032	0.84
(2) PU	--	1	.553**	.429**	3.60	.055	0.77
(3) SE	--	--	1	.437**	3.72	.071	0.85
(4) SN	--	--	--	1	3.59	.055	0.84

Note: ** Correlation is significant at 0.01 level (2-tailed), N=255, $p=.000$

USM: Use of Social media, PU: Perceived Usefulness, SE: Self-efficacy, SN: Subjective Norm

The mediation hypotheses testing approach directly tests the indirect effect between predictor and the response variable through the two mediators in series using a bootstrapping procedure (Hayes, 2013). The tests were undertaken by following serial mediation model 6 using the PROCESS software for SPSS (Hayes, 2012). To test the mediation hypotheses, it was established whether the relationship between subjective norm and social media use were mediated by self-efficacy and perceived usefulness in the same order. Fig 3 shows these mentioned paths with path coefficients. Initially, the total direct (c) for subjective norm was significant (0.492, 95% CI = [0.351, 0.653], $t= 6.861$, $p= .000$). After the mediating variables were incorporated in the order given, the direct effect (c') was reduced to non-significant level (coefficient=0.09, $t=1.374$, $p=0.171$). It was observed that the effect of subjective norm on social media use was fully mediated by the two mediators. Hypothesis H1 and H2 were supported as evident from statistically significant path coefficients in Fig 3. Further explanation is offered in subsequent paragraph. The total indirect effect (coefficient=0.40) and the significance of this indirect effect were tested using bootstrapping procedures. Unstandardized indirect effects were calculated for 5000 bootstrapped samples, $SE=.063$ and the 95% CI = [0.29, 0.54]. Thus, the indirect effect was statistically significant. These results supported the mediation hypothesis H3. The specific indirect paths are explained subsequently.

**Figure 3.** Three Path Mediation Model with Regression Coefficients

The estimates of indirect effects and the 95% bias corrected bootstrapped confidence intervals for path estimates are provided in Table 3. Hypothesis H1 stated that the relationship between SN and USM for learning is mediated by SE. This hypothesis is supported. Hypothesis H2 stated that PU mediates the relationship between SN and USM for learning and this hypothesis is also supported. As per hypothesis H3, the relationship between SN and USM for learning is sequentially mediated by SE and PU. This hypothesis was also supported.

The analyses conducted shows that self-efficacy mediated the relationship between subjective norm and perceived usefulness, and that perceived usefulness mediated the relationship between subjective norm and social media use. Formal testing of hypothesis H3 concluded that subjective norm was positively associated with self-efficacy and perceived ease of use, which related to use of social media for learning.

Table 3 Path Coefficients and Indirect Effects for Mediation Models

	Path Coefficients			Indirect Effects	
	Use SM	SE	PU	Estimate	Bootstrap 95% CI
SN	0.09 (0.06)	0.64 (0.08)	0.22 (0.05)		
SE	0.37 (0.05)		0.29 (0.04)		
PU	0.41 (0.07)				
Total				0.40 (.06)	0.29, 0.54
Ind1				0.24 (0.05)	0.15, 0.35
Ind2				0.08 (0.02)	0.04, 0.13
Ind3				0.09 (0.04)	0.03, 0.17

Note: N = 255. Bootstrap confidence intervals were constructed using 5000 samples. Standard error in parentheses. SN: Subjective norm; SE: Self-efficacy; PU: Perceived usefulness

Total effect (Sub Norm → UseSocMed) = 0.49 (.07)

Ind1: Sub Norm → SelfEffi → UseSocMed

Ind2: Sub Norm → SelfEffi → PercUsef → UseSocMed

Ind3: Sub Norm → PercUsef → UseSocMed

DISCUSSIONS AND CONCLUSION

Widespread availability of mobile technology and corresponding increase in social media use has provided ubiquitous tools for social connectivity in everyday lives. The frequent use of smartphones by the young generation have provided for an emerging mode of learning, where social media is used in the mobile learning mode. Since over 80 percent of students' own smartphones, the omnipresence of social media and its usage is evident at institutes of higher education. The primary objective of this study were to ascertain the relationship between subjective norm (beliefs of students towards usefulness and suitability of e-learning) and the actual use of social media in education. This research found a significant relationship between the two, meaning that students find e-learning useful and are thus willing to incorporate the social networking into formal learning by using relevant tools in practice. These results are consistent with the findings of Morbey, Sabeti & Frank (2014) who observed that majority of students in their study were willing to incorporate social media into higher education and faculty members were also capitalizing upon existing social media strengths of students to improve formal academic practices (Stathopoulou et al, 2019). Using technology in education that is relevant (as it fully supports the connectivism theory) and familiar to students is a positive sign since it does not require any complex training to develop expertise for its use. In another study, it was found that students participating in Facebook study groups were learning and performing better in university studies (Cuesta, Eklund, Rydin & Witt, 2016), however, the integration of social networking in education is a choice that each instructor could make at their own level (Tess, 2013).

Secondly, this research explored the mediating roles of self-efficacy (SE) and perceived usefulness (PU) towards social media use in education and a positive relationship was observed between them in this research. SE and PU have been separately studied in many researches and positive significant associations have been observed between them and intention to use and actual use of technology for learning. However, this research makes an additional contribution to the literature by finding significant mediating effects of these constructs. A positive relationship between SE and PU with an average medium effect size has been reported by Abdullah & Ward (2016) after reviewing the relevant literature and the present research is in agreement with the finding with the additional serial mediating effect of SE and PU (in this order) on use of social media for learning.

The effect of SN on e-learning acceptance has been established in this research and significant positive relationship has been found which is in agreement with previous studies done on the two constructs (Abdullah & Ward, 2016; Park, 2009; Choi & Chung, 2013; Hanif, Qaisar & Imran, 2018). While SN is like an extrinsic motivational factors, it is found to strongly influence student intention to use social media for learning and with the significant mediating effects through self-efficacy and perceived usefulness on social

media adoption, the implications of these findings are vital. Students who are already users of the technology primarily for social interactions need to be encouraged by the faculty to use it for learning purposes and accept the change caused by the ubiquitous interconnected environment that supports education and learning across any boundaries. The positive influence of subjective norm can then come from the faculty and administration who must make it easier for students to adopt mobile based social media assisted e-learning as such experiences will be valuable for their forthcoming professional lives.

Considering the role of gender on self-efficacy, this research did not find any significant differences between males and females and found them equally self-sufficient to use technology. Although technology is traditionally thought of as male dominated, this is changing rapidly as far as technological advancements in ICT are concerned. The respondents of this study were undergraduate and graduate students and the results are in agreement with studies which concluded that higher levels of technological proficiency and self-efficacy existed in students of age group 18 to 25 years (McCoy, C. 2010). Moreover, male learners did not have added self-efficacy and affirmative attitude than females concerning the use of technology (Yau and Leung, 2016; Al Qaysi et al, 2019). That explains why there were no significant differences between undergraduate and master's students as far as self-efficacy and perceived usefulness were concerned. Young students are more technology savvy and gender differences drop intensely among the younger group and a unisex pattern of equality emerges as far as technological self-efficacy is concerned (Morris, Venkatesh, & Ackerman, 2005).

The technology acceptance model has been studied extensively in previous researchers, however, very few researches have attempted to explore and understand the mediating effects of external factors of technology adoption for social media based learning. This study explores TAM in current learning environments where majority of the students have access to mobile technology for learning. Hence, the significance of this research is to identify underlying factors that mediate and influence students' intents to use innovative learning technologies that involve social networking applications. Collaborative technology and its adoption for learning is largely influenced by near ones as seen by the positive relationship discovered in this study. The perceived usefulness of these technologies is important and regardless of gender or level of education, subjective norm and self-efficacy of the students are positively associated with technology-based learning.

Practical implications for this research can be seen in times like the COVID-19 pandemic when the only way left for continuation of formal education was through the use of technology. Adding to problem was a situation where face to face meetings became impossible and student collaboration through social networks took over as a new norm. Since students are deeply involved in use of mobile technologies for social use, there is a need to use research on effective learning strategies that help students connect with technology by engaging them to promote collaborative learning. Course material and assignments preparation efforts by the faculty with the additional use of personal mobile devices can help expand student engagement by leveraging blended learning opportunities.

Limitations and Future Research

One limitation of this research study is sampling of students from four universities only and may limit the boundaries of generalizing the drawn conclusions from the analyzed data. Other variations could be explored in the research model by adding more dimensions to explain student participation in e-learning initiatives. For example, attitude towards learning technologies and personal characteristics of learners are dimensions that can be explored to explain student participation in future research. Additional research can link more external factors with the studied outcome variables along with their mediating and moderating effects on the behavioral intention of technology adoption to make users acceptance of e-learning programs a success.

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AUTOMATED FEEDBACK AND TEACHER FEEDBACK: WRITING ACHIEVEMENT IN LEARNING ENGLISH AS A FOREIGN LANGUAGE AT A DISTANCE

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ABSTRACT

Information and communication technologies have been transforming the way we teach and learn. Either for facilitating teaching practices or for making learning more interesting and joyful for the learners, artificial intelligence-based applications are utilized in recent years. In this connection, this study intends to examine if automated feedback and teacher feedback contribute to academic writing achievement and whether they differ in their effect on achievement in learning English as a foreign language in an open and distant learning context. The participants of the study were open education faculty students in a higher education institution in Turkey. In this quasi-experimental quantitative study repeated measures design was adopted. the participants were given writing tasks each week in a nine-week writing activity and they received feedback from their English language teachers for the first three tasks, and they received feedback from the software for the last three tasks. All participants wrote an English text as a diagnostic test at the beginning of the process. At the end of the teacher and software feedback phases, they took post-tests. All grades were statistically analyzed in order to find any effect of regular feedback either from a language teacher or from an online software on academic writing achievement. Results revealed significant differences between the diagnostic test and two achievement tests. Participants tended to improve their academic writing skills by taking regular feedback, and it was observed that the writing scores increased slightly more when receiving feedback from teachers compared to automated feedback software.

Keywords: Automated feedback, English as a foreign language, writing achievement, open and distance learning, teacher feedback.

INTRODUCTION

The English language has become a global language and medium of both traditional and online instruction across the world. This has made English a must course in many countries. It is known that teaching English as a foreign language (EFL) in open and distance education context has its own difficulties, and it becomes even more challenging for those instructors who have less favorable views of technology (Kessler & Plakans, 2008). Interaction, as one of the most essential components of open and distance learning (Simonson, Smaldino, Albright & Zvacek, 2006), can be supported via regular, effective, and timely online feedback. Likewise, Moore and Kearsley (2012) highlight the importance of timely, effective feedback. Particularly, in language learning, certain skills like writing require regular, continuous feedback from the instructor (Andersen,

Yannakoudakis, Barker & Parish, 2013, p. 32). Studies in the literature report large amounts of evidence in favor of enhancing the role of feedback on EFL writing achievement (Bozkurt & Acar, 2017; Daneshvar & Rahimi, 2014; Ferris, 2006; Hattie & Timperly, 2007). In these studies, timely and effective feedback given to writing activities significantly increases student success (Daneshvar & Rahimi, 2014; Hattie & Timperley, 2007; Scheeler, McKinnon, & Stout, 2012; Shute, 2008). Moreover, formative feedback has been seen to increase fluency in writing skills (Hier & Eckert, 2014). With the help of feedback, learners engage in dialogue within themselves by making reflections on what they produce, develop their own understanding and ensure their language development by internalizing correct forms (Swain, 1995). According to the Interaction Hypothesis (Swain, 1985) in foreign language learning, learning occurs through the exposure of the student to the target language, the production of the language, and feedback they receive about this production (Gass & Mackey, 2007). However, the growing number of students in mega universities makes it even harder to provide language learners with individualized feedback (D'antoni, et al., 2015, p. 2). In this study, an automated feedback tool within the scope of EFL learning at a distance is examined in terms of enhancing English writing achievement.

THEORETICAL FRAMEWORK AND LITERATURE REVIEW

Feedback in Foreign Language Learning

Feedback, which has various definitions in the literature (Carter, 1984; Mory, 2004), is defined in this study as any kind of formative, indirect or indirect semi-corrective remedial written commentary, sign, or indicator that a learner can approve (Wu, 2014), evaluate (Johnson & Johnson, 1993), add, and restructure his/her existing knowledge whenever he/she needs it during the learning process. This feedback might be for learner's current activity, for the learning process, for the learner's own development, or for his/her future planning as long as it serves their learning aims.

There are different sources of feedback, and the most common one is teacher or instructor feedback (Martin & Valdivia, 2017). Apart from teacher feedback, there are also peer feedback, automated feedback, and self-correction. It is emphasized that learners tend to find teacher feedback more complex, yet they perceive it as more reliable and effective when compared to other sources of feedback. This might be due to the fact that teachers mostly use their expertise and reflect their own insights onto the feedback they give, which in result creates more effective feedback process (Gielen, Tops, Dochy, Onhema & Smeets, 2010).

Feedback plays a significant role in foreign language learning processes as well, and especially developing productive skills requires more intensive practice along with more feedback exchanges between content-teacher-learner. According to the Interaction Hypothesis in the field of foreign language acquisition, structures such as input (Krashen, 1982, 1985, Long, 1996), interaction (Pica, 1998), feedback, and output (Swain, 1985, 1995) play an important role in the learning process. Feedback encourages learners to create hypotheses by reviewing what they produce about the nature of language problems. Thanks to the feedback, the learner gets the opportunity to make performance arrangements by interacting with the more competent and knowledgeable counterparty. Feedback also efficiently combines input, student prior knowledge, selective attention, and output (Long, 1996, pp. 451-452). Krashen (1985) stated that language learning is directly related to the amount of understandable input a learner receives. In order for learners to internalize the forms and structures in a foreign language, learners need tools such as repetitions, affirmations, re-corrections, and controls to reinforce the meaning (Pica, 1994, s. 500). Learners become aware of their linguistic problems and structures that they do not know or know wrong with the productions they make in a foreign language. This awareness can be achieved through explicit or implicit feedback (Swain, 1995, p.129).

Particularly, writing has always been recognized as an effective skill that contributes to students' language learning. However, for many EFL learners, writing is considered to be challenging since it is an active, productive skill (Erkan & Saban, 2011), and because it requires rhetorical organization, proper language use, and a certain level of vocabulary background. Therefore, the questions whether feedback improves learners' academic writing skills and what kind of feedback is more effective have been the focus of attention in many studies (Bozkurt & Acar, 2017; Hattie & Timperly, 2007). Gebhard (2000), underlines the importance of process approach to writing by pointing out that learners should engage in a process of creating and recreating by writing multiple drafts so that they can make inner evaluations. According to Sulistyo, Mukminatien,

Cahyono, and Baukah, (2019) writing in foreign language as a process becomes more effective when it is accompanied by educational technologies.

Feedback has been discussed and categorized according to its functions such as error analysis, motivation, and interaction. Of these functions, the error analysis helps learners clarify and understand their errors (Mory, 2004). The other function of feedback might be to motivate and encourage learners by making them realize that they are making progress (Hattie & Timperley, 2007; Pyke & Sherlock, 2010). One function of feedback might be to enhance interaction in the learning process, which in return might diminish the learners' feelings of isolation (Alger & Kopcha, 2009).

Automated Feedback in Foreign Language Learning

The increasing demand for foreign language learning tools to support the teaching and learning of the English language all around the world (Chodorow, Gamon & Tetreault, 2010, p. 420) triggered the development of automated scoring and feedback systems for the assessment and learning of a language. However, giving automated scores and feedback is regarded as an extremely complex task as it requires expertise in first or second language acquisition (SLA), language assessment, educational measurement, and computational linguistics (Xi, 2010). It is expected that machine learning and NLP will have a major impact on teaching EFL (Al Emran & Shaalan, 2014, p. 393). To the authors, these technologies have led to the creation of intelligent language tutoring systems (ILTSs), which attempt to process and assess learner input to provide error detection, error source, and immediate individualized feedback. Automated feedback is of paramount importance in the learning experience, especially thanks to the effective and rapid response it provides in language learning (Boud & Molloy, 2013; Nicol, 2010). Among reasons for using automated feedback systems is their structure that is "... claimed to be effective if it (a) is individualized according to specific learner input, (b) points to the error type, (c) explicitly explains the error, and (d) leads to self-correction" (Cotos, 2011, p.423).

Automated feedback is not only regarded as cost-effective, but it is believed to give rigorous and prompt feedback as well (Hyland & Hyland, 2019). The effect of automated feedback on foreign language writing quality has been examined in only a small number of studies (Wilson, Olinghouse & Andrada, 2014). When the studies in the literature are evaluated, it is observed that the automatic feedback has the potential to improve the writing skills of EFL learners (Grimes & Warschauer, 2010; Shermis & Burstein, 2013; Cheng, Law & Wong, 2016). Some findings indicate that automated feedback helps learners reduce the number of errors in grammar, mechanics, and style (Kellogg, Whiteford, & Quinlan, 2010). Also, automated feedback increases content and holistic quality of papers (Wade-Stein & Kintsch, 2004), and overall writing ability of students in school districts (Vantage Learning, 2007). Even though there are few studies that suggest positive effects of automated feedback on the quality of learner texts, studies demonstrating the positive effects of these tools on overall writing proficiency are still limited (Stevenson & Phakiti, 2019). Despite highly positive perception on the benefits of the systems indicated above, there is still inadequacy that causes contradictions between instructors and narrow revisions among students (Warschauer & Grimes, 2008; Schulze, Heift, Thomas, Reinders & Warschauer, 2013). More studies regarding the empirical evaluation of automated writing evaluation feedback used for foreign language teaching/learning and academic writing should be conducted (Cotos, 2011) because studies have focused mainly on outcomes, and those studies tend to lack a focus on the learning process. Therefore, they shed no light on how automated feedback may shape learning to write (Chen & Cheng, 2008). According to Ramaswamy (2012), studies on automated feedback tools tend to give more importance to technical developments and the accuracy of the tools rather than the learning and teaching process. That is why, these studies are regarded as methodologically unsound and outcome based (Ramaswamy, 2012). More importantly, most of these studies in the literature focus on the efficiency of automated feedback systems in face-to-face learning contexts (Wilson & Czik, 2016) or distance education contexts. According to Stevenson and Phakiti (2019), automated writing feedback and evaluation tools have been designed for classroom use in order to decrease teacher labor on papers. They are regarded as supplementary tools, not as substitutes for teachers (Stevenson, 2016). These automated writing tools seem to be often used in English as a second language (ESL) settings) like college and high school classes with diverse student population (Stevenson & Phakiti, 2019). Some other studies analyzed automated writing tools in tertiary EFL settings (Li, Link & Hegelheimer, 2015; Lu & Li, 2016; Yu, 2015). These tools have the potential

to improve English writing proficiency of learners who are not necessarily students at a formal educational institution but might be adult learners who embark on lifelong learning in their own open learning contexts such as social networking sites. With these considerations in mind, this study focuses on those adult learners who voluntarily participate in the study to improve their English writing skills.

Write & Improve and Teacher Feedback

Write & Improve, an automated writing practice and feedback tool, used in this study, might provide an insight into the potential contributions of such tools on writing achievement. Write & Improve brings together long-standing academic research and technology in teaching/learning English in association with Cambridge English (Cambridge English, 2018). The platform provides writing practice and feedback in an intuitive, engaging, and easily interpretable way for EFL learners and it may be considered as a pedagogical application environment rather than a text-editing tool. Writing is regarded as a significant skill in language classrooms, and improvement in linguistic accuracy helps learners better communicate their ideas. More important point is to provide effective corrective feedback to improve linguistic accuracy (Li, Link & Hegelheimer, 2015). As an automated feedback tool Write & Improve also provides graphical feedback showing how well the student is writing (Caccamise, Franzke, Eckhoff, Kintsch, & Kintsch, 2007; Kintsch et al., 2007). Although there are studies in which different automatic feedback tools are used, current studies especially on Write and Improve are still limited (Cheng, Law & Wong, 2016, Czaplewski, 2009). For example, in Wali and Huijser's (2018) study majority of the learners found automatic feedback very useful and emphasized that it contributed to their development not only in writing but also in grammar and vocabulary.

The software feedback content that the participants of this study were exposed to included indirect, semi-corrective feedback on word-level such as spelling, grammar and vocabulary choice. Also, the tool drew attention of the students by coloring parts of sentences where more attention needed. The software did not provide direct correction. An example of software feedback can be seen in Figure 1.



Figure 1. Software feedback sample

The content of teacher feedback included mostly direct, semi-corrective feedback on word-level and mechanics including punctuation, word choice, tense, word order and spelling. The teacher gave feedback on the social media platform just below the tasks submitted by the students as a comment. The teacher either capitalized the correct form or suggested revision for problematic areas. An example for teacher feedback can be seen in Figure 2.

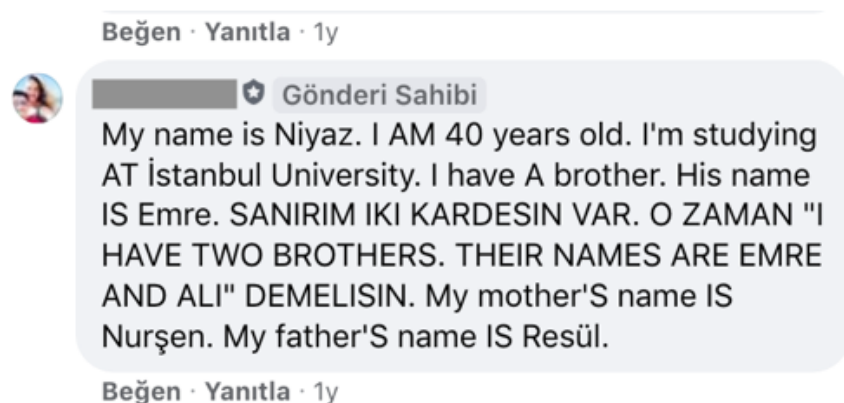


Figure 2. Teacher feedback sample

SIGNIFICANCE OF THE STUDY

Automated feedback tools have been investigated in a variety of studies across different contexts and genres, yet there is not much empirical evidence on the implementation of such tools with adult learners in an open and distance learning context. This study aims to investigate potential contributions of regular feedback from teacher and automated feedback tools to writing achievement in EFL learning for guiding writing practice purposes rather than writing assessment. Distance education that particularly depends on technological innovations may require new and authentic ways, which may require different feedback methods (Borup, West & Thomas, 2015). By means of these methods, learners can receive synchronous or asynchronous feedback that may have a positive impact on their online learning performance (Goldsmith, 2014). As a striking concept that pushes new boundaries in distance education, human-like feedback started to be given by automated feedback tools.

Another importance of this study is that it can give ideas about how much these tools, by giving fast and quality feedback on writing tasks as supposed, can help alleviate the burden of dealing with mechanical errors on adult learners who try to learn English as a foreign language with their own efforts in the context of lifelong learning. The study intends to answer the following main research question:

“To what extent does regular feedback contribute to English writing achievement of adult learners in an open and distance learning context?”

In order to analyze the main research question, the following sub-questions were sought:

- To what extent does teacher feedback contribute to English writing achievement of adult learners in an open and distance learning context?”
- To what extent does automated feedback contribute to English writing achievement of adult learners in an open and distance learning context?”
- Is there any significant difference between the initial step of regular feedback treatment (diagnostic test) and final step of the regular feedback treatment (software feedback post test)?

METHODOLOGY

In this quasi-experimental quantitative study a repeated measures design was used as it employs only a single group of participants. It is known that in “a repeated measures design, all participants in a single group participate in all experimental treatments, with each group becoming its own control. The researcher compares a group’s performance under one experimental treatment with its performance under another experimental treatment” (Creswell, 2012, p.315).

In this study, the participation was on a voluntary basis and 36 learners participated in the study all by taking a pretest, three writing tasks on different topics in which they received feedback from language teachers, a post-test followed by three more writing tasks on different topics in which they received feedback from Write and Improve software, and another post-test. Creswell (2012) points out that “...in terms of threats to internal validity, this design is not affected by threats related to comparing groups (i.e., selection, treatments, regression, mortality, maturation, or interactions with selection)” (p.316). However, time can be seen as a potential problem that increases the likelihood of influencing the outcome measure. Adequate time intervals should be left between the first application and the second application. Otherwise, the first application may affect the second application (Creswell, 2012, p. 316). In order to minimize the effect of the first treatment (teacher feedback), on the second one (the software feedback), the participants did not start the following tasks until 3 weeks passed.

Participants and Settings

The participants of the study were members in an open learning study group on a social networking platform, Facebook, and they were of various cities in Turkey. They were all graduates of an open education faculty. English language was compulsory and embedded in the curriculum in the majority of the programs in the faculty they were graduated from. Researchers made an announcement regarding the invitation to the study in the closed group. Those who wanted to take part in the study were grouped in another closed group that was opened particularly for the study. In the group the participants were informed about the procedures and how to use the automated feedback platform through videos and announcements. The learners participated in the study voluntarily, and their ages ranged from 28 to 54. All participants had completed their compulsory English I and English II courses successfully. These two compulsory courses at the faculty covered learning outcomes at A2 level of English proficiency. The number of participants varied from the first week of the study to the last week that is because some of them did not submit a few tasks. Therefore, the number of those who consistently participated throughout the study was 36.

Instruments

The announcements for the study were made in an open learning study group on a social networking platform, Facebook. The participants were invited to the study via this online platform, and they received writing tasks and instructor feedback on the same platform. The teacher raters who evaluated the diagnostic test and post tests were at least 10-year experienced EFL lecturers at Anadolu University School of Foreign Languages. For the diagnostic test, the teacher feedback post-test, and the software feedback post-test independent raters’ scores were compared and correlation was found to be .951, .985, and .915 respectively. This shows a high level of inter-rater reliability between the two raters of the study as Intraclass Correlation Coefficient (ICC) of .80 or higher reflects high reliability (Prince, Makrides, & Richman, 1980).

An analytic EFL writing criterion (see Appendix A), which belongs to Anadolu University School of Foreign Languages Testing Office, was used in the study with an official permission. This analytic criterion consists of components which are content, organization, grammatical competence, and lexical competence. It was used to grade pre-tests and post-tests of both software feedback phase and teacher feedback phase outputs.

Procedures

The study was conducted in 2019. The participants were invited to the study on the closed Facebook group called “Distance Learners”. The researchers opened another closed group called “Write and Improve” for those distant learners who accepted the invitation. Volunteered participants were primarily given a

diagnostic test that was a paragraph describing themselves. As the study aimed to analyze whether there would be development of writing proficiency at individual level, the purpose of the diagnostic test was to evaluate the writing proficiency level of each participant as their own starting points. Two independent raters evaluated the texts based on the criteria, and interrater reliability of the raters was calculated. Throughout the study the participants were given only descriptive tasks so that there would be no impact of genre difference on their achievement scores. After the diagnostic test, participants were given three different tasks, and they received online indirect semi-corrective feedback for each from a language teacher in two weeks' time. The indirect semi-corrective feedback included underlying problematic areas and suggesting learners' alternative corrections. Once the participants received their feedback for the last task, they were given a post-test that asked them to write a paragraph about their daily routines. This post-test at the same time served as a diagnostic test (starting point) for the second treatment, which was software feedback. After three-week interval the participants were given short information about how to use Write and Improve and they received three more tasks in each following week. They uploaded their tasks on the platform, and received automated feedback for their work as many times as they wished. The software provided indirect semi-corrective feedback by highlighting problematic areas such as spelling, word choice, tense, part of speech sentence fragments, and punctuation. It also offered possible corrections for those problematic areas. Once task and feedback processes were completed, the participants took a post-test that asked them to write a paragraph about the reasons why learning English was important to them. Their paragraphs were evaluated by two independent raters based on a holistic criterion. The scores for pre-test and post-tests were compared statistically via repeated measures t-test. Figure 3 describes the procedure of the study.

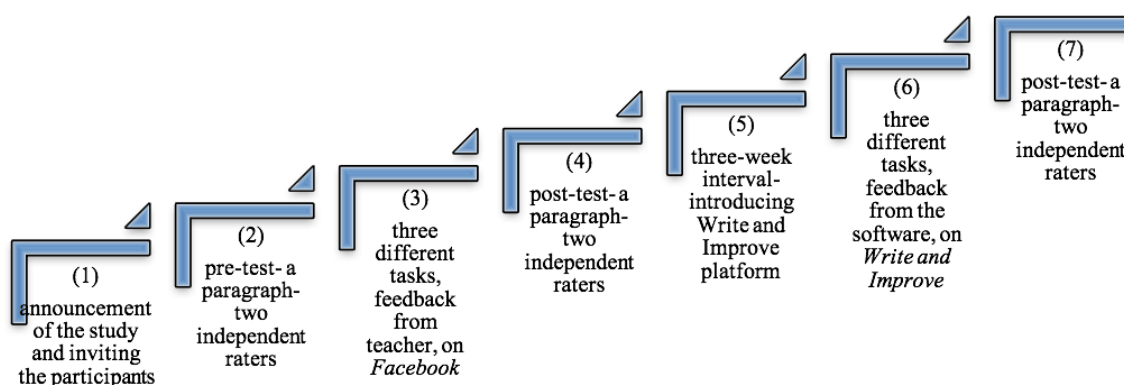


Figure 3. Procedure of the study

Data Analysis

In this repeated-measures design study, diagnostic test, post-test after teacher feedback (which also served as a diagnostic test for the second treatment) and post-test after software feedback were all evaluated by two independent raters based on a specific writing evaluation criterion. Inter-rater reliability of the raters for each test was calculated by correlation coefficient statistics (see Appendices B, C, D). Before running paired-samples t-test analyses to compare the mean differences of diagnostic and post-tests in each treatment, normality tests were calculated (see Appendix E). For normality tests Shapiro-Wilk was preferred as it is accepted as stronger and more convenient when the number of participants is lower than 50 (Razali & Wah, 2011).

FINDINGS

In order to answer the sub-research questions (a) and (b), researchers analyzed possible differences between mean scores of pre and post-tests for each application phase. The means scores of pre-test and post-test were compared using paired samples t-test statistics. As an assumption of t-test analysis, the normality test was run for pre-test, teacher feedback phase post-test and software feedback post-test. The calculated value was higher than .05, which shows that the distribution is normal (see Appendix E). A paired-samples t-test was conducted to compare writing achievement of the learners in no feedback (diagnostic test) condition and

teacher feedback condition. There was a statistically significant difference in the mean scores for diagnostic test ($M=9.31$, $SD=2.012$) and teacher feedback post-test ($M=13.39$, $SD=3.515$) conditions; $t(35)=-6.680$, $p<.001$. Table 1 shows the paired-samples t-test analysis.

Table 1. Paired samples t-test between pre-test and teacher feedback post-test

Paired Samples statistics	\bar{X}	n	SD	t	df	p
Diagnostic	9.31	36	2.01	68	35	.001
Teacher_Feedback_PostTest	13.39	36	3.51			

At the end of the automated feedback phase the participants took another post-test, which was rated by two independent raters through the same holistic criteria and which revealed high inter-rater reliability. A paired-samples t-test was conducted to compare writing achievement of the learners in teacher feedback post-test, which served as the diagnostic test for the second treatment (software feedback), and software feedback post-test. There was a significant difference in mean scores for teacher feedback ($M=13.39$, $SD=3.515$) and software feedback post-test ($M=14.71$, $SD=3.274$) conditions; $t(35)=-2.104$, $p=.04$ (Table 2).

Table 2. Teacher feedback post-test as a diagnostic test and software feedback post-test

Paired Samples statistics	\bar{X}	n	SD	t	df	p
TeacherFeedbackPostTest as Diagnostic test	13.39	36	3.515	-2.10	35	.04
Software_Feedback_PostTest	14.72	36	3.274			

Regarding the last sub-research question (c), the researchers intended to see if there is any significant difference between the initial step of regular feedback treatment (diagnostic test) and final step of the regular feedback treatment (software feedback post test). For this purpose, a paired-samples t-test was conducted to make the comparison. Findings revealed that there was a significant difference in mean scores for no feedback ($M=9.31$, $SD=2.012$) and software feedback post-test ($M=14.71$, $SD=3.274$) conditions; $t(35)=-10.637$, $p=.001$ (Table 3).

Table 3. No feedback (diagnostic test) and software feedback post-test

Paired Samples statistics	\bar{X}	n	SD	t	df	p
Diagnostic (No feedback)	9.31	36	2.012	0.63	35	.001
Software_Feedback_PostTest	14.72	36	3.274			

DISCUSSION

This study took place in an online open and distance learning context with voluntary participation of 36 adult learners. This study did not intend to compare and contrast each treatment condition post-tests with each other. Instead it aimed to examine if regular feedback, regardless of its source, contributes to EFL writing achievement to some extent. Findings of the study revealed that there is improvement in writing achievement of EFL learners with each treatment. Therefore, it can be concluded that software feedback might support learners' writing achievement when teacher feedback is elusive or it can be used as supplementary to the teacher feedback. There is evidence in the literature that automatic feedback can be more useful when used with teacher guidance (Sherafati et al., 2020; Wang & Wang, 2012).

The mean score of the diagnostic test was calculated as 9.31 out of 20, which can be regarded as a moderate achievement. For the first three tasks the participants received regular feedback from a language tutor on a social networking site. At the end of the first phase, the learners took a post-test, which was evaluated by two independent raters, and the inter-rater reliability was found to be high. The mean score of teacher feedback

post-test was calculated to be 13.39. The mean scores show that there is a sharp increase in learner writing achievement after receiving regular teacher feedback. The increase was found to be statistically significant. This might show that the writing achievement of the learners increased with the help of regular online teacher feedback. Since the study took place in open and distance learning context, there might also be other factors affecting the achievement such as extra instruction, exposure to target language, private course, social learning networks, learner WhatsApp groups, and mobile language learning application. However, these outside factors cannot be controlled unless the study has an experimental design. Therefore, these probabilities were counted beyond the scope of this quantitative study. As an essential part of learner success in achieving target skills, feedback plays a significant role in EFL (Boling et al., 2012; Bonnel, 2008; Hattie & Timperley, 2007). In this sense, this study showed parallel findings with the relevant literature (Alharbi, 2016; Purnawarman, 2011). For many language learners writing skill is regarded as one of the compelling skills (Erkan & Saban, 2011), yet the learners in this study seemed to overcome this challenge by receiving regular online feedback from the language tutor and revising their work based on teacher's semi-corrective feedback.

In order to minimize the effect of first treatment (teacher feedback), on the second one (the software feedback), the participants did not start the following tasks until three weeks passed. As the second phase the participants completed three different writing tasks for each of which they received regular feedback from the software. The mean score of the software feedback post-test revealed that the achievement level of the participants increased at a statistically significant rate. Even if the mean score of software feedback condition did not increase as sharp as the teacher feedback condition, the gradually increasing scores showed gains in EFL writing achievement thanks to automated feedback, which is a similar finding with some studies (Graham et al. 2015; Wilson & Czik, 2016; Wilson, Olinghouse & Andrada, 2014). This finding might also indicate that automated feedback software supports EFL writing achievement at a certain extent, yet they might not adequately replicate a real teacher (Cheng, 2017). Automated feedback software can be regarded as supplementary tools in EFL writing feedback (Wang & Wang, 2012). When evaluated in the context of this study, automated feedback tools can be seen as reinforcing the learner's own efforts and contributing to the motivation of the learner to sustain.

As advantageous sides are taken into account, learners can be free to upload their works on the system as many times as they desire. In this study, the online classroom learner activity data showed that learners tended to have their work checked by the system multiple times. They kept revising their works according to the formative feedback provided by the system. These attempts might be regarded as an application of self-regulated learning, which is known to increase learner achievement and motivation (Pintrich, 2000; Zimmerman, 2001) as learners engage in a process of continuously regulating their own learning with effort (Winne, 2011), managing their learning actively by themselves. In this study learners repeated attempts might indicate that learners' motivation and interest steadily increased thanks to the feedback provided by the system. It can be concluded that an automated feedback system might contribute to learner motivation and learner autonomy in EFL context (Fang, 2010) even in open learning context with adult learners. With another perspective, such tools, even though they are limited in detecting typing errors, help learners to receive immediate feedback, and this is what real teachers might not always do (Lavolette, Polio & Kahng, 2015).

The main aim of the research was to examine to what extent regular feedback contribute to the EFL writing achievement of adult learners. For this purpose, the scores of diagnostic test (no feedback condition) and final step of the regular feedback treatment (software feedback post test) were compared. Findings revealed that there was a significant difference in mean scores for no feedback and after treatments conditions. This difference cannot be owed to solely software feedback treatment or teacher feedback treatment. There must have been contribution of both treatments. The ultimate goal of the study was not to compare which treatment was more effective, but to find out if these treatments together contributed to writing achievement in general. This shows that regular feedback, regardless of its source (either from teacher or from software) contributes to EFL writing achievement to some extent. The regular feedback treatments provided by the teacher and the software might have helped learners to be better writers and each process might have created maturation for learners. Based on these findings, it can be concluded that both online teacher feedback and automated feedback have great importance when learning foreign languages. Whether from a real person or an automated system, getting regular feedback is a very useful step when practicing foreign language writing skills. Adult learners in open learning context can benefit from this service thanks to the immediate and continuous support it provides. Through learning with this kind of software, learners can practice on their own at their own pace and place.

This convenience might help develop learner autonomy because such systems allow learners to try as many times as they need, and they provide instant individualized feedback. By this way, the process of feedback practice loop accelerates, which is significant for fostering EFL writing achievement (Kellogg & Whiteford, 2009). Wang and Wang's (2012) study reveals similar results and the authors conclude that an intelligent software can encourage learners for continuous writing practice thanks to instant feedback. This, eventually, help them become more aware of their strengths and weaknesses. Moreover, on demand feedback motivates learners to revise their work based on instructional feedback continuously. Nevertheless, Wang and Wang (2012) claim that the automated feedback system fails to offer adequate feedback, and so it can be used as a supplementary tool to improve writing quality. Comparing to face to face traditional feedback, instructors may integrate intelligent technologies as supplementary tools more into their teaching processes in open and distance learning. In this way, the interaction between the content-learner in distance education can be maintained.

This study is expected to fill the gap in EFL learning at a distance through automated feedback system research. Little research explored the use of these systems in open and distance EFL learning contexts with adult learners. According to Moore and Kearsley (2012, p. 115), in open and distance learning context most learners want immediate feedback, and very few people will be satisfied with ongoing one-way communication without feedback. In this connection, the automated feedback system used in this study might meet the specific need for immediate feedback of EFL distance learners. In particular, the most important method for developing a productive skill such as writing skill is that the learner regularly writes and receives continuous formative feedback (Andersen, Yannakoudakis, Barker & Parish, 2013, p. 32). In order to achieve this, automated feedback systems might be promising for the improvement of writing as a productive skill.

CONCLUSION

According to the result obtained with the quantitative findings of this study, the writing skills of the distance learning participants improved from the first attempt to the last attempt with the contribution of formative automatic feedback and teacher feedback. This improvement was observed to increase significantly from the first task to the last one. It can be observed that regardless of its source, formative feedback seems to have a contributing role in the development of foreign language writing skill. Therefore, including formative feedback in foreign language learning processes in open and distance learning contexts can be a promising attempt that encourages learners to engage in self-correction and reflection on their own learning. As open and distance education is heavily dependent on self-regulated learning strategies, this study can be regarded as a promising one in literature. The participants of this study were adult open and distant learners who were graduates and who voluntarily joined the writing activities. When the participant profile is considered, timely and prompt automated feedback and online teacher feedback can be considered as contributors to writing improvement of self-directed learning. It is known that growing number of students create large class sizes in open and distance learning. This situation means that the workload of instructors in large classes becomes heavier. Considering that giving feedback for the language instructors is a difficult and time-consuming process, with such automatic feedback tools, the majority of the minor mistakes in the assignments from the first to the last attempt might be corrected, which makes language instructors to save time and effort. By this way, the language instructors might use more time on rather serious language problems of the learners. As these tools can provide instant feedback to learners and take on the role of an assistant, they might reduce instructor workload and shorten the grading time. From this perspective, in an open and distance learning context, such automated feedback tools can support teachers in terms of the burden of increased classroom sizes and increased expectations for individualized support. In these cases, automated feedback tools can be viewed as a cost-effective way to fix and improve learners' written outputs by providing timely and limitless feedback. They could also reinforce the learners to put efforts to accomplish the given tasks and sustain their motivation in the long term

Limitations and Suggestions for Future Research

The results of this study were based on quantitative analysis using achievement scores of the participants in different treatments. However, as pointed out in the literature a student's editing, correcting his/her drafts by using automated feedback is inadequate information for us to infer that the students actually acquire that specific feature (Hyland & Hyland, 2019). Also, these behavioural attempts are not necessarily proof of development of meta-cognitive skills, by means of which learners are able to notice, evaluate and correct

textual problems in other texts successfully (Stevenson & Phakiti, 2014). Similarly, the participants of this study might have had completely different experiences at individual level during the automated feedback process. Their achievement scores tell us very little about their engagement, social and cognitive presence, interaction, learning strategies, attitudes, and motivation levels.

In future studies, programs supported by automated feedback can be used in different foreign language contexts focusing on different feedback types. By this way, comparisons on the effect of intelligent feedback systems on the development of foreign language skills can be made accordingly. Moreover, future research regarding the scope of this study can be conducted with qualitative research designs that include other data collection methods such as interviews, observations, think alouds and reflective diaries. Also, detailed data can be collected from language specialists, software developers, distance education experts, course designers and distant learners regarding their experience. Finally, the number of the students participating in this study were limited to 36 students, so generalizing the results may not be applicable for more valid and reliable results. In this regard, future studies can consist of larger groups of learners studying in the Open Education Faculties across Turkey.

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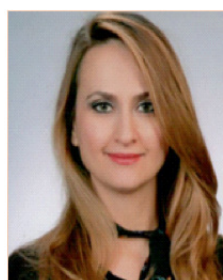


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APPENDIX A

Criterion

Writing Criteria v3		
Components	Descriptors	Grades
Content	Addresses the topic with a wide range of details (explanations and/or exemplifications)	5
	Has some components of 3 and some components of 5	4
	Addresses the topic with moderate details with a few repetitions and/or some points are considered irrelevant.	3
	Has some components of 1 and some components of 3	2
	Is unable to include most of the details; and/or most details are irrelevant and/or mostly repeated.	1
Organisation	Establishes an effective organisation of ideas with a wide variety of cohesive devices (transitions, sequencers, linking devices, referring expressions and punctuation)	5
	Has some components of 3 and some components of 5	4
	Establishes a moderate organisation of ideas with a moderate variety of cohesive devices (transitions, sequencers, linking devices, referring expressions and punctuation)	3
	Has some components of 1 and some components of 3	2
	Is unable to establish any organisation; no variety of cohesive devices (transitions, sequencers, linking devices, referring expressions and punctuation)	1
Grammatical Competence	Uses a wide variety of language forms appropriately and accurately.	5
	Has some components of 3 and some components of 5	4
	Uses a moderate variety of language forms; and/or there are a few inaccuracies.	3
	Has some components of 1 and some components of 3	2
	Uses almost all language forms inaccurately; and shows no variety.	1
Lexical Competence	Uses a wide variety of vocabulary appropriately and accurately; and/or shows a good control over spelling and capitalisation.	5
	Has some components of 3 and some components of 5	4
	Uses a moderate variety of vocabulary; and/or there are a few inaccuracies; and/or shows a moderate control over spelling and capitalisation.	3
	Has some components of 1 and some components of 3	2
	Uses almost all vocabulary items inaccurately and shows no variety; and/or shows no control over spelling and capitalisation.	1

NOTES TO THE TEACHER:

- A paper will be scored **1 out of 20; that is, 5 out of 100** if it
 - is **off-topic**. That is, it answers a completely different question or doesn't answer the given question at all.
 - doesn't answer the question **with at least 2 (two) supporting details**.
 - is **too little to assess**. That is, it doesn't meet **60% of the minimum word limit**.
- If the discrepancy between two graders is **higher than 2 points**, the graders will negotiate.

APPENDIX B

Inter-Rater Reliability for Pre-Test

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.951	.953	2

Intraclass Correlation Coefficient

	Intraclass Correlation ^b	95% CI	F Test				
		<i>LL</i>	<i>UL</i>	<i>Value</i>	<i>df1</i>	<i>df2</i>	<i>Sig</i>
Single Measures	.907 ^a	.826	.952	20.569	35	35	.000
Average Measures	.951 ^c	.905	.975	20.569	35	35	.000

Two-way mixed effects model where people effects are random and measures effects are fixed.

- The estimator is the same, whether the interaction effect is present or not.
- Type C intraclass correlation coefficients using a consistency definition. The between-measure variance is excluded from the denominator variance.
- This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

APPENDIX C

Inter-Rater Reliability for Teacher Feedback Post Test

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.985	.986	2

Intraclass Correlation Coefficient

	Intraclass Correlation ^b	95% CI	F Test				
		<i>LL</i>	<i>UL</i>	<i>V</i>	<i>df1</i>	<i>df2</i>	<i>Sig</i>
Single Measures	.907 ^a	.942	.985	65.996	35	35	.000
Average Measures	.985 ^c	.970	.992	65.996	35	35	.000

Two-way mixed effects model where people effects are random and measures effects are fixed.

- The estimator is the same, whether the interaction effect is present or not.
- Type C intraclass correlation coefficients using a consistency definition. The between-measure variance is excluded from the denominator variance.
- This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

APPENDIX D

Inter-Rater Reliability for Write And Improve Software Feedback Post-Test

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.915	.917	2

Intraclass Correlation Coefficient

	Intraclass Correlation ^b	95% CI		F Test with True Value 0			
		<i>LL</i>	<i>UL</i>	<i>V</i>	<i>df1</i>	<i>df2</i>	<i>Sig</i>
Single Measures	.843 ^a	.714	.917	11.766	35	35	.000
Average Measures	.915 ^c	.833	.957	11.766	35	35	.000

Two-way mixed effects model where people effects are random and measures effects are fixed.

- The estimator is the same, whether the interaction effect is present or not.
- Type C intraclass correlation coefficients using a consistency definition. The between-measure variance is excluded from the denominator variance.
- This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

APPENDIX E

Tests of Normality for Diagnostic, Teacher Feedback Post-Test, Software Feedback Post-Test

Tests of Normality						
	Kolmogorov Smirnov ^a		Shapiro-Wilk			
	<i>Statistic</i>	<i>df</i>	<i>Sig.</i>	<i>Statistic</i>	<i>df</i>	<i>Sig.</i>
Diagnostic	.135	36	.095	.949	36	.094
Teacher_Feedback_						
Post test	.093	36	.200*	.958	36	.185
Software_Feedback_						
Posttest	.119	36	.200*	.954	36	.139

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

SOCIAL MEDIA UTILIZATION AND ITS IMPACT ON MALE MEDICAL STUDENTS' LEARNING DURING COVID-19 PANDEMIC

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ABSTRACT

To assess the patterns of social media uses and their impact on the learning of male medical students during the COVID-19 pandemic. A cross-sectional descriptive study was conducted from March to May 2020 at the College of Medicine, University of Bisha (UBCOM) in Saudi Arabia. A validated questionnaire was used to collect data from the students at first year, pre-clerkship and clerkship levels about the types, patterns and benefits of social media usage in their learning. A five-Likert scale was used to measure the students' responses.

Descriptive statistics and ANOVA tests were used for data analysis. Of the 203 students enrolled, 89.2% (n=181) were responded. Most students commonly used Twitter (75.1%), followed by YouTube (52.5%) and Facebook (24.3%). The highest usage of Twitter was found among clerkship students (85.1%) compared to first-year (76.2%) and pre-clerkship students (69.6%), with no significant differences ($p = 0.133$). About 38.7% of students spent over 10 hours per week on social media and pre-clerkship students being the highest group (43.5%). Most students (67.9%) showed that social media enhance learning activities, 65.2% are interested in using social media in their learning and 64.1% suggested that their inappropriate use consumes time. We concluded social media become interactive tools of learning in medical schools during the urgent situation such as the COVID-19 pandemic. Such findings highlighted the benefits of considering social media inclusion when designing medical curricula.

Keywords: Social media applications, benefits, medical students, COVID-19.

INTRODUCTION

The coronavirus disease 2019 (COVID-19) pandemic is a global public health crisis that resulted in massively social, educational, economic and health challenges (Garfin, 2020) (Ibrahim, Al-aklobi, Abomughaid, & Al-Ghamdi, 2021). This global dilemma resulted in the locked-down of schools, colleges and educational institutions, leading to a shift to distance learning (Garfin, 2020). Social media websites and applications are digitally mediated technologies that become popular tools and widely use with multiple attractive facilities (Radwan, Radwan, & Radwan, 2020; Sattar et al., 2016). It is internet-based tools that facilitate communication between groups of peoples to share information, ideas and messages (Guraya, 2016; Sattar et al., 2016). There are several types of social, including Facebook, Wikipedia, Twitter, YouTube, and Blogger, LinkedIn, Snapshot and Instagram (Wanner, Phillips, & Papanagnou, 2019). However, the era of technology and mobile phones makes social media applications in learning is attainable (Elsamanoudy et al., 2018). Unlike traditional written media, such as textbooks, social media is cost-effective, cheap, allowing users for vivid interaction, add comments or content and can easily apply (D'Souza et al., 2017; Wanner et al., 2019).

In medical education literature, usage of social media is supported by constructivist learning theory, where the learning between learners could be facilitated by interaction, exchanging information and active enrolment in activities (Huang, 2002). Social media has created a revolution learning in teaching and practicing medicine in the digital and communication era (Guraya, 2016; Sattar et al., 2016). Medical literature suggests a significant correlation between social media and the acquisition of knowledge and desired skills among medical students (Al-Khateeb & Abdurabu, 2014). Connection via social media can promote collaborative learning among medical students and can retain the knowledge taught, exchange of information and discuss any target learning objectives (Hinojo-Lucena, Aznar-Díaz, Cáceres-Reche, & Romero-Rodríguez, 2020). Also, students can share texts, posts, presentation of pictures, and audio of learning materials and videos of practical procedures (Wanner et al., 2019).

In recent years, social media has become a trend for most educational institutes by the provision of the website, official pages for the institute and students (Kind, Genrich, Sodhi, & Chretien, 2010; Wanner et al., 2019). Students at medical schools and other healthcare institutions are frequently using social media in their education (Wanner et al., 2019). Several studies highlight the benefits of social media in improving the learning of students during their medical education (Hinojo-Lucena et al., 2020; Pander, Pinilla, Dimitriadis, & Fischer, 2014; Ravindran, Kashyap, Lilis, Vivekanantham, & Phoenix, 2014; Wanner et al., 2019). A systematic review found that medical students accept Facebook and 45-96% of health care professionals have a Facebook profile during their medical school (Pander et al., 2014). Ravindran et al. indicated that Facebook provides a safe environment for learning and discussion amongst medical undergraduates undergoing their clinical attachments (Ravindran et al., 2014). Another study found that the use of Facebook, YouTube, Instagram and Twitter augments the education of physician assistant students' (Wanner et al., 2019). In Saudi Arabia, several studies assessed the usage of social media in medical education and found it to be promising (Alsuraihi, Almaqati, Abughanim, & Jastaniah, 2016; Elsamanoudy et al., 2018; Sattar et al., 2016). According to Alsuraihi et al. medical schools need to improve the utilization of social media by their faculty and students by developing activities and encouraging the usage of social media in education (Alsuraihi et al., 2016).

Due to the global crisis of novel coronavirus disease 2019 (COVID-19), educational institutions have introduced distance learning to prevent the spread of infection (Sahu, 2020). Academic institutions support the faculty and student to stay connected through online applications social media forums to deliver educational activities and to support academic continuity (Rastegar Kazerooni, Amini, Tabari, & Moosavi, 2020; Sahu, 2020). However, the University of Bisha, College of Medicine (UBCOM) facilitates the usage of social media networking to cope with the urgent situation brought by the COVID-19 pandemic. This study aimed to assess the patterns of social media networking uses and their impact on the learning of male medical students from different academic years during the COVID-19 pandemic.

METHODS

Study Design and Setting

A cross-sectional descriptive study was conducted from March to May 2020 during the lockdown of all educational institutions because of the COVID-19 pandemic. The study was carried out at the University of Bisha, College of Medicine (UBCOM) in Bisha, Saudi Arabia. The UBCOM adopted an innovative medical curriculum and most of the courses were students centered, conducted through different instructional methods of team-based learning, problem-based learning, seminars, and interactive lectures. Due to the diversity of these educational methods, students need to exert massive effort to cope with their learning. However, university administration provides blackboard internet accounts for students and tutors to interact with each other to promote collaborative learning.

Participants

Male medical students at all academic levels of Year one, pre-clerkship (second, third and fourth years) and clerkship (fifth and sixth years) were included in the study. Students who are not registered for the current academic year were excluded from the study.

Data Collection and Processing

An online survey was conducted to collect the data from medical students from all academic years. A standardized structured questionnaire was designed to assess the patterns, frequency and benefits of social media use, as described in the literature (Alhababi, Alfadil, Mia, & Williams, 2015; El Bialy & Jalali, 2015; Guraya, 2016). The link to the survey questions was sent to the students through their mobile numbers and their official e mails registered at the university.

The questionnaire comprised three parts: the first part concerned with the general information of the students. The second part comprised items to identify the types of social media and their frequency of usage by students. The third part was used to assess students' perceptions about the benefits of social media in their learning. In parts one and two, the students were asked to respond to different closed-ended questions regarding demographic data, types of social media, and its frequent usage per week. A five-Likert scale was used to test the third part of the questionnaire. This was arranged from 5 to 1 as strongly agree, agree, neutral, disagree, strongly disagree. For the analysis purposes, 5 and 4 were categorized as positive perceptions, and 2 and 1 were grouped as negative perceptions about social media.

Ethical Approval

The study was approved by the Research Ethics Committee at the University of Bisha, College of Medicine (UBCOM/H-06-BH-87 (03/21)). Participation in the study was voluntary and anonymous. Cover letters that explained the purpose and benefits of the study were distributed to the students with the questionnaires. Participants in the study were not provided incentives or affect students' academic scores.

Statistical Analysis

Data entry and analysis were performed by the Statistical Package for Social Sciences (SPSS version 22) (Armonk, NY: IBM Corp.). Simple descriptive statistics of percentage, mean, and standard deviation were used to present the data. The frequency response of the Likert scores was calculated as a positive perception for 5 and 4 scores and negative perception for 2 and 1 scores with each question statement. The internal consistency of the questionnaire items (part 3) measured using Cronbach's alpha. One-way analysis of variance (ANOVA) was used for multiple comparisons. All p values less than 0.05 were considered statistically significant.

FINDINGS

Cronbach's alpha test was 0.681, indicating the validity and reliability of the questionnaire to assess medical students' perceptions about the benefit of social media. Of the 203 students asked to participate in the study, 181 (89.2%) were responded and completed the questionnaire forms. These participants were from the first year (n=42), pre-clerkship (n=92) and clerkship (n=47). The students were in the age ranged from 18 to 26 years old, with a mean of 21.2 ± 2 .

Types and Frequency Use per Hour of Social Media

Social media classified according to their aspects of electronic communication and collaboration including, blogs (Blogger), micro-blogs (Twitter), social networking (Facebook), professional career networking (LinkedIn, Hangout), video-sharing (YouTube, Snapchat) and photo-sharing (Instagram)(Jose et al., 2014; Wanner et al., 2019). The types of social media and their common features and uses in medical education are shown in Table 1.

Table 1. Types of social media and their common features and uses in medical education.

Social media	Feature
Twitter	<ul style="list-style-type: none">Allow a total of 280 characters in a single tweet (Katz & Nandi, 2021).Information dissemination, social networking, and real-time communication (Jose et al., 2014).
Facebook	<ul style="list-style-type: none">Permits about 63,206 characters in a single post(Katz & Nandi, 2021)Facilitate communication between learners, promoting learning, collaboration and exchange of ideas between students and for the circulation of documents (Latif, Hussain, & Atif, 2019; Wise, Skues, & Williams, 2011).
Instagram	<ul style="list-style-type: none">Share images and short videos, give students access to virtual mini-case presentations(Katz & Nandi, 2021).Share visually appealing teaching points even after a formal lecture(Katz & Nandi, 2021).
YouTube	<ul style="list-style-type: none">The single largest video-sharing platform and is the leading free web-based source of videos (Katz & Nandi, 2021).Permits to upload and create galleries of photos, videos, and, slide presentations (Jose et al., 2014).
WhatsApp	<ul style="list-style-type: none">Used to send messages, pictures, video, and audio files (Katz & Nandi, 2021; Latif et al., 2019).Provides secure, encrypted messaging and sharing of audiovisual material (Katz & Nandi, 2021).Hand availability of WhatsApp facilitates learning at ease, anytime, anywhere, and immediately (Latif et al., 2019)
Snapshot	<ul style="list-style-type: none">Video-sharing, obtain information (Wanner et al., 2019).
LinkedIn, Hangout	<ul style="list-style-type: none">Interactions and relationships related to business or a person's professional career(Jose et al., 2014).

Table 2 summarizes the frequency and usage of social media per hour. Most students commonly used Twitter (75.1%), followed by YouTube (52.5%) and Facebook (24.3%). The highest usage of Twitter was found among clerkship students (85.1%) compared to first-year students (76.2%) and pre-clerkship students (69.6%), with no significant differences ($p = 0.133$). YouTube was most likely preferred by all students at clerkship students (57.4%), first-year students (54.8%) and pre-clerkship students (48.9%). The highest usage of LinkedIn was found among clerkship students, whereas first-year students frequently used Snapshots and Instagram. Overall, 38.7% of students spent over 10 hours per week in the social media and pre-clerkship students being the most group 40 (43.5%), followed by first-year students (35.7%) and clerkship students (31.9%). However, no significant differences in time spent on social media among these three groups of students ($p = 0.738$) (Table 2).

Table 2. Frequency per hours and types of social media usage medical students from different academic levels

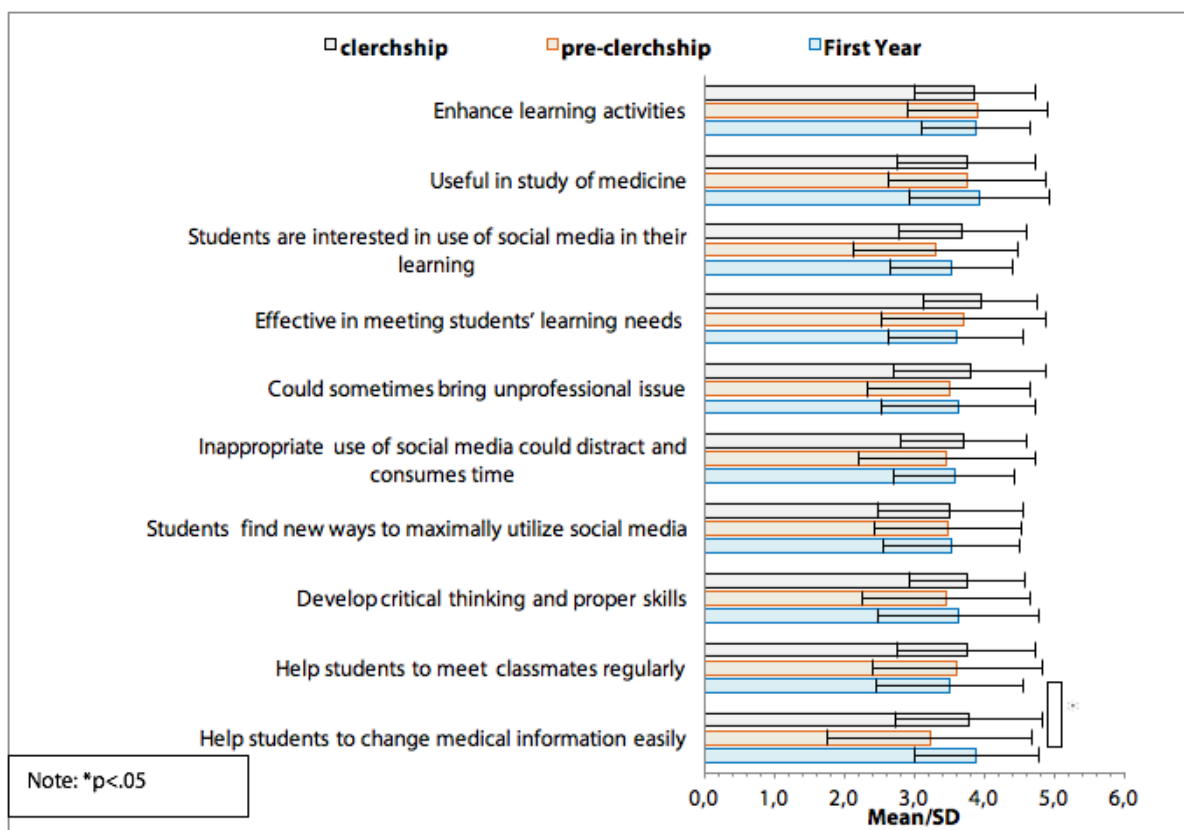
Item	Overall (n=181)	First Year (n=42)	pre-clerkship (n=920)	Clerkship (n=47)	
Type of social media	n (%)		n (%)		P-value
Twitter	136 (75.1)	32 (76.2)	64 (69.6)	40 (85.1)	0.133
YouTube	95 (52.5)	23 (54.8)	45 (48.9)	27 (57.4)	0.604
Facebook	44 (24.3)	8 (19.0)	19 (20.7)	17 (36.2)	0.087
LinkedIn	31 (17.1)	7 (16.7)	12 (13.0)	12 (25.5)	0.183
Snapshot	20 (11.0)	8 (19.0)	8 (8.7)	4 (8.5)	0.171
Instagram	14 (7.7)	5 (11.9)	7 (7.6)	2 (4.3)	0.406
Spend hours per week					0.738
1 to 2 hours	18 (9.9)	3 (7.1)	13 (14.1)	2 (4.3)	
2 to 6 hours	53 (29.3)	18 (42.9)	21 (22.8)	14 (29.8)	
7 to 10 hours	40 (22.1)	6 (14.3)	18 (19.6)	16 (34.0)	
More than 10 hours	70 (38.7)	15 (35.7)	40 (43.5)	15 (31.9)	

Students' Perception about Social Media

Table 3 illustrates students' perceptions of social media. Medical students have positive attitudes ranged from 68.5% to 55.8% to the investigated items. As shown in Table 3, about 68.5% of students find new ways to use social media maximally, 67.9% reported that social media enhance learning activities, 65.2% are interested in using social media in their learning and 64.1% showed that inappropriate use of social media could distract and consumes time. Regarding the item of social media change medical information easily, pre-clerkship students have reported significantly lower rates when compared to clerkship students ($p=0.041$) or first-year students ($p=0.014$) (Figure 1).

Table 3. Medical students' perception about the benefits of social media

Item	Negative Perception (%)	Neutral (%)	Positive perception (%)	Mean±SD
Enhance learning activities	10 (5.6)	48 (26.5)	123 (67.9)	3.9±0.9
Useful in study of medicine	21 (11.6)	46 (25.4)	114 (63)	3.8±1.1
Students are interested in using social media in their learning	33 (18.3)	30 (16.6)	118 (65.2)	3.5±1.1
Effective in meeting students' learning needs	19 (10.5)	47 (26)	115 (63.5)	3.7±1.0
Could sometimes bring unprofessional issue	32 (17.7)	42 (23.2)	107 (59.1)	3.6±1.1
Inappropriate use of social media could distract and consume time	28 (15.4)	37 (20.4)	116 (64.1)	3.5±1.1
Students find new ways to maximally use social media	26 (14.4)	31 (17.1)	124 (68.5)	3.5±1.0
Develop critical thinking and proper skills	28 (15.4)	43 (23.8)	110 (60.8)	3.6±1.1
Help students to meet our classmates regularly	29 (16)	40 (22.1)	112 (61.9)	3.6±1.1
Help students to change medical information easily	35 (19.3)	45 (24.9)	101 (55.8)	3.5±1.3

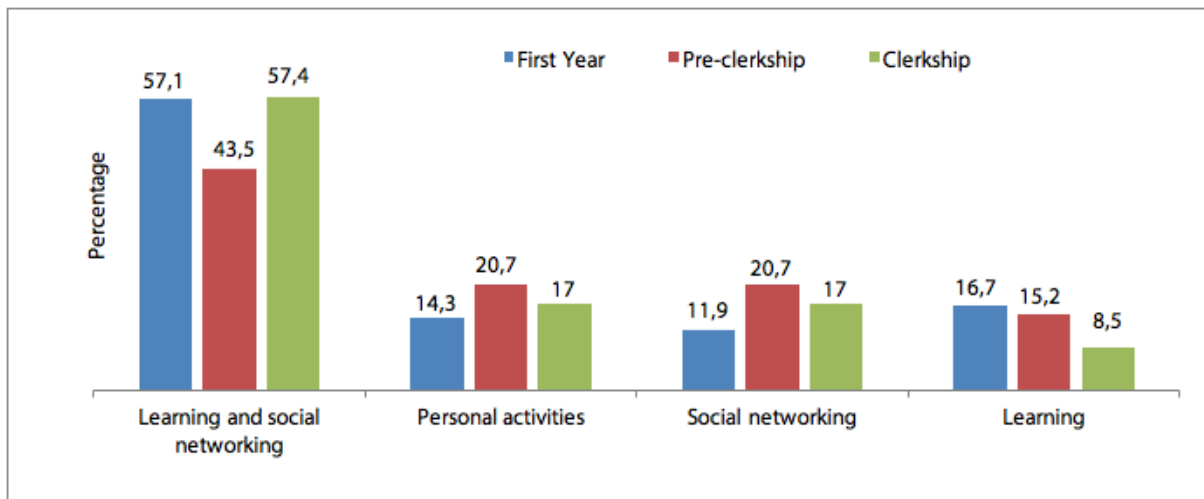
**Figure 1.** Comparison of students' perceptions (mean ± SD) about the benefits of social media by academic levels

Purposes of Social Media

The purposes of using social media among medical students are shown in Figure 1 and Table 3. Half of the medical students were used social media for learning and social networking, 18.2% were reported for personal activities and 17.7% were reported for social networking and 13.8% for learning. However, no statistical differences between the students' academic levels ($p=0.319$) (Table 4).

Table 4. The purposes of the usage of social media among medical students

Usage	Total number of students				P-value
	Overall (n=181)	Year one (n=42)	Pre-clerkship (n=92)	Clerkship (n=47)	
Social networking	32 (17.7)	5 (11.9)	19 (20.7)	8 (17)	0.319
Personal activity	33 (18.2)	6 (14.3)	19 (20.7)	8 (17)	
Learning	25 (13.8)	7 (16.7)	14 (15.2)	4 (8.5)	
Learning and social networking	91 (50.3)	24 (57.1)	40 (43.5)	27 (57.4)	

**Figure 2.** Comparisons of the purposes of social media usage according to the academic level of students.

DISCUSSION AND CONCLUSION

In the education context, active use of social media can generate more available data as students create and share medical information online. It provides opportunities for students to receive, share, and express knowledge and information with each other's (Latif et al., 2019; Moorhead et al., 2013). However, passive use involves consuming information and reposting links not aimed at anyone in particular, unrelated to the person's self-concept, and requiring minimal effort (Allegrante & Sigfusdottir, 2019). Research evidence documented that passive use of social media is associated with depressive symptoms and poor psychological well-being (Allegrante & Sigfusdottir, 2019). Studies suggest many disadvantages of social media, including information overload, wasting time, doubt about online information credibility, and sharing risky behaviors (Benetoli, Chen, & Aslani, 2019; Radovic et al., 2017). In addition, spending more time on social media has adverse effects on students' learning and leads to poor academic achievements (Latif et al., 2019). The present study aimed to assess the patterns of social media use and the impact on male medical students learning in UBCOM during the COVID-19 pandemic. The results revealed that all the students were using social media daily. Previous studies in Saudi Arabia found that medical students commonly experienced social networking (Elsamanoudy et al., 2018; Sattar et al., 2016). Similarly, elsewhere authors documented that social media as useful learning tools for medical students (Guraya, 2016; Pander et al., 2014) and health care professionals (McGowan et al., 2012; Wanner et al., 2019).

In the present study, Twitter was the most used type of social media, with the highest rates reported among clerkship students. Previous studies in Saudi Arabia found that male medical students preferred Twitter than other types of social media like email, Facebook and short message service (Alsuraihi et al., 2016). Widely accepted that Twitter provides many advantages such as allowing brief comments, permitting immediate suggestions of a topic for discussion, therefore, it is suitable for large group learning and improving academic engagements (Wise et al., 2011). The literature showed that Twitter improves students' learning in the classroom of the college (Alhababi et al., 2015). In the present study, YouTube and Facebook tend to become the second choice of social media by our medical students.

YouTube is preferred by about half of the clerkship students. Well known that YouTube is an easy tool for search learning topics and share videos with other learners without creating a website account (Alsuraihi et al., 2016). Data argued Facebook has only limited benefits for promoting students' academic engagement (Pander et al., 2014; Wise et al., 2011). A previous study found that students' users of Facebook were having lower GPAs and spend fewer hours per week studying than nonusers (Kirschner & Karpinski, 2010). Another study concluded that the professional use of Facebook as an educational tool is associated with a good student's perception, satisfaction index and better academic performance (Elsamanoudy et al., 2018). Other authors suggest Facebook can be used for small group discussions in the closed platform. According to Ali., educators should encourage the use of secret or closed informal Facebook groups in educational contexts, especially within small groups, to enhance learning (Ali, 2016). Henry et al. suggested that Facebook discussion group was a free, efficient, and effective method of cultivating the learner-teacher relationship with the preclinical medical students, resulting in a reported enhancement of learning and morale (Henry et al., 2020).

Most medical students in this study spent over ten hours per week on social media. A previous study in the United States found that college students at a doctoral research institution commonly spent less than ten hours per week on social media (Alhababi et al., 2015). The increasing time of social media usage in this study could be attributed to the current situation of the COVID-19 pandemic since our medical school moved to online learning that needs students to be in contact with their tutors and colleagues on daily bases (Huddart et al., 2020).

In this study, 13.8% of the students used social media for learning, with no significant difference observed between students' academic levels. This result was lower than that reported in Turkey, where 89.3% of medical students were using social media for their education and professionalism (Avci, Celikden, Eren, & Aydenizoz, 2015). Similarly, a systematic review found that 20% of medical students using social media for sharing academic and educational information (Guraya, 2016). Our findings revealed that half of the students were using social media for both social and learning communication. According to Paul and Baker, the time spent on social media networking sites by medical students can negatively influence students' academic achievement. Students should be made aware of the detrimental impact of online social networking on their potential academic performance (Paul, Baker, & Cochran, 2012).

In the present study, students in the first year, pre-clerkship and clerkship have positive insight into the benefits of social media as effective tools for their learning. However, more than half of the students were satisfied with social media in terms of learning, accessing information and developing skills and thinking abilities. This is in agreement with a previous study conducted at King Saud University, Riyadh, Saudi Arabia (Sattar et al., 2016). Likewise, the positive attitudes among medical attitudes towards social media have been reported in Turkey (Avci et al., 2015). However, McGowan et al. indicated that the use of social media applications might be seen as an efficient and effective method for physicians to keep up-to-date and to share newly acquired medical knowledge with other physicians within the medical community and to improve the quality of patient care (McGowan et al., 2012). In this study, about 60%% of our medical students were having a sense of the possible unprofessional attitudes that might be developed from social media. Well known that unaware of using social media for posting material online has adverse effects on students' careers and might raise an ethical issue. Therefore, appropriate lecturing sessions about the professional use of social media should be introduced to our medical students to raise their attention.

The present study concluded that social media become common tools of learning in medical schools and their usage might increase during the urgent situation such as in the current COVID-19 pandemic. Twitter, YouTube, and Facebook seem to be the most popular social media platforms used by UBCOM medical students. Most of the students from different academic levels have positive perceptions about social media in supporting their medical education and awareness about the effects of improper usage. Such findings highlighted the benefits of considering social media inclusion when designing medical curricula. However, large-scale studies are recommended to build quantitative evidence about the use of social media in the medical curriculum.

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EFFICIENCY IN OPEN AND DISTANCE EDUCATION: A RESEARCH AT ANADOLU UNIVERSITY

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ABSTRACT

Limited time, physical and financial opportunities in education has caused the expansion of the education system and emergence of new alternatives. One of these alternatives is open education that emphasizes the philosophy of sharing the information and materials used in learning and teaching freely and openly, and one is distance education that offers a formal form of education blended with information systems and the internet. Anadolu University Open Education System, not only in Turkey, in many countries around the world offers learners the opportunity to open and distance learning. In this sense, it has one of the largest student communities in the world. Therefore, evaluating the efficiency of a large and powerful organization like the Anadolu University Open Education System has gained importance. This study was carried out to determine the activities of associate degree programs in Anadolu University Open Education System in the fall and spring semesters of 2016-2017, 2017-2018, 2018-2019 academic years. Anadolu University Open Education System associate degree programs are ranked according to their efficiency values, by the Slack-Based Measure Analysis.

Keywords: Open and Distance Education, Anadolu University Open Education System, efficiency, Slack-based measure analysis.

INTRODUCTION

The ongoing global shifts have had a deep transformative impact on the traditional approaches to education. Global challenges in education and economics have not only shaped working and living conditions, but also profoundly affected the ways of teaching and learning (OECD, 2016). In other words, ways of learning and teaching new knowledge are no longer bound by time and space. Consequently, although the individual learning process has not completely changed, platforms of education, along with learning resources, have become highly diverse (Stracke, 2017). Open education is an academic practice that emphasizes the philosophy of freely and openly sharing ideas, information, methods, platforms, tools, approaches and materials used in learning and teaching in higher education systems (Mossley, 2013, p. 12). Distance education is an institutional form of formal education in which learning groups are separated and interactive communication systems are used to connect learners, educational resources, and educators (Simonson, 2003).

The developments in information technologies and the widespread use of the internet have increased the global interest in open and distance education. Anadolu University Open Education System, celebrating its 39th year in 2021, plays a critical role in Turkish higher education thanks to its special projects and offering higher education services to more than 1 million students and 2.8 million graduates.

Anadolu University Open Education System has 19 undergraduate and 41 associate degree programs as of the 2019-2020 academic year. Anadolu University Open Education System, offers learners the opportunity to open and distance learning not only in Turkey, but also in many countries around the world. In this sense, it serves one of the largest student communities in the world. Anadolu University Open Education System reduces the cost of procuring or purchasing educational resources, and increases the quality of education by preparing and evaluating teaching materials. Adopting the lifelong learning and equal opportunity approaches in education, Anadolu University Open Education System offers sustainable education.

Anadolu University Open Education System is a flexible system that offers useful and rich learning environments regardless of time and place, tries to provide equality of opportunity and cost effectiveness, and pursues the goal of lifelong learning. This plays a key role in encouraging learners to enroll in open and distance learning programs. Due to the flexibility of the structure of the system, the number of learners choosing to become part of it has been steadily rising. As learners continue to earn degrees, certificates and diplomas from the system, the system will continue to be a rapidly growing part of higher education, maintain its sustainability and offer lifelong education.

With the gradual growth of the system, training in many programs has begun, and new technologies and learning environments have been included in the system with new programs. Thus, the number of learners, the number of users of Anadolium e-Campus and the number of graduates have increased. However, attendance in these programs is much lower than formal education programs. Many learners complete their education with very low GPAs or quickly drop out of the programs they are enrolled in, and thus experiencing financial losses. Therefore, efficiency analysis methods have become important tools for decision makers in the field of open and distance learning. As such, the aim of the study is to determine the relative efficiency of the associate degree programs in Anadolu University Open Education System in the fall and spring semesters of 2016-2017, 2017-2018, 2018-2019 academic years by applying the “Slack-Based Measure Analysis”.

The Importance

Each institution has some predetermined goals. Determination of the status of the institution compared to similar institutions and its use of resources, and understanding its strengths or weaknesses play an important role in achieving these predetermined goals. Therefore, performance evaluation studies can be considered as the core of the measures to be taken by decision makers and the activities to be carried out.

Evaluation of the Open Education System's degree of efficiency is critical since this helps determine the performance of the programs and allows making accurate decisions about program objectives, strategic planning, quality assurance, identification of the strengths and weaknesses of the programs, and improving the overall quality of the programs and the services offered. In addition to these reasons, this study was carried out with the aim of being a guide and pioneer in the evaluation of the efficiency of distance education institutions with a large and dynamic structure such as Anadolu University Open Education System. The results of the efficiency model analysis created in this context is expected to provide useful information for the decision-makers of the Open Education System by pointing at many potential areas of improvement.

That universities are non-profit organizations and thus their inputs or outputs cannot be measured by any financial value, the existence of a wide variety of input and output variables, the difficulty of accessing data on these variables, and the difficulty of determining the best perspective to approach efficiency measurement, make the efficiency analysis performed in this study challenging yet invaluable.

LITERATURE REVIEW

The efficiency, which is indispensable for businesses, institutions and systems, has become indispensable for education as well. Using the available resources efficiently enables educational institutions to fully achieve their targets, while helping individuals to keep up with the dynamics of the changing and developing world (Bakirci & Babacan, 2010, p. 216).

Determining the status of a certain organizational unit of education vis-à-vis similar units is possible by periodically measuring performance with the help of measurable data. These measurements provide decision-making bodies with the opportunity to see the superior aspects and weaknesses of the units, and to take

measures for inefficient units. Although efficiency is a performance dimension, it is important for education units (Yesilyurt, 2003, p. 79).

The studies examining the efficiency of universities or departments (or faculties) at universities constitute the majority of efficiency analysis studies conducted in the field of education. The efficiency of universities are frequently evaluated at national and international scale due to the fact that universities are non-profit and knowledge-producing organizations and have a wide range of inputs and outputs. The related research literature mostly employs the traditional Data Envelopment Analysis (DEA) and focuses on the efficiency of universities in terms of using finance and human resources, adapting to increasing competition conditions, and ensuring sustainability in education.

The opportunities offered by education systems and the competencies gained during and after the education process are important in terms of evaluating the success of education systems. The extent to which the opportunities and competencies offered are transformed into output can be determined by efficiency performance measurement. For example, by using the relative efficiency variables in the exams conducted nationwide, Yesilyurt (2009) analyzed the efficiency of the economics departments of state and private universities in Turkey, and Icoz (2013) evaluated the efficiency of the state university statistics departments in Turkey.

The increasing global competition has been forcing all types of organizations to use their resources more efficiently. Efficient use of the available resources is an important performance indicator for economic decision-making units. According to Kao and Hung (2008), the decrease in the state contributions allocated to universities in Taiwan in recent years has necessitated more efficient use of resources. Accordingly, they evaluated the relative efficiencies of academic departments at National Cheng Kung University in Taiwan. According to Johnes and Johnes (1993), the financial pressures on public institutions in the UK in the early nineties caused a rapid increase in interest in measuring the performance of such bodies. Accordingly, they evaluated the research performance of economics departments in the UK for the period of 1984-88. It is of great importance in academic, administrative and financial terms that universities, which produce qualified human resources with specialized knowledge and technology, use their existing resources (student, general budget, academic staff, etc.) in the most effective way. Cinaroglu et al. (2018) determined the efficiency levels of 18 faculties of Erciyes University, which adheres to the principle of being an efficient institution in academic and administrative terms. When analyzing the performance of an organization or a system, it is necessary to determine its efficiency and whether its resources are used efficiently. Turker (2012) conducted an efficiency analysis of 14 Industrial Engineering Departments in Turkey; Uzgoren and Sahin (2013) carried out an efficiency analysis of Dumlupinar University Vocational Schools; and Bakirci and Babacan (2010) carried out efficiency analysis of the Economics and Administrative Sciences Faculties of various universities in Turkey.

The education system can be considered as a service-based industry. With no motivation to profit, education systems aim to produce well-qualified graduates and successful research results. Therefore, the performance of education systems should be evaluated for a nation to grow and prosper. Thus, many countries strive to evaluate and improve the performance of their education systems. According to Jakaitiene, Zilinskas and Stumbriene (2018), evaluation of the performance of education systems is an issue that needs to be addressed worldwide. Although there are many studies evaluating the performance of schools, a limited number of studies have analyzed the education system as a whole. According to Aziz, Janor, and Mahadi (2013), universities are complex organizations that use multiple inputs to produce multiple outputs, and evaluating the relative efficiency of institutions is difficult. Tyagi, Yadav, and Singh (2009), who reported determining how to evaluate the performance of academic programs as one of the difficulties encountered, state that the data envelopment analysis method is used to evaluate the performance of academic institutions in many countries such as the USA, UK and Australia. Later, Kulshreshtha and Nayak (2015) evaluated the educational efficiency of the technical universities in India.

The concept of efficiency is vital for organizations to survive. Organizations need to measure efficiency not only to see where they are but also to understand their strengths and weaknesses. It is not possible to decide what is good or bad without measuring it. Ulucan (2011) analyzed the efficiency of universities in Turkey, while Cunha and Roche (2012) carried out an efficiency analysis of the universities in Portugal through data envelopment analysis. Efficiency measurement should not be considered to be only about the efficient use

of resources. Ozel (2014), who stated that it is possible to determine the place of a unit compared to similar units through periodic efficiency analysis, performed efficiency rankings of the state universities in Turkey.

A review of the literature reveals that the number of studies evaluating the efficiency of open and distance education is much lower than the efficiency studies focusing on traditional higher education. These studies have mostly adopted the DEA analysis as their efficiency measurement method. With the advances in information technologies, students in modern societies are able to apply what they have learned through open and distance education. Stating that education provided through internet, teleconferencing and e-learning is not worse than traditional education, Xiaoming, Shieh, and Wu (2014) examined the distance education activities of universities in China.

Like any organization, educational institutions should attach importance to needs assessment and performance measurement to improve the use of limited resources and increase the efficiency of programs. Stating that one of the most practical methods used in the evaluation of performance is DEA, Jalalvand and Navabakhsh (2017) evaluated the performance of 33 distance education units in the second semester of the 2014-2015 academic year. In the 21st century, the main competitive power of a nation is the power it generates from knowledge. According to Liu (2017), e-learning based knowledge and competition are the most powerful tools. Services such as information, skills, policies and regulations provided to the public make brand new e-learning methods possible. As such, Liu (2017) tried to determine the performance of e-learning in the public sector in the city of Kaohsiung with the help of DEA.

According to Akmese, Demir and Dunder (2016), the increasing demand for distance education has led to the opening of new distance education programs. The ever-growing number of distance education programs has made it essential to investigate the efficiency of these programs. Universities that offer distance education open new programs and improve their existing programs to meet the education, diploma and certificate needs of the society. Gok (2017) also investigated the service quality of distance education programs offered at universities in Turkey and evaluated their performance.

In recent years, studies have been carried out that show that DEA has some disadvantages, and some new DEA models have been proposed to eliminate these disadvantages. Jablonksy (2016) stated that new DEA models should be formulated to evaluate the efficiency of decision-making units and introduced new models. To illustrate these models, he analyzed the research and education performance of 19 economics faculties in Czech Republic over a four-year period.

According to Johnes and Tone (2017), DEA is a method frequently used to evaluate the efficiency of higher education institutions, and many alternative non-parametric measurement methods are available for researchers. Johnes and Tone (2017) analyzed the efficiency of higher education institutions in the UK for the period of 2013-2014 in three different ways and compared the results. They used the DEA method developed by Charnes et. al. (1978), and the Slack-Based Measure (SBM-Min and SBM-Max) developed by Tone. Abdullah et. al. (2018) stated that DEA is a performance evaluation method used when the set of decision units is represented with multiple inputs and outputs. They evaluated the efficiency of the departments at Malikussaleh University using the SBM. Luan (2017) determined the efficiency values of 11 faculties of Qufu Normal University in China for the year of 2016 through SBM.

With new approaches to public administration, the quality and efficiency of higher education has been increasingly questioned. Thus, many researchers have attempted to measure the quality and efficiency of universities as if they were evaluating businesses. According to these researchers, universities have turned into private enterprises. Because universities have to deal with certain inputs and outputs, pursuing maximum outputs under resource constraints. As such, Chuanyi, Xiaohong, and Shikui (2016) used traditional DEA methods and SBM (Slack-Based Measure) methods to determine the relative efficiency of China's science and technology universities. They emphasized that radial data envelopment models reveal proportional changes while ignoring slack variables. They stated that slack-based measure models can detect both proportional change and change in slack variables.

METHOD

Determining the input and output variables to be used constitutes the basis of evaluating the efficiencies of Anadolu University Open Education System associate degree programs. The same input and output

variables must be used for each program in evaluating the efficiency of associate degree programs in the system. Therefore, first of all, input and output variables of each decision unit must be determined.

Efficiency Model Variables

Since open and distance education feature structural differences in the higher education system compared to formal education, it is inevitable for the variables used in the relative measurement of the efficiency of the distance education system to differ. In the current study, since the efficiency of the associate degree programs of the Open Education System was investigated, various system variables that were thought to reflect the efficiency of the system better were used. The variables in the efficiency model created in the study, the units, and the abbreviations used for the variables in the mathematical structure of the model are given in Table 1.

Table 1. Variables and units used in the efficiency model

Input Variables	Unit
k: The ratio of active learners	%
a: Anadolum e-Campus use rate	%
Desirable Output Variable	
m^{good}: The ratio of graduating learners (within three years)	%
Undesirable Outputs Variable	
uz^{bad}: The learner ratio variable whose GPA is below 2.00 (adjusted from 0.00)	%
uv^{bad}: The rate of learners who took the midterm exam and did not take the final exam	%

The ratio of active learners refers to distance learners who renew their registration periodically in the Open Education System. In other words, the ratio is obtained by proportioning the number of learners who renewed their registration to the number of all learners in the relevant program. Anadolum e-Campus use rate is calculated by the ratio of the number of learners using Anadolum e-Campus to the number of learners who renew their registration. These variables were calculated separately for each associate degree program before they were included in the analysis.

Unlike the formal education system, the Open Education System has no restriction on the duration of completion of education, so learners can stay in the system for a long time. Since this high number of learners who stay in the system for a long time do not comply with the goals of the system, it is thought that it will affect the efficiency of the programs negatively. Therefore, a limitation has been introduced in the model for the values to be taken by the graduated learner ratio variable in terms of time frame, and the ratio of learners who graduated within three years from the moment of inclusion in the system is taken into account as the desirable output variable. *The ratio of graduating learners* is obtained by proportioning the number of learners who graduated in this time period (within three years) to the number of learners who renewed the registration for each of the associate degree programs.

To graduate from a higher education institution in Turkey, a learner must have 2.00 or higher GPA. Due to the flexible structure of the Open Education System, learners with low GPA usually lose a semester or graduate with a low grade point average. Such factors are thought to affect the efficiency of the system negatively. *The learner ratio variable whose GPA is below 2.00 (adjusted from 0.00)* is obtained by proportioning the number of learners with a GPA below 2.00 to the number of learners who renew their registration. One of the main problems of the Open Education System is the difference between the number of learners who take the midterm exam and the number of learners who take the final exam. Most of the learners prefer not to take the final exam when they cannot achieve the success they desire in the midterm exam. *The rate of learners who took the midterm exam and did not take the final exam* was calculated by the ratio of the difference between the number of students taking the midterm exam and the number of students taking the final exam to the number of students taking the midterm exam. These two variables are taken into account as the undesirable output variable in the model.

In the 2019-2020 academic year, there were 41 associate degree programs in the Anadolu University Open Education System. Since the data of 6 associate degree programs for the periods in which efficiency analysis were to be made were not fully formed, these programs could not be included in the analysis. Therefore, an efficiency model was created for the remaining 35 associate degree programs in the Open Education System. According to the data envelopment analysis theory used in the model created, the number of decision units cannot be less than five times the total number of input and output variables (Chen & Jia, 2017, p. 848). To meet this prerequisite, the efficiency evaluation of Anadolu University Open Education System associate degree departments was carried out using a total of five variables (two inputs and three outputs).

Open Education System Efficiency Model

Depending on the status of the output variables, The Slack-Based Measure model is divided into: one is the model based on undesirable outputs and the other is the nonseparable outputs model based on the link between output variables. While the “Undesirable Outputs Model” handles desirable (good) and undesirable (bad) outcomes independently, the “NonSeparable Outputs Model” establishes a link between desirable and undesirable outputs. Here, the term “link” indicates that reducing undesirable outputs will also reduce desirable outputs (Tone, 2004, p. 6).

The efficiency of the Open Education System associate degree programs is determined in terms of input and output variables as modeled in Eq. (1).

$$A = \{(k, a, m, uz, uv) \mid (k, a) \text{ can produce } (m, uz, uv)\} \quad (1)$$

Considering the variables of input, desirable output, and undesirable output in terms of open and distance education, cluster A is generally assumed to be a closed and restricted set. In other words, finite amount of input can only produce finite amount of output (Choi et al., 2012). Two additional assumptions must be applied to reasonably model the joint production of desirable and undesirable outputs (Färe vd., 1989).

- i) If $(k, a, m, uz, uv) \in A$ and $0 \leq \alpha \leq 1$, then $(k, a, \alpha m, \alpha uz, \alpha uv) \in A$.
- ii) If $(k, a, m, uz, uv) \in A$ and $uz = uv = 0$, then $m = 0$.

The first assumption states that reducing the unwanted outcomes cannot be achieved in an easy way. It implies that the reduction of undesirable outcomes is possible by reducing both the desirable and undesired outcomes proportionately. The second assumption emphasizes that learners may have a low GPA and there may be learners who took the midterm exam and did not take the final exam, and that undesirable outcomes are inevitable. The only way to eliminate these conditions would be to stop the educational activities, in other words, the closing of the related associate degree program. Thus, under these two assumptions, it can be accepted that cluster A is the production group of the Open Education System associate degree programs. Due to the limitations of radial efficiency measurements, the Slack-Based Measure was used, and since the model contained some undesirable outputs, the “Undesirable Outputs Model” was used.

Suppose that the number of Open Education System associate degree programs is n , and two inputs (k, a) for each program and one desirable (m) and two undesirable outputs (uz, uv) will be used. Accordingly, we can show the inputs, desirable outputs and undesirable outputs with the help of three matrices defined below.

$$x = \begin{bmatrix} k_1 & k_2 & \dots & k_n \\ a_1 & a_2 & \dots & a_n \end{bmatrix} \in R^{2 \times n}$$

$$Y^g = [m_1 \ m_2 \ \dots \ m_n] \in R^{1 \times n}$$

$$Y^b = \begin{bmatrix} uz_1 & uz_2 & \dots & uz_n \\ uv_1 & uv_2 & \dots & uv_n \end{bmatrix} \in R^{2 \times n}$$

Then we can define the production group

$$P = \{(x, y^g, y^b) \mid (x, y^g, y^b) \text{ produce, } x \geq X\lambda, y^g \leq Y^g\lambda, y^b \geq Y^b\lambda, \lambda \geq 0\} \quad (2)$$

as set in the form Eq (2). Here, λ is the non-negative density vector. This indicates that the above definition corresponds to the assumption of constant returns to scale. Based on the concept of slack, the efficiency of decision units should be measured by considering how much the input surplus can be reduced for a given output level and how much the output can be increased for a given input level (Tone, 2001; Tone 2004). The Slack-Based used in this study to measure the efficiency of the Open Education System associate degree programs can be expressed with the mathematical structure of the Undesirable Outputs Model Eq. (3) and Eq. (4).

$$\rho_i^* = \min \frac{1 - \frac{1}{2} \left(\frac{s_i^k}{k_i} + \frac{s_i^{a-}}{a_i} \right)}{1 + \frac{1}{3} \left(\frac{s_i^{m+}}{m_i} + \frac{s_i^{uz-}}{uz_i} + \frac{s_i^{uv-}}{uv_i} \right)} \quad (3)$$

$$\left. \begin{aligned} k_i &= \sum_{j=1}^n \lambda_j k_j + s_i^{k-} \\ a_i &= \sum_{j=1}^n \lambda_j a_j + s_i^{a-} \\ m_i &= \sum_{j=1}^n \lambda_j m_j - s_i^{m+} \\ uz_i &= \sum_{j=1}^n \lambda_j uz_j + s_i^{uz-} \\ uv_i &= \sum_{j=1}^n \lambda_j uv_j + s_i^{uv-} \\ s_i^{k-}, s_i^{a-}, s_i^{m+}, s_i^{uz-}, s_i^{uv-}, \lambda &\geq 0 \end{aligned} \right\} \quad (4)$$

Here, s_i^{k-}, s_i^{a-} shows the excesses of input variables, which are the active learners ratio in the i. program and *rate of Anadolium e-Campus* s_i^{m+} ; use, respectively. indicates the shortfall the desirable output variable, which is the ratio of graduating learners of the i. program. s_i^{uz-}, s_i^{uv-} shows the learner ratio in i. program with a GPA below 2.00 and the rate of learners who took the midterm exam and did not take the final exam as the excesses of undesirable output variables, respectively. $\lambda_j = [\lambda_1, \lambda_2, \dots, \lambda_n]$ represents the non-negative intensity vector of the j. program, and n represents the total number of programs. The objective function, ρ_i^* , represents the efficiency of the program that is expected to be measured and must have values in the range $0 \leq \rho_i^* \leq 1$. If $\rho_i^* = 1$ and $s_i^{k-} = s_i^{a-} = s_i^{m+} = s_i^{uz-} = s_i^{uv-} = 0$, then the Open Education System program is efficient. If $\rho_i^* < 1$, then the Open Education System program is inefficient and the input and output variables should be improved. The larger the value of the objective function ρ_i^* , the more efficient the i. program is. By improving $\sum_{j=1}^n \lambda_j = 1$, this model can be constructed with the help of the variable return to scale assumption (Choi et. al., 2012; Zhang & Choi, 2013).

Data Analysis

In the efficiency analysis conducted in the study, the data complied by the Computer Research and Application Center (BAUM) unit and created in the institutional archive of Anadolu University Open Education System were used as the quantitative secondary data for the variables considered in the study. The efficiency values of the Open Education System associate degree programs for 2016-2017, 2018-2017 and 2018-2019 fall and spring terms were calculated separately, and the efficiency rankings of the associate degree programs were thus obtained.

Since the measurement of the relative performance of the Open Education System associate degree programs is based on linear programming, optimization programs such as GAMS, and LINDO, or commercial software such as Frontier Analyst, DEA Solver PRO, On Front, and Warwick, or non-commercial software such as DEA Excel Solver, DEAP, EMS, and Pioneer can be used (Babacan, 2006). In this study, DEA Solver PRO software was used to evaluate the efficiency of the Open Education System associate degree programs.

FINDINGS

The data on the 2016-2017 academic year fall term efficiency values obtained by using the Slack-Based Measure “Undesirable Outputs Model” of the Anadolu University Open Education System associate degree programs are shown in Table 2, and the data on the spring term efficiency values are shown in Table 3. The data on the fall term efficiency values of the 2017- 2018 academic year are shown in Table 4, the data on the spring term are in shown in Table 5. The 2018-2019 academic year fall term efficiency values are shown in Table 6, and the spring term data are given in Table 7. In these tables, instead of the full names of the associate degree programs, “Prg No” is used to indicate them.

Table 2. Efficiency values of the 2016-2017 fall term associate degree programs

Ranking	Associate Degree Programs	Efficiency Values	Ranking	Associate Degree Programs	Efficiency Values	Ranking	Associate Degree Programs	Efficiency Values
1.	Prg 28	1,0000	13.	Prg 9	0,4124	25.	Prg 10	0,1222
1.	Prg 27	1,0000	14.	Prg 23	0,3426	26.	Prg 22	0,1183
1.	Prg 25	1,0000	15.	Prg 15	0,3425	27.	Prg 13	0,0888
1.	Prg 24	1,0000	16.	Prg 8	0,3017	28.	Prg 12	0,0875
5.	Prg 32	0,9191	17.	Prg 7	0,2891	29.	Prg 21	0,0685
6.	Prg 14	0,9186	18.	Prg 18	0,2738	30.	Prg 26	0,0396
7.	Prg 6	0,6489	19.	Prg 5	0,2491	31.	Prg 3	0,0001
8.	Prg 11	0,6116	20.	Prg 33	0,2456	32.	Prg 35	0,0000
9.	Prg 20	0,5909	21.	Prg 34	0,2199	33.	Prg 19	0,0000
10.	Prg 30	0,5525	22.	Prg 2	0,2081	34.	Prg 4	0,0000
11.	Prg 17	0,4436	23.	Prg 1	0,1540	35.	Prg 16	0,0000
12.	Prg 29	0,4196	24.	Prg 31	0,1249			

When the efficiency values of the 2016-2017 fall term associate degree programs in Table 2 are examined, Prg 24, Prg 25, Prg 27 and Prg 28 are observed to be fully efficient programs, while Prg 14 and Prg 32 are the programs closest to the efficiency limit. In addition, Prg 3, Prg 35, Prg 19, Prg 4 and Prg 16, whose efficiency values are the smallest (the values converge to zero since four digits are used after the comma), are the programs farthest from the efficiency limit. These programs are the newly opened associate degree programs, and the values of these programs in the input and output variables in the efficiency model are very low compared to the values of other programs. Hence, these programs were placed at the end of the ranking.

Table 3. Efficiency values of the 2016-2017 spring term associate degree programs

Ranking	Associate Degree Programs	Efficiency Values	Ranking	Associate Degree Programs	Efficiency Values	Ranking	Associate Degree Programs	Efficiency Values
1.	Prg 24	1,0000	13.	Prg 20	0,2245	25.	Prg 4	0,1367
2.	Prg 11	0,5801	14.	Prg 15	0,2085	26.	Prg 17	0,1297
3.	Prg 29	0,4102	15.	Prg 8	0,1933	27.	Prg 5	0,1153
4.	Prg 30	0,4003	16.	Prg 31	0,1789	28.	Prg 26	0,1084
5.	Prg 23	0,3670	17.	Prg 7	0,1725	29.	Prg 22	0,1053
6.	Prg 32	0,3344	18.	Prg 18	0,1696	30.	Prg 34	0,0875
7.	Prg 28	0,2929	19.	Prg 9	0,1651	31.	Prg 12	0,0771
8.	Prg 25	0,2836	20.	Prg 27	0,1636	32.	Prg 35	0,0595
9.	Prg 1	0,2621	21.	Prg 21	0,1629	33.	Prg 19	0,0348
10.	Prg 33	0,2498	22.	Prg 13	0,1415	34.	Prg 16	0,0214
11.	Prg 6	0,2392	23.	Prg 2	0,1399	35.	Prg 3	0,0000
12.	Prg 14	0,2309	24.	Prg 10	0,1377			

When the efficiency values of the 2016-2017 spring term associate degree programs in Table 3 are examined, only Prg 24 emerges as the fully efficient program, and Prg 3 with the lowest efficiency value is the program farthest from the efficiency limit. As stated before, the values of the newly opened Prg 3 in the input and output variables in the efficiency model are quite small compared to the values regarding the other programs. Thus, this program was placed at the end of the ranking.

Table 4. Efficiency values of the 2017-2018 fall term associate degree programs

Ranking	Associate Degree Programs	Efficiency Values	Ranking	Associate Degree Programs	Efficiency Values	Ranking	Associate Degree Programs	Efficiency Values
1.	Prg 5	1,0000	13.	Prg 13	0,3656	25.	Prg 9	0,1136
1.	Prg 6	1,0000	14.	Prg 28	0,2939	26.	Prg 20	0,1072
1.	Prg 15	1,0000	15.	Prg 7	0,2928	27.	Prg 1	0,0793
1.	Prg 24	1,0000	16.	Prg 21	0,2889	28.	Prg 12	0,0665
5.	Prg 14	0,5507	17.	Prg 29	0,2600	29.	Prg 19	0,0521
6.	Prg 27	0,4851	18.	Prg 25	0,2495	30.	Prg 26	0,0491
7.	Prg 34	0,4622	19.	Prg 32	0,2495	31.	Prg 2	0,0481
8.	Prg 18	0,4274	20.	Prg 30	0,2002	32.	Prg 10	0,0393
9.	Prg 4	0,4219	21.	Prg 33	0,1967	33.	Prg 35	0,0288
10.	Prg 8	0,4167	22.	Prg 22	0,1572	34.	Prg 16	0,0247
11.	Prg 11	0,3948	23.	Prg 31	0,1421	35.	Prg 3	0,0000
12.	Prg 17	0,3939	24.	Prg 23	0,1336			

When the efficiency values of the 2017-2018 fall term associate degree programs in Table 4 are examined, it is observed that Prg 5, Prg 6, Prg 15 and Prg 24 are fully efficient programs, and Prg 3, with the lowest efficiency value, is the farthest from the efficiency ranking. In addition, Prg 3 values for the input and output variables included in the model are very low in the fall period of 2017-2018 compared to the values for the other programs.

Table 5. Efficiency values of the 2017-2018 spring term associate degree programs

Ranking	Associate Degree Programs	Efficiency Values	Ranking	Associate Degree Programs	Efficiency Values	Ranking	Associate Degree Programs	Efficiency Values
1.	Prg 24	1,0000	13.	Prg 19	0,3510	25.	Prg 18	0,1790
1.	Prg 32	1,0000	14.	Prg 14	0,3460	26.	Prg 33	0,1706
1.	Prg 35	1,0000	15.	Prg 31	0,3456	27.	Prg 2	0,1632
4.	Prg 23	0,6757	16.	Prg 9	0,3365	28.	Prg 22	0,1602
5.	Prg 1	0,5484	17.	Prg 16	0,2930	29.	Prg 26	0,1446
6.	Prg 11	0,5307	18.	Prg 15	0,2778	30.	Prg 12	0,1441
7.	Prg 29	0,4465	19.	Prg 30	0,2727	31.	Prg 27	0,1437
8.	Prg 28	0,4183	20.	Prg 13	0,2310	32.	Prg 10	0,1425
9.	Prg 6	0,4058	21.	Prg 17	0,2005	33.	Prg 5	0,1120
10.	Prg 21	0,4046	22.	Prg 8	0,1958	34.	Prg 34	0,0803
11.	Prg 25	0,3920	23.	Prg 7	0,1950	35.	Prg 3	0,0000
12.	Prg 4	0,3880	24.	Prg 20	0,1881			

When the efficiency values of the 2017-2018 spring term associate degree programs in Table 5 are examined, Prg 24, Prg 32 and Prg 35 can be seen to be fully efficient programs, and Prg 3, with the lowest efficiency value, is the program farthest from the efficiency limit. Since the values of Prg 3 in the input and output

variables in the model remained small compared to the values of other associate degree programs in this period, this program was placed at the end of the efficiency ranking.

Table 6. Efficiency values of the 2018-2019 fall term associate degree programs

Ranking	Associate Degree Programs	Efficiency Values	Ranking	Associate Degree Programs	Efficiency Values	Ranking	Associate Degree Programs	Efficiency Values
1.	Prg 4	1,0000	13.	Prg 18	0,3361	25.	Prg 31	0,1623
1.	Prg 8	1,0000	14.	Prg 17	0,3256	26.	Prg 5	0,1581
1.	Prg 19	1,0000	15.	Prg 23	0,2817	27.	Prg 11	0,1454
1.	Prg 35	1,0000	16.	Prg 29	0,2491	28.	Prg 12	0,145
5.	Prg 24	0,6171	17.	Prg 30	0,2415	29.	Prg 1	0,1197
6.	Prg 15	0,5254	18.	Prg 21	0,2201	30.	Prg 25	0,1176
7.	Prg 13	0,4866	19.	Prg 7	0,2186	31.	Prg 2	0,1132
8.	Prg 6	0,4822	20.	Prg 22	0,2058	32.	Prg 34	0,0934
9.	Prg 16	0,4588	21.	Prg 10	0,1968	33.	Prg 27	0,0724
10.	Prg 32	0,4372	22.	Prg 9	0,1919	34.	Prg 26	0,0425
11.	Prg 33	0,4361	23.	Prg 28	0,1745	35.	Prg 3	0,0424
12.	Prg 20	0,3656	24.	Prg 14	0,1658			

When the efficiency values of the 2018-2019 fall term associate degree programs in Table 6 are examined, Prg 4, Prg 8, Prg 19 and Prg 35 are observed to be fully efficient programs, while Prg 3 and Prg 26 are the programs found to be the farthest from the efficiency limit. Since the values of Prg 3 in the input and output variables in the model increased slightly in the fall period of 2018-2019, the fall period efficiency value of this program also increased.

Table 7. Efficiency values of the 2018-2019 spring term associate degree programs

Ranking	Associate Degree Programs	Efficiency Values	Ranking	Associate Degree Programs	Efficiency Values	Ranking	Associate Degree Programs	Efficiency Values
1.	Prg 35	1,0000	13.	Prg 28	0,4521	25.	Prg 22	0,2237
1.	Prg 24	1,0000	14.	Prg 3	0,4493	26.	Prg 20	0,2219
3.	Prg 9	0,6981	15.	Prg 21	0,442	27.	Prg 2	0,2185
4.	Prg 19	0,616	16.	Prg 32	0,3799	28.	Prg 27	0,1873
5.	Prg 23	0,6098	17.	Prg 31	0,346	29.	Prg 18	0,1741
6.	Prg 4	0,5421	18.	Prg 25	0,3434	30.	Prg 26	0,1731
7.	Prg 16	0,5216	19.	Prg 6	0,323	31.	Prg 10	0,1707
8.	Prg 1	0,4995	20.	Prg 30	0,3091	32.	Prg 17	0,1666
9.	Prg 29	0,4963	21.	Prg 7	0,2916	33.	Prg 5	0,1645
10.	Prg 11	0,4906	22.	Prg 14	0,2783	34.	Prg 12	0,1533
11.	Prg 33	0,4895	23.	Prg 13	0,2562	35.	Prg 34	0,1397
12.	Prg 15	0,4574	24.	Prg 8	0,2435			

When the efficiency values of the 2018-2019 spring term associate degree programs in Table 7 are examined, it is clear that Prg 24 and Prg 35 are fully efficient programs, and Prg 34 is the farthest from the efficiency limit. In addition, the values of Prg 3 in input and output variables in the model increased further in the fall period of 2018-2019, and Prg 3, which was the farthest from the limit in the previous periods, rose to the 14th place in the efficiency ranking in the relevant period.

As the efficiency value increases, the efficiency of the relevant associate degree program increases, and the smaller the value, the less efficient the program is. In the fall and spring semesters of 2016-2017, 2017-2018, 2018-2019 academic years, 12 different programs (Prg 4, Prg 5, Prg 6, Prg 8, Prg 15, Prg 19, Prg 24, Prg 25, Prg 27, Prg 28, Prg 32 and Prg 35) were found to have an efficiency value of “1”. Among these programs, Prg 24 reached the efficiency value of “1” in five of the six periods and Prg 35 had the value of “1” in the last three periods. For this reason, Prg 24 and Prg 35 ranked at the top in terms of average efficiency by period (Table 8). The values in Table 8 were obtained by taking the average of the efficiency values in Table 2, Table 3, Table 4, Table 5, Table 6 and Table 7.

Table 8. Associate degree programs the average of the efficiency values and rankings

Ranking	Associate Degree Programs	Efficiency Values	Ranking	Associate Degree Programs	Efficiency Values	Ranking	Associate Degree Programs	Efficiency Values
1.	Prg 24	0,9362	13.	Prg 29	0,3803	25.	Prg 18	0,2600
2.	Prg 32	0,5533	14.	Prg 19	0,3423	26.	Prg 7	0,2433
3.	Prg 6	0,5165	15.	Prg 27	0,3420	27.	Prg 16	0,2199
4.	Prg 35	0,5147	16.	Prg 30	0,3294	28.	Prg 31	0,2166
5.	Prg 15	0,4686	17.	Prg 9	0,3196	29.	Prg 34	0,1805
6.	Prg 11	0,4589	18.	Prg 5	0,2998	30.	Prg 22	0,1618
7.	Prg 28	0,4386	19.	Prg 33	0,2980	31.	Prg 2	0,1485
8.	Prg 14	0,4150	20.	Prg 20	0,2830	32.	Prg 10	0,1349
9.	Prg 4	0,4148	21.	Prg 1	0,2772	33.	Prg 12	0,1122
10.	Prg 23	0,4017	22.	Prg 17	0,2767	34.	Prg 26	0,0929
11.	Prg 25	0,3977	23.	Prg 21	0,2645	35.	Prg 3	0,0820
12.	Prg 8	0,3918	24.	Prg 13	0,2616			

Similarly, for the fall and spring semesters of the 2016-2017, 2017-2018, 2018-2019 academic years, the efficiency values of 5 different programs (Prg 3, Prg 4, Prg 16, Prg 19 and Prg 35) were close to “0” since four digits were used after the comma. Prg 4, Prg 16, Prg 19 and Prg 35 had a value close to “0” for only one semester (the 2016-2017 academic year spring semester), while Prg 3 had an efficiency value converging to “0” in four of these six semesters. For this reason, Prg 3 ranked lowest in terms of average efficiency values by period (Table 8). As the periods progressed, the efficiency values of these five programs, except Prg 3, increased. Prg 4, Prg 19 and Prg 35 received “1” as the most efficient programs in the fall semester of 2018-2019 (Table 6). Prg 3, on the other hand, increased in efficiency value with the fall semester of the 2018-2019 academic year, and continued to rise in both efficiency value and efficiency ranking in the spring of the same academic year (Table 6 and Table 7).

CONCLUSION AND DISCUSSIONS

The performances of education systems can be evaluated from perspectives such as academic achievement, financial situation and use of human resources. Tomkins and Green (1988), Breu and Raab (1994), Kutlar and Kartal (2004), Fandel (2007), Tyagi, Yadav and Sing (2009), Cunha and Rocha (2012), Selim and Bursalioglu (2015), Arik and Seyhan (2016), Erkoç (2016) and Uslu, Ertas and Yayar (2018) discussed academic achievement, financial situation and human resource use perspectives as hybrids in their studies. In this study, performance analyzes of the Open Education System were made by considering the perspectives mentioned in a hybrid way.

Evaluation of efficiency in education can be perform between educational institutions as well as between faculties and programs. While evaluating the efficiency of universities in Kulshreshtha and Nayak (2015) and Caglar and Gurler (2020) studies, Cinaroglu et al. (2018) performed the efficiency evaluations of the faculties, Tyagi, Yadav and Singh (2009) and Aziz, Janor and Mahadi (2013) programs.

Organizations or systems should determine which indicators will be used in the process of achieving the determined goals, form sets of indicators and analyze the sets of indicators to reach results. It can be said that the variables in the indicator sets used for efficiency analysis in the literature differ according to the performance perspectives. It has been found that variables such as “number of publications, number of graduates, number of projects” are used for academic success, “personnel expenses, government supports, project budgets” for financial status, and “number of academic staff, number of students” for human resources. (Tomkins & Green, 1988; Breu & Raab, 1994; Kutlar & Kartal, 2004; Fandel, 2007; Tyagi, Yadav & Sing, 2009; Ulucan, 2011; Cunha & Rocha, 2012; Aziz, Janor & Mahadi, 2013; Selim & Bursalioglu, 2015; Arik & Seyhan, 2016; Erkoc, 2016; Caglar & Gurler, 2020). Due to the structure of the distance education system, it has been inevitable that the variables used in this study show some differences. For this reason, variables that are specific to the system and that are thought to better reflect the efficiency of the system were used in the study.

Differing from the formal education system, the Open Education System places no restriction on the maximum duration of study. However, the large number of learners staying in the system for a long time does not comply with the goals of the system. Hence, a limitation has been imposed in terms of the time period for the values to be taken by the “number of graduating learners” variable, which is included as the desirable output variable in the efficiency model, and the “number of graduating learners” within three years from the moment they are included in the system is taken into account. This reduced the values of the “graduating learner ratio” variable by programs. Along with this, the efficiency values of the programs also decreased and the efficiency rank of the associate degree programs changed as well. Therefore, steps should be taken to ensure a standard of efficiency for associate degree programs that are at the top of the efficiency rankings, it should be ensured that the learners in the lower associate degree programs remain loyal to the system, and the advantages of graduating from these programs should be advertised and communicated better.

When the efficiency analysis results of the Open Education System associate degree programs are examined, some common characteristics of the programs that are at the top of the efficiency rankings stand out. It is clear that the programs that rank high are those that contribute to individual development, enable the development of skills and abilities, and offer job opportunities due to the recent human resources needs arising in some fields of the public sector. These qualities can be argued to increase the efficiency of associate degree programs. The programs that rank low are those that have recently been opened or those that have been in the system for a long time, have reached occupational saturation, and begun to attract less interest. Therefore, the lower-ranking associate degree programs need to be equipped with the qualities stated above to keep the student interest in them strong.

Open and distance education is a relatively recent interdisciplinary field where technology plays an instrumental role. It is clear that as technology advances, these fields develop accordingly, and they offer new learning opportunities to learners. Consequently, it has become important to develop a more comprehensive understanding of open and distance education and to examine these fields from different perspectives (Bozkurt, 2019, p. 252). Thus, the current study, which evaluates the efficiency of Anadolu University Open Education System associate degree programs, which has one of the largest learning communities in the world, aimed to bring a new perspective to the discipline of open and distance learning, and to show that interdisciplinary studies can be carried out by bringing this discipline and other disciplines together. This study is expected to guide system administrators, decision-makers and scientists interested in this discipline in terms of evaluating the efficiency of similar open and distance education systems. In evaluating the efficiency of systems that provide open and distance education services, first considering the characteristics of the systems and then creating models by determining the appropriate variables for these characteristics is strongly recommended.

In open and distance education systems, the learner and instructor are separated from each other, and interaction between the learner and teacher is provided with the help of information and communication technologies. It can be said that the technological tools and platforms, learning environments and learning materials in open and distance education systems are the actors that increase the interaction between the learner and instructor. The increasing learner-instructor interaction has brought about the creation of big data for open and distance education systems and organizations. Using the cloud technologies specific to

systems or organizations to process and store big data is highly recommended. The use of such technologies is expected to facilitate access to data in studies to be carried out in these areas, and to increase the number of such studies.

With the COVID-19 pandemic, which spread all over the world in the first half of 2020, and was responded by most countries through strict preventive measures in the second half of 2020, social solidarity has increased, the importance of individual hygiene has been emphasized and new concepts such as social distance has become an essential part of our daily lives. Under these circumstances, traditional education could not be continued in many countries, and emergency open and distance learning has become the only viable solution. It is worth bearing in mind that open and distance learning is not simply a fad arising from dramatic changes or crises (such as a pandemic) brought about by technological possibilities and changing global conditions, but it is a genuine necessity.

Suggestions or Future Research

After determining the characteristics of the systems or institutions that provide open and distance education services and the variables for these features, efficiency analyses can be performed in various other ways. In future efficiency analysis studies in the field of open and distance education, more than one efficiency analysis can be performed using different combinations of the variables discussed, and the efficiency values of decision units can be compared. In addition, the efficiency levels of decision units can be determined by using reference-based Multi-Criteria Decision Making (MCDM) methods. Further studies comparing the efficiency of institutions or systems that provide open and distance education services can be carried out. Moreover, whether the effects of the current COVID-19 pandemic play a role in the efficiency of open and distance education systems can be investigated. By comparing the efficiency of the open and distance education systems in this pandemic period with their pre-pandemic efficiency, the positive and negative aspects of the characteristics of these systems can be revealed.

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SECOND LIFE IN ART AND DESIGN FROM STUDENTS' PERSPECTIVE: A CASE STUDY

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ABSTRACT

This article tried to determine the students' opinions related to the use of Second Life (SL) application in higher education art and design education. In this case study conducted with 17 students selected via typical case sampling, the SL virtual platform was used as a research area. Data collection tools were included document analysis, self-peer-process assessment, focus groups. Research data were analyzed with content analysis. Participants stated that the use of SL application in art and design education provides support for analysis of 3D programs, virtual exhibition opportunities and simple 3D modeling. Internet speed, slowness of computers, technical and build problems were the common difficulties experienced by the participants. Consequently, the participants' application skills, 3D thinking skills, design skills and creativity during the practise of the SL application improved. Despite some technical difficulties in understanding SL, it is thought that SL is a suitable environment for art and design education. Also, due to the Covid-19 pandemic, most of the education activities, are conducted on virtual environments. Therefore, it is thought that SL will contribute to distance education by online learning.

Keywords: Art and design education, Second Life, 3D thinking skills, student opinions, online virtual learning, distance education.

INTRODUCTION

Education systems are in a constant transformation. Each new age reorganizes the teaching methods and environments by including the tools that it considers appropriate to the educational environment. In our age, this situation can be explained by digitalization. Today, in many scientific studies, virtual worlds, virtual reality and the virtual medium, which are referred to by different names, are effectively studied and used. Girvan (2018, p.1099) defines virtual worlds as "shared, simulated spaces which are inhabited and shaped by their inhabitants who are represented as avatars". The usage areas of three-dimensional simulation programs, which are one of the virtual worlds, have expanded as much as possible. These programs, enables people to represent themselves visually and can be addressed to different senses through user interaction. It can create a sense of presence in the environment in the user, can provide intuitive interaction with real-time natural orientations, create a secure environment and thus make the virtual world more visual and realistic (Mikropoulos & Bellou, 2006). In addition, having the motivating feature of virtual reality, being effective, practical, providing opportunity for repetition, being instructive, enabling skill learning, saving time, presenting different places to users, allowing various variations, increasing physical activity and providing different experiences are among the remarkable qualities (Kalkan, 2020). Virtual worlds provide opportunities for skill training that involves high risk or is difficult to implement. It provides the opportunity to make experiences that are impossible to apply. For example, a physics experiment can be designed and implemented in a virtual laboratory. Environments that cannot be reached under normal conditions (moon surface, seabed, natural habitats of wild animals, etc.) can be designed in 3D and experienced in virtual reality. Using the avatar reduces the feeling of social disconnection (immersive). It contributes to distance education by providing a realistic environment through simulation (Karabatak, 2020).

The study area of this article has been determined as the Second Life virtual World. Harrison (2009) states that SL is designed as an alternative utopia to the real world. SL is defined as a “3D, online virtual world created by Linden Lab, containing persistent content created by its Residents” (wiki.secondlife.com, 2021). SL is a platform among three-dimensional educational environments, helps the use of various educational disciplines such as collaborative learning (Erbaş & Demirel, 2015), experimental learning, (Wang, Grant & Grist, 2020) game-based learning and role-playing learning (Can, 2012). Therefore, it is thought that the student supports own learning (Wang, Grant & Grist, 2020).

SL is an online, 3D, multi-user platform where users can represent themselves via avatar and thus feel themselves inside the application. SL has great potential, especially for distance learners (Burgess et al., 2010). Distance education can be traditionally defined as the physical separation of student and teacher. However, even though it is difficult to completely eliminate student-teacher physical separation with the use of digital technologies, it may be possible to create a collaborative, virtual pedagogical space that reduces the distance between them (Anderson & Rivera-Vargas, 2020). This distance between students and teachers can be reduced by the immersion and presence feature of virtual environments. Immersion and interaction which are considered as the main features of Second Life, show that the user can relate to the environment in many ways through user avatar (Fedeli, 2016).

In SL, educators can organize activities such as seminars, conferences, symposiums simultaneously with the real world. Various leading universities of the world, such as Saint Leo University Virtual Campus, Stanford University Libraries, Open University, have established virtual campuses and include SL in their education programs (wiki.secondlife.com, 2021). SL contributes to skills such as socializing, research-discovery, visual design, communication, collaboration, problem solving, critical thinking, developing psychomotor skills, contributing to linguistic-cultural development by developing digital visual culture and virtual literacy skills (Karabatak, 2020).

The use of three-dimensional virtual worlds in art education is one of the frequently discussed topics (Han, 2016, 2019, 2020; Banic & Gamboa, 2019; Erkan, 2020; Dolphin, 2020; Kaur, 2019). Loveless (2002) stated that individuals can embody their original and creative ideas by using information and communication technologies. Today's students are more capable and comfortable in using technology and learning materials (Wang & Braman, 2009). The art educators of higher education warn the schools to discover, experiment and embrace some parts of constantly evolving forms of education by encouraging students' unreachable imagination in different ways and they are trying to merge the education with other technologies and disciplines (Salman, 2009 as cited in Stokrocki, 2011).

When the methods used in art and design education are evaluated, the scarcity of teaching and learning processes in 3D virtual worlds draws attention (Fleischmann, 2020; Dreamson, 2020). This situation strengthened the idea of using 3D virtual environments in our research. In addition, the rapidly developing technology of our age supports the idea of using virtual environments in art and design education. Today, however, the world is facing an entirely new situation. Covid-19 pandemic is forcing all education providers to migrate courses to online learning platforms (Dreamson, 2020). Therefore, not only due to the technological advances of our age, but also due to the epidemic, it is necessary to harmonize the methods used in art and design education with technological developments. Based on these ideas, it was decided to use 3D, online multi-user virtual environments in higher education art and design education. In this process, it was aimed to reveal the positive and negative aspects of art education in virtual environments, considering that the views of the participants should be taken into account. For this purpose, SL application has started to be used in higher education art and design education. Using the “Second Life” application, which is a 3D online life simulation, in the art and design education process carried out in higher education, taking the opinions of the students and examining the dimensions of these opinions constitute the problem presented by this article.

Today, the use of the SL application becomes even more important in the light of the Covid-19 epidemic and the discussions surrounding online learning. Given the improvement of online, 3D environments, affecting the creative industry, and the need for social distancing, SL should be effective. In this connection, this paper aims to determine what students' opinions about the use of Second Life application in art and design education. In order to achieve this goal, answers were sought for the following questions.

- 1- "What are the students' views on the use of Second Life application in art and design education?"
- 2- "What are the views of the students about the works obtained in the art and design course where Second Life application is used?"
- 3- "How does the Second Life application affect the learning process in art and design education?"

With the data obtained within the scope of these questions, it is aimed to reveal students perspectives on the use of SL application in higher education art and design education and the effect of SL on learning processes. It is thought that the findings and results obtained from this research may strengthen the idea that the SL virtual environment can be used as an alternative environment in line with the goals of art and design education. This article also refers to the importance of virtual learning and students' continuous learning during the ongoing global pandemic. The issue is important and current given less human interaction due to the need to maintain social distance protocols. From this point of view, this article is expected to contribute to distance art and design education by online learning.

METHOD

This study, in which students' views on the use of SL application in art and design education are interpreted, was conducted with the "Case Study" design, one of the qualitative research applications. "Case Study" is an empirical research method that works on a current phenomenon within its own real-life framework, is used when the boundaries between the phenomenon and its content are not clearly clear and when there are more than one evidence or data source." (Yin, 1984 as cited in Simsek & Yildirim, 2016, p. 289). The situation studied in this study is the views of students on the use of SL application in art and design education. In this study, it is aimed to describe the current situation in depth and understand people's perspectives.

Participants

The sample of this study; 6 of them are in the 3rd class of TOBB University of Economics and Technology, Faculty of Fine Arts, Design and Architecture, Visual Communication Design Department, 6 of them are in the 2nd class of Gazi Education Faculty, 5 are in Giresun Gorele Fine Arts Faculty, Graphic department consists of 17 students studying in the second grade. Participants were identified through "Typical Case Sampling". Typical Case Sampling, one of the non-probabilistic sampling method; "requires determining a situation typical of many situations in the universe regarding the research problem and collecting information on this sample" (Buyukozturk et al, 2016, s.91).

Looking at the demographic characteristics of the participants; it was observed that 11 of the students who participated in the research voluntarily were girls and 6 of them were boys, and the age range of the participants varied between 19 and 23. Each participant who volunteered from three universities providing art and design education was included in the study.

During the 12-week implementation process, depending on the situation under study, the researcher is a person who directly meets the participants, shares the same environment and uses her perspective in data analysis, that is, both the practitioner and the participant observer. Thus, the researcher aimed to support comments on the findings. Researcher as participant observer; fulfilled tasks such as explaining how SL was applied to the participants in a virtual environment, observing and motivating the participants, meeting with the participants, providing technical support to the participants.

The SL virtual platform, which offers the graphic workshop course and 3D technologies to the use of learners in an educational framework, has been determined as a research area. SL is an internet based life simulation. Each avatar causes a concentration on the internet and it becomes impossible to build in areas where avatars are concentrated. In order to avoid this problem, the researcher rented working area with a building permit in the Happy Hippo Building School's sky. The working area has shown in Figure 1-4 and the stages of the research are as in Figure 5.



Figure 1. Happy Hippo Building School

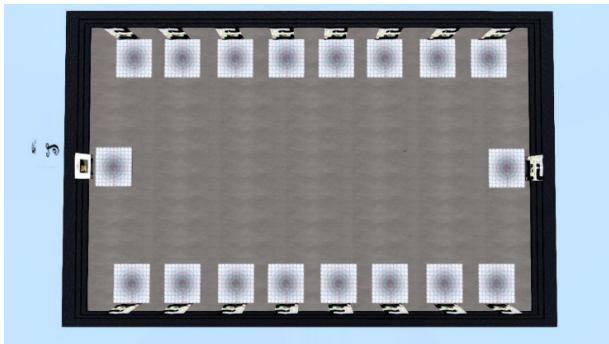


Figure 2. View of the working area from the top

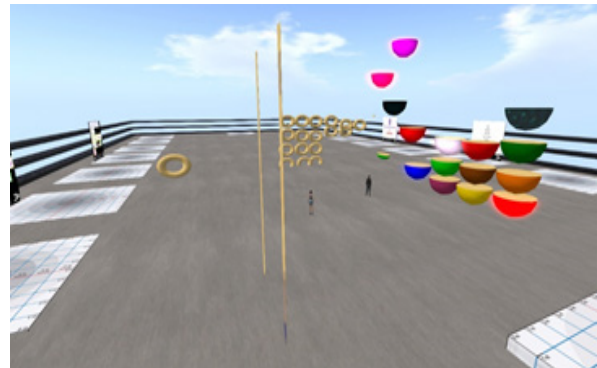


Figure 3. View of the working area from the across

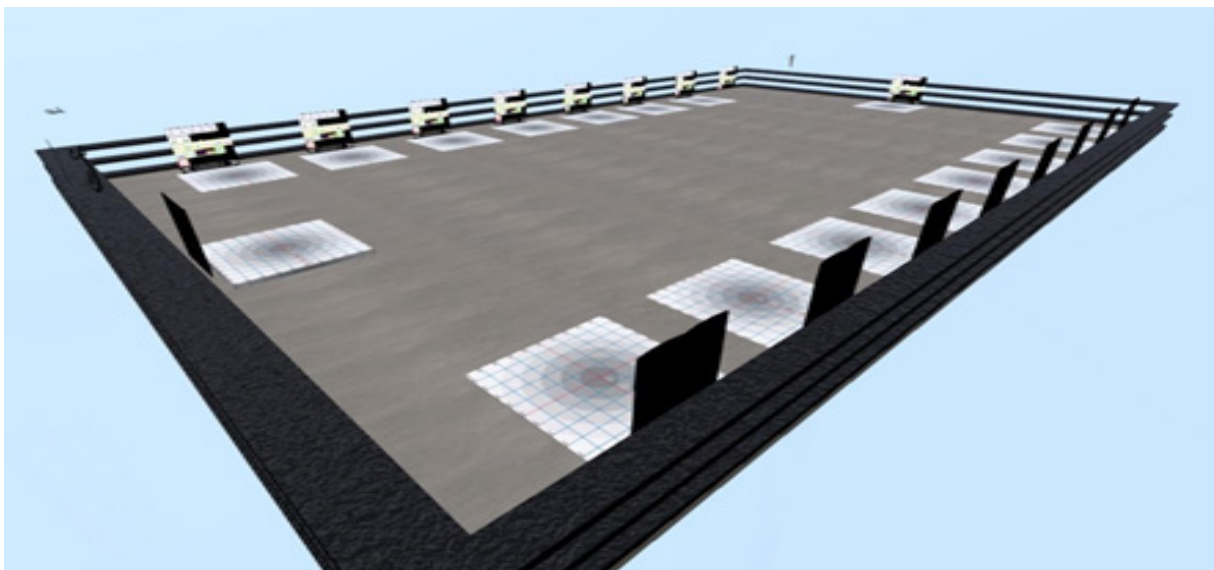


Figure 4. View of the working area from the corner

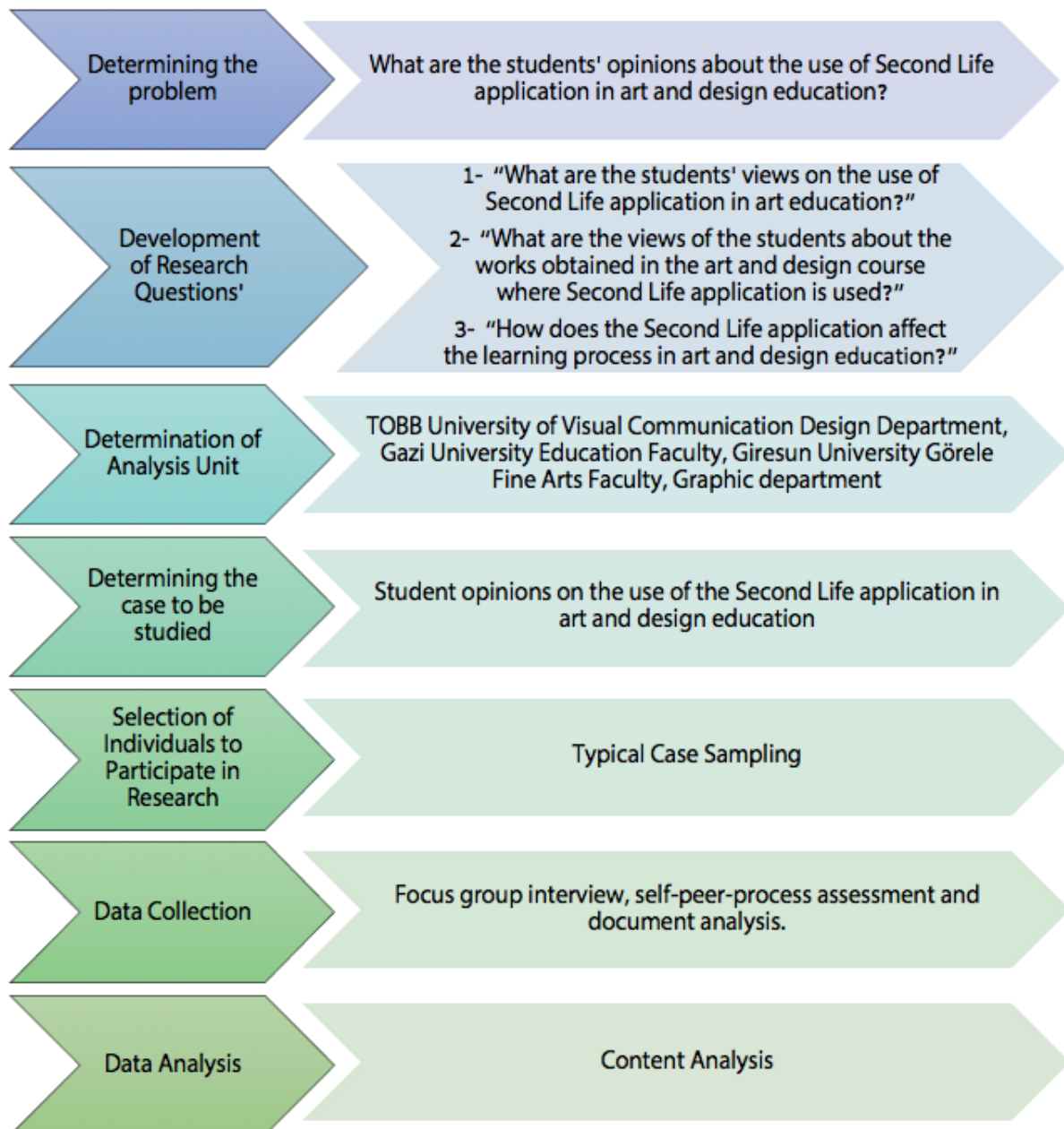


Figure 5. The stages of the research

Data Collection

The working group built the exhibition design in a 12-week period using the virtual world of Second Life. In this study, design process is examined. Data related to the process and perceptions were used in the study. While the data on the process were related to what was going on during the research and how it affected the research group, the data pertaining to the perceptions are related to the thoughts of the individuals included in the research group about the process (Yildirim & Simsek, 2016).

In the study, triangulation has been made in data sources in order to learn different aspects and formations of reality, to reveal different perspectives, different indicators and meanings. "Put simply, the concept of triangulation means that an issue of research is considered from (at least) two points or perspectives." (Denzin & Lincoln, 2018, p.779). Diversifying data sources; it is a tool in which multiple data types are associated with each other. These data are obtained from direct observations, interviews, analysis of the materials used, information gathered with interpretation or assesment. In addition, triangulation can provides opportunities to the researcher for to strengthen the credibility of the research (Eisner, 2017).

In this study, which was conducted with qualitative research method, data were obtained through focus group interview, self-peer-process assessment and document analysis. All data were analyzed by content analysis. Interviews were conducted with the activities of the researcher who was a “Participant Observer”. All data has been collected via internet. Collection of data related to the process (SL chat log, Whatsapp chat records, e-mail, sms, etc.) continued throughout the application, regardless of a specific time period. After the development of the research question, determination of the participants and the creation of the study area, the data related to the perceptions in the research were collected as in Figure 6. Before the study started, the necessary “Ethics Committee Approval” was obtained from Gazi University Ethics Committee for all data collection tools used in the study.

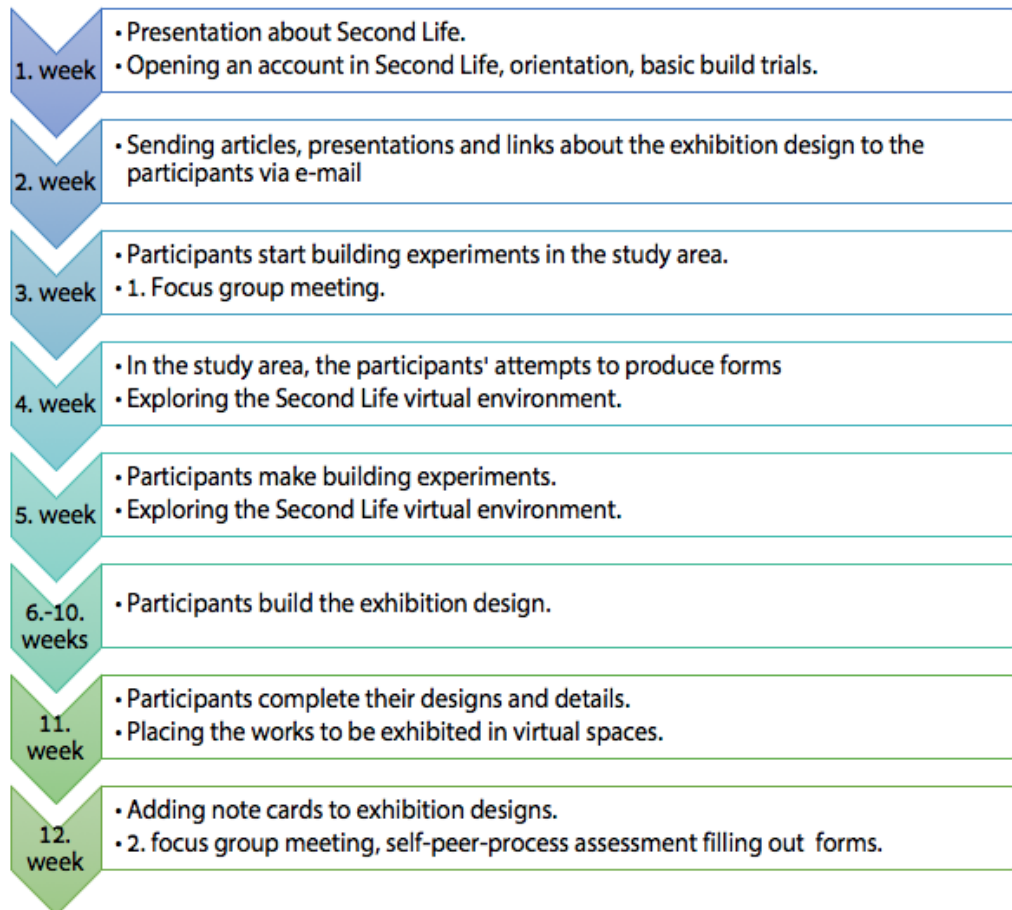


Figure 6. Research process

Focus Group Meeting

Focus group interviews were held at the beginning and end of the implementation process, and the opinions of the participants about their knowledge and usage skills were tried to be determined. The resources used in the preparation of the interview questions include the articles scanned in the field indexes and the books written on measurement-assessment. Focus group interview forms (see Appendix A) have been prepared in line with the opinions of academicians who are specialized in both art and design and qualitative research methods. The questions were kept as short as possible and expressions that could be interpreted in the same way were preferred by each participant. Alternative questions and probes were used to make the questions easier to understand.

Document Review

While examining the process in this study, the records of three different Whatsapp group interviews and individual Whatsapp conversations when necessary, SL chat diary records, text messages and e-mails were evaluated within the scope of document analysis. The researcher provided motivation and technical support to participants about four hours a day for eight weeks on the use of the Second Life application. Since the researcher conducted this research on SL, which is an online, 3D environment, the research period was recorded with a data set consisting of more than 600 screenshots, 161 pages of SL chat records (raw data), 87 pages of Whatsapp chat records (raw data).

Self-peer-Process Assessment

In order for the participants to reflect their views on performance tasks in the creative design process, to determine how much they understand the concepts related to the subject, to what extent they can use the Second Life virtual environment and to determine their attitudes towards virtual worlds “Self Assessment Form” (see Appendix B), “Peer Assessment Form” (see Appendix C) and “Student’s Process Assessment Form” (see Appendix D) were used. While creating these tools used the resources include the articles scanned in the field indexes and the books written on measurement-assessment. Also the opinions of academicians specialized in both the field of art and design and qualitative research methods, and these questions compliance with the sub-objectives were taken into account in this progress. These forms were filled in by the participants at the end of the research process.

Analysis of Data

In the study, the analysis of qualitative data collected through focus group interview, self-peer-process assessment and document analysis was conducted with content analysis technique. The main purpose of content analysis is to reach the concepts, themes and relationships that can explain the collected data. Researchers identify and analyze the existence, meanings, and relationships of these themes and concepts. Then the researchers make inferences about the messages in the data (Buyukozturk et al, 2019).

In this context, the researcher determined 33 main themes (main categories) based on 33 codes by reading the data set several times at different times in line with the aims of the research. Then, besides the researcher, three academicians who are experts in the field of art and design examined the codes and main themes. As a result of this examination, expert academicians determined 21 main themes and 45 sub-themes based on 28 codes. Disagreements on the codes and main themes were resolved with consensus after expert academicians exchanged views. Thus, the code and main themes list to be used in the analysis were reached by arranging the codes and main themes. In conclusion, this article, which includes students’ opinions on the use of Second Life application in art and design courses, includes 9 main themes and 25 sub-themes based on 17 codes.

Providing detailed definitions is one of the most important solutions proposed to eliminate threats to reliability and increase validity and quality in qualitative research. Therefore, the level of validity and credibility for qualitative research; almost all of the data collection and analysis processes depend on the elements that threaten the validity and the techniques applied to eliminate these threats to be written in the research report in an open and systematic manner. Including everything in the research process in the research report in a clear and traceable manner increases the credibility and therefore the quality of the research (Hammersley, 1987; LeCompte & Goetz, 1982; Pyett, 2003; Rubin & Rubin, 1995; Whittemore et al. 2001 as cited in Yasar, 2018). In order to ensure external reliability, the research should be reported transparently, the participants and other data sources should be clearly stated (Connelly, 2016 as cited in Baltaci, 2019). In this study, in the method part of the research, in order to ensure the external validity of the research; the method used in the data collection process, the tools developed, the participants and the implementation process are explained in detail. In addition, the obtained findings were presented in an original way, with direct quotations, without adding comments, and then the researcher’s comments were included.

Perhaps the most known and applied strategy for increasing the internal validity and reliability of a study is the triangulation technique. Triangulation, which is also defined as variation, is one of the techniques that increase the consistency, understandability and timeliness of the results, thus increasing the credibility of the

research (Yasar, 2018). In this study, the researcher diversified the data collection process and gathered detailed and in-depth information through focus group interviews, self-process reviews, and document analysis.

Asking people who have general knowledge about the research subject and who are specialized in qualitative research methods to examine the research in various dimensions is another measure that can be taken in terms of credibility (Baskale, 2016) In order to analyze and interpret the research data in terms of validity and reliability of the research, three educators who are experts in the field of art and design and an measurement-assessment specialist's opinion was sought. Thus, it was possible to evaluate the data from different angles.

Long-term interaction with the participants increases the reliability of the research results. This includes the fact that the researcher devotes sufficient time to the data collection process to gain an in-depth understanding of the culture, language or views of the group under study. Sustained involvement, also helps build the trusting relationships and rapport that are necessary to elicit accurate and thorough responses (Houser, 2016). In order to ensure the internal validity of the research, the researcher participated in the research field and had a long-term interaction for 12 weeks. The abbreviation system specified in the table below was used in the analysis of all qualitative data obtained in the study.

Table 1. Management of qualitative data set

Expression	Expansion of expression
FG Interview Record 2,11th stud /Ln 25	Focus Group Interview Record 2, 11th student/ Line number 25).
PA, 16th stud /Ln 13	Peer Assessment, 16th student /Line number 13
SA, 9th stud /Ln 53	Self Assesment, 9th student /Line number 53
PrA, 7th stud /Ln 64	Process Assessment, 7th student /Line number 64
SLdiary, 8th stud /Ln 450	Second Life Chat Diary, 8th student /Line number 450
WPdiary, 14th stud /Ln 25	Whatsapp Chat Diary, 14th student /Line number 25

FINDINGS

Student views on the use of SL application in higher education art and design education are grouped under three main themes. These are 1) Students 'views on the use of the Second Life application in art and design education, 2) Students' views on the designs obtained through the use of the Second Life application, 3) The impact of the Second Life application on the learning process. Main themes are given in the Figure 7.

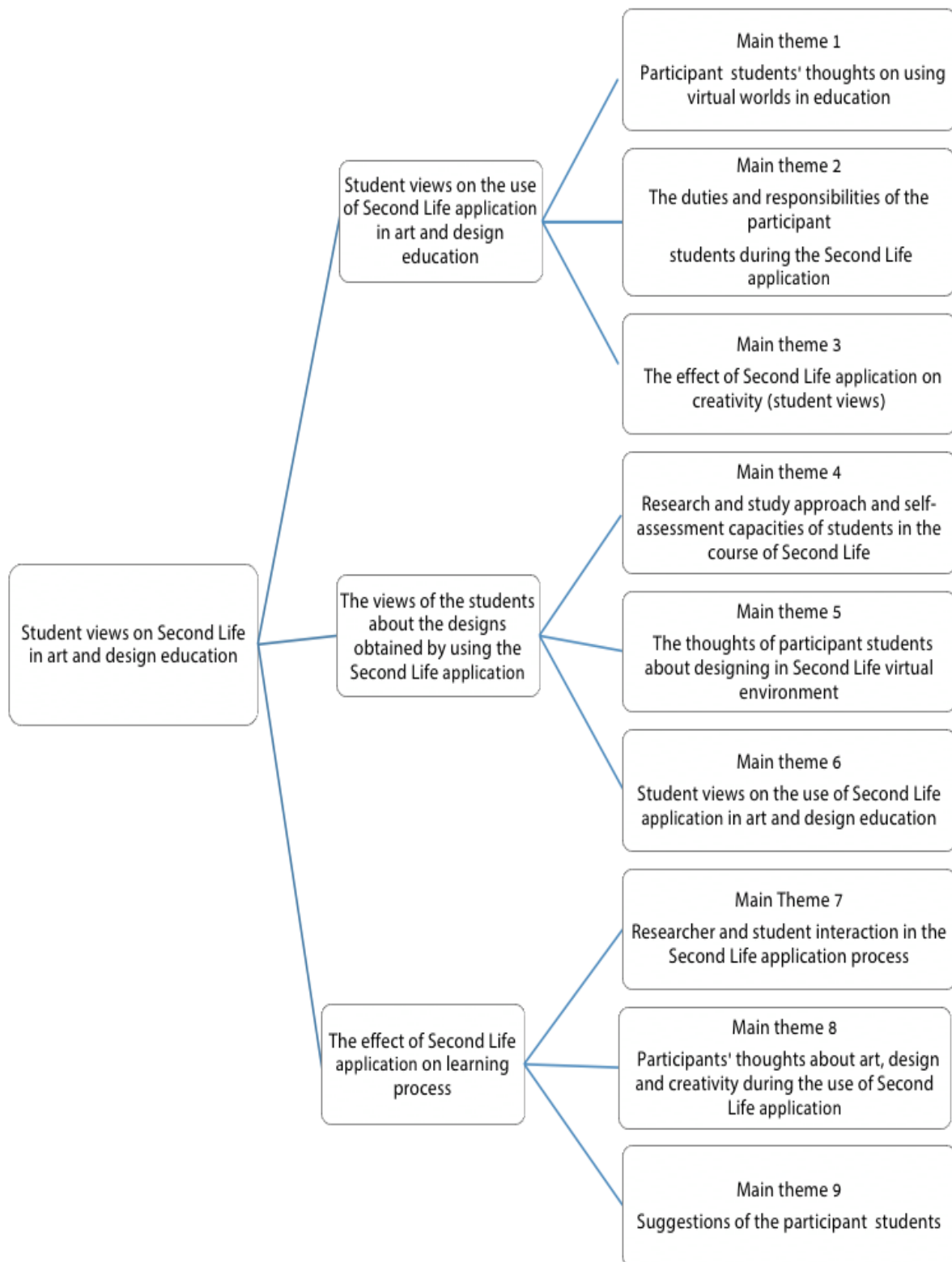


Figure 7. Overview of student views on Second Life application in art and design education

Findings about 1st Research Question

The first question of the research is “What are the students’ views on the use of the Second Life application in arts education?” expressed in the form. The views of the participants to answer this question were collected under three main themes. These are; 1) Participant students ‘thoughts on the use of virtual worlds in

education, 2) The duties and responsibilities of the participant students during the Second Life application, 3) The effect of Second Life application on creativity (according to the students' views). Figure 8 shows the themes and sub-themes of student views on the use of the Second Life application in art and design education”.

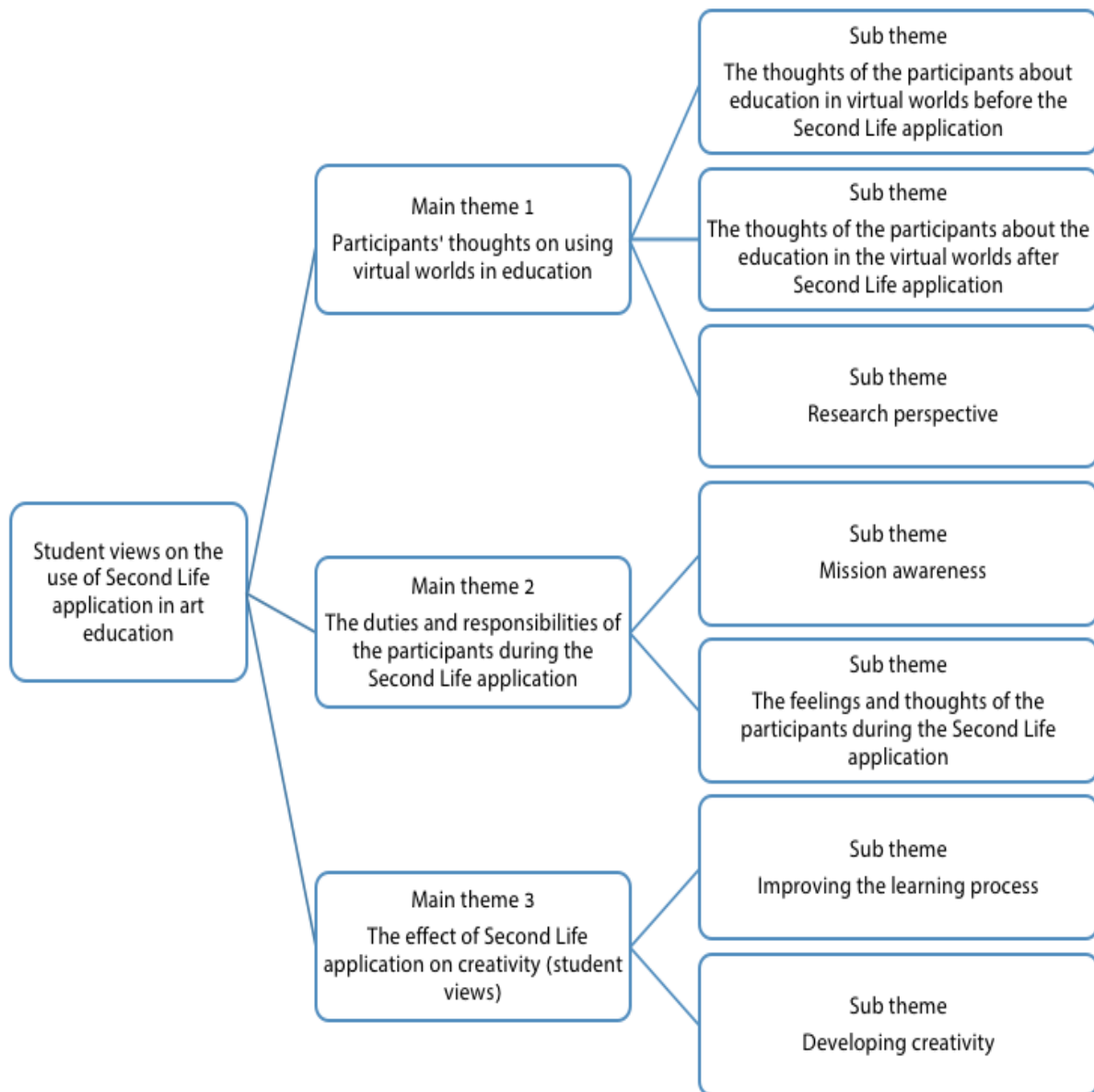


Figure 8. Overview of students' views on the use of Second Life application in arts education

1st main theme; when the data about “The opinions of the participant on using virtual worlds in education” are examined; Three sub-themes have emerged. Before using the SL application, the participants (f:2) stated that they used virtual environments for visual search, examining examples and distance education. These expressions contain both positive and negative meanings.

“..... I'm more interested in web sites because I am more interested in images.” (FG Interview Record 1, 11th stud/Ln 77-81).

“We had distance education lessons in our first year and I don't think it worked ..” (FG Interview Record 1, 8th stud/Ln 152-154).

After using the SL application, the participants (f:5) stated that they wanted to do more practice about art and design education and SL enabled this.

"... I think it is definitely beneficial to use such programs actively... Instead of just taking technical knowledge and making experiments, I think that when we try it in a virtual environment, it is easier and we can bring about more work. " (FG Interview Record 2, 8th stud/ Ln 71-78).

Although the perspectives of the participants before their voluntary participation in the study are mostly positive (f:6), negative (f:2) statements can also be seen. Examples of the findings are given below.

If we understand V... 's words correctly, I think that we will do a good job and it becomes much clearer when we talk together (WPdiary, 8th stud/Ln 31-33).

"372 mb internet is gone, I played for 15 minutes or so" (WPdiary. The student who has not completed the research /Ln 2069-2073).

Most of the participants did not design in online, 3D virtual environments prior to the research. They stated that they generally use virtual environments for research. Some of them used virtual environments for distance education and had negative results. Participants stated that they found a environment to practice in the field of art after the SL application. Most of the participants were positively impressed by this design experience in SL.

2nd main theme; when the data about the "Roles and responsibilities of participating students during SL application" were examined, 171 opinions were obtained. Findings participants' sense of duty; (f:99) and participants' feelings and thoughts (f:62) during SL application. One of the opinions of the participants is given below.

"We solved it by examining a little program. He told the one who could not solve it a little... The moment you say we are gathering friends, we feel responsible and go there. We are starting to work... I think it is useful in this respect too. " (FG Interview Record 2, 8th stud/ Ln 125-131).

When the findings are examined, it can be said that the participants behaved very responsibly in completing the assigned tasks, informing the researcher and helping each other during 12 weeks. At the end of the research process, 16 of the 17 students who started the research completed the exhibition design construction.

"The feelings and thoughts of the participants during SL application" were examined under two headings as positive (f:45) and negative (f:17). Some of the emotions that the participants felt during the study and some of the thoughts that developed accordingly are as follows:

"I think putting out a job is great. For the first time, I have created something of my own in the virtual world, and it made me very happy. " (FG Interview Record 2,15th stud/ Ln 509-511).

"It drew my interest, but I didn't think it would force me that much. But it was a different challenge for me. It was a different experience. " (SA. 12th stud/ Ln 105-107).

When the findings are examined, it is seen that positive expressions are much more than negative statements. It is striking that negative opinions were stated at the beginning of the study. This situation points to the difficulties experienced in learning the program at the beginning.

3rd main theme; when the data about the "Effect of SL application on creativity" are examined; it is seen that the participants defined SL as a creative environment (f:13). At the same time, they stated that they encountered many creativity elements in many virtual environments and these elements were generally art and design products.

"... .. they have done it officially, places where a great deal, extensive and much effort has been spent .." (SLdiary, 11th stud/ Ln 1161-1180).

"I'll give Second Life as an example again. I think it was again a very creative environment that I did not expect. So it's the first time I've met. And it was a creative environment for me. " (FG Interview Record 1, 8th stud/Ln 382-384).

85 opinions were reported about SL application improving the learning process (f:52) and improving creativity (f:33).

"His feedback in my strengths and weaknesses provided suggestions and contributions for permanent learning." (PA, 16th stud/ Ln 15-16).

"It was a preliminary preparation for the 3D Max program rather than the graphic design programs I know.... I liked it very much because I experienced the power of designing and teamwork. (SA, 16th stud/ Ln 80-83).

Using expressions such as discovering, learning, 3D design, the participants mentioned the positive effect of SL on the learning process. Some of the statements of the participants about SL developing creativity are as follows;

"I think it has a very positive effect on creativity..." (FG Interview Record 1, 11th stud/ Ln 218).

"There is absolutely no limitation. For one thing, there is such a thing as flying in the game. So we didn't even have to put it on the ground. I think we worked so freely the game made us think much more creatively in this respect. We tried to make what was not possible... it provides a very creative working environment..." (FG Interview Record 2, 8th stud/ Ln 234-241).

When the findings were examined, the participants reported many positive (f:33) and rarely negative (f:2) opinions on the improvement of creativity by SL application. In addition, the participants stated that the more they experiment, the more creative they are. The relationship between SL and creativity has been defined in many ways. There are many features in SL such as creative builds, avatars, teleport and flying. In addition, many features of SL such as allowing for social interaction, hosting works of art, and easy design have attracted the attention of the participants. For this reason, it can be said that they find SL creative.

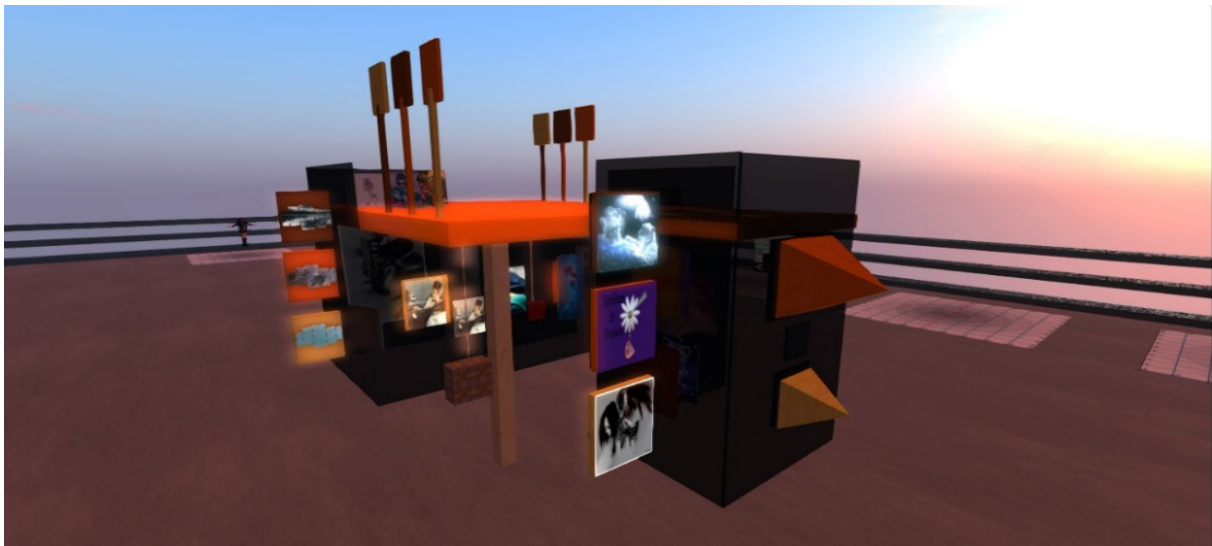


Figure 9. 15th participant's design

Findings about the 2nd Research Question

The second question of the research is "What are the views of the students about the works obtained in the art and design course where Second Life application is used?" expressed in the form. The views of the participants to answer this question were collected under three main themes. These; 1) Research and study approach and self-assessment capacities of students in the course process carried out by using the SL application, 2) Participants' thoughts about designing in Second Life virtual environment, 3) It is in the form of student views on the possibilities of use of Second Life application in art and design education. In Figure 10, the main theme and sub-themes for the "opinions of students on designs obtained by using the Second Life application " are shown.

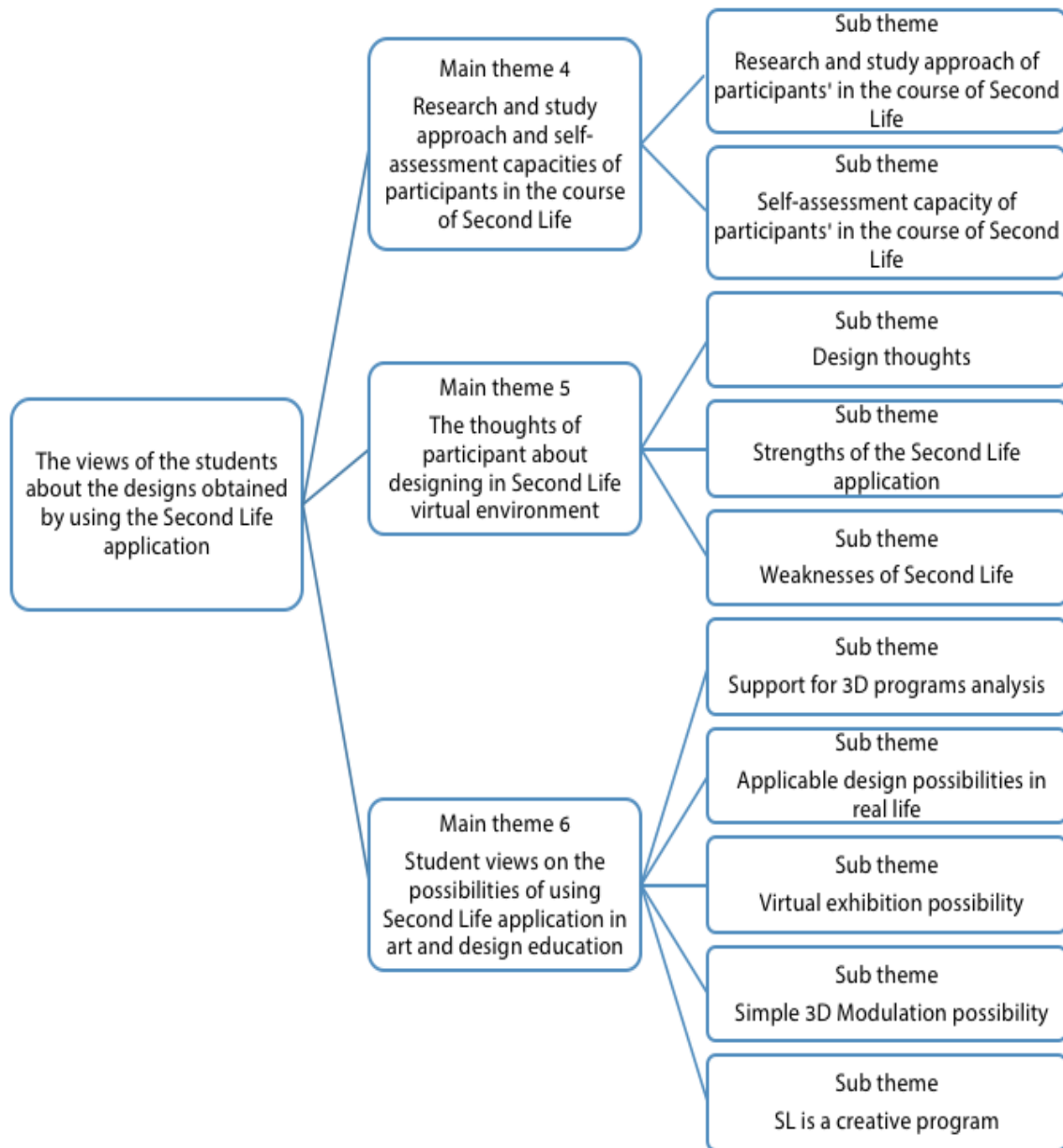


Figure 10. Students' views on the designs obtained through the use of the Second Life application

4th main theme; when the data about “Research and study approach and self-assesment capacities of students in the course process carried out by using the Second Life application “ are examined; It was seen that 125 opinions were expressed. The researchs of the participants during the SL application in order to learn the technical part of the application and to generate an idea about the exhibition design are as follows; conducting internet research, planning the design, benefiting from the information e-mails sent by the researcher, using the trial and error method and transferring the information by the researcher. Some of the findings about the “research and study approach of the participants” (f:52) are as follows:

“I am thinking of reviewing what you posted today. I will spend time revealing the design” (WPdiary, 7th stud/ Ln 3098-3099).

“I am experimenting” (SLdiary, 10th stud/ Ln 3040).

“... I did a lot of research.” (SA, 16th stud/ Ln 224).

The self-assessment capacities of the students in the lesson process conducted by using the Second Life application were analyzed under four headings by analyzing the participants' expressions (f:73) about their self-assessment. These; 1) Criticism, 2) Liking, 3) Worry, 4) Gaps. Some of the findings are as follows:

"Because it has a design related to the content of my artistic work I put forward a social issue, so the value of my work is high for me." (SA, 8th stud/ Ln 45-47).

"I have to think more about the interior design of the space." (SA, 13th stud/ Ln 654).

During the research process, the participants displayed an attitude that could self-assessment, like their own designs, and be aware of the shortcomings in their designs. Participants rarely worried about their work (f:2). When the findings are examined, some of the participants stated that they needed more time and a larger workspace to complete the design. Some of the participants pointed out that they should work harder and selflessly, be more creative, and learn the program better.

5. main theme; when the data about "Participants' thoughts about designing in Second Life virtual environment" are examined; 59 opinions were determined and evaluated under three headings. 1) Ideas about designing, 2) Strengths of Second Life application, 3) Weaknesses of Second Life application. Some of the opinions of the participants about "Designing" (f:14) are given below.

At the beginning of the application;

"It's very complicated indeed. It's a bit overwhelming." (WPdiary, 14th stud/ Ln 1942-1943).

When the application progresses;

"... It was a bit difficult for me, but as things go I thought it might get easier." (FG Interview Record 1, 15th stud/Ln 311-312).

When the findings were examined, participants had difficulties at the beginning of the implementation process and reflected this on their discourse. When the process progressed and the learning about the construction part of the program took place, the participants expressed more positive opinions. Reasons for participants' positive thoughts about SL application; It is stated that SL is useful, functional and easy, allows 3D design and display opportunities.

Statements of the participants on "Strengths of the Second Life application" (f:23) were classified under the following headings. 1) Improving 3D thinking, 2) Free and creative environment, 3) Easy and useful, 4) Improving perspective, 5) Unlimited examples, 6) Helping language learning. When the findings were examined, it was seen that the most expressed strength of the Second Life application was "improving 3D thinking" (f:11). Since the participants had the chance to make 3D designs, they defined SL as a preliminary preparation for 3D programs. Some of the statements of the participants are listed below.

"When I start to learn the 3D Max program in the future, I think it may help me." (SA, 13th stud/ Ln 549-550).

"I think he has developed three dimensional thinking a lot ..." (FG Interview Record 2, 12th stud/ Ln 411).

"Creating a free environment and giving us the opportunity to design." (PA, 9th stud/ Ln 109).

"The interface is easy and useful." (PA, 15th stud/ Ln 69).

Some of the participants stated that thanks to the SL application, their perspective improved, they could find many examples about art and desing and they could practice language learning. Some participants have stated on several occasions that SL is an extremely free environment. Participants have discovered the strengths of SL.

Six titles related to the sub-theme "Weaknesses of the Second Life application" (f:73) were revealed. These; 1) Difficulty of the program, not being used to the interface, 2) Shortcuts, insufficient use of the mouse, simplicity of the program, 3) Saving, loading problems (build), 4) Avatar density, 5) Internet connection problems, technical problems, 6) Land problem (for building), 7) Inability to be creative. Some of the statements of the participants are as follows.

"Yes we were not used to this interface. Because we were used to different programs. I guess we just had her trouble." (FG Interview Record 2, 8th stud/ Ln 421-422).

"The program is hard to understand." (PA, 1st stud/ Ln 129).

"The key combinations I used while designing in the application made me a bit bored." (PA, 11th stud/ Ln 170-171).

Participants mostly stated that the program was difficult and they were not used to the interface and defined this as the weakness of the SL application. When the findings about the weaknesses of the SL application are examined, other issues that are mostly emphasized are technical issues such as shortcuts, inadequate mouse use, and simplicity of the program. Participants defined situations such as key combinations and program difficulty as weaknesses.

"..... Now I am connecting 3 objects but this time I cannot tie it to the ground, the same warning comes. Now, it does not connect with other parts, but it does not connect to the big part." (SLdiary, 14th stud/ Ln 3881-3898).

"I'm at a deadlock in creativity..." (SA, 3rd stud/ Ln 277).

"... Yesterday was over, I looked not now, this aspect of the game is very bad.." (WPdiary, 16th stud/Ln 3989-3990).

"I did some of the practice in Maya. Having many people online at the same time in SL slowed me down. This is a big drawback." (PA, 5th stud/ Ln 121-122).

Problems such as saving, loading problems, avatar density, internet connection that occur during the practise of the SL application are defined as the problems most frequently encountered by the participants. Technical problems constitute a large part of the weaknesses of SL. When the technical problems are eliminated, it is seen that the only problem to be experienced in SL is the imagination of the participant.

6. main theme; the data (f:14) regarding "Student views on the possibilities of using Second Life application in art and design education" were evaluated under five headings. These; 1) Support for 3D programs analysis, 2) Design possibilities applicable in real life, 3) Virtual exhibition, 4) Simple 3D modeling opportunity, 5) A creative program. Some of the findings are given below.

"I can create my own exhibition." (SA, 15th stud/ Ln 544).

"Too many I can't count. If I need to give the clearest example, since my department is graphic design, it is the highest level of creativity for the 3d Max program and other designs I will do." (SA, 16th stud/ Ln 523-525).

Some of the participants (f:4) think that SL will provide ease of analyzing more complex 3D design programs.

"I can apply what I applied in this study in real life." (SA, 5th stud/ Ln 533).

The designs obtained as a result of the practise of Second Life application were defined as applicable in the real world by some participants (f:4). Participants stated that it is very costly to open an exhibition or make a 3D modeling in real life, SL eliminated the high cost problem and this situation provided an advantage for the users. Participants also noted that they often encountered complex and difficult 3D modeling programs. When they experienced the SL's modeling tool, they noted that 3D design was easier. They stated that 3D modeling on SL was an advantage for them before using other programs such as 3D Max and Maya.

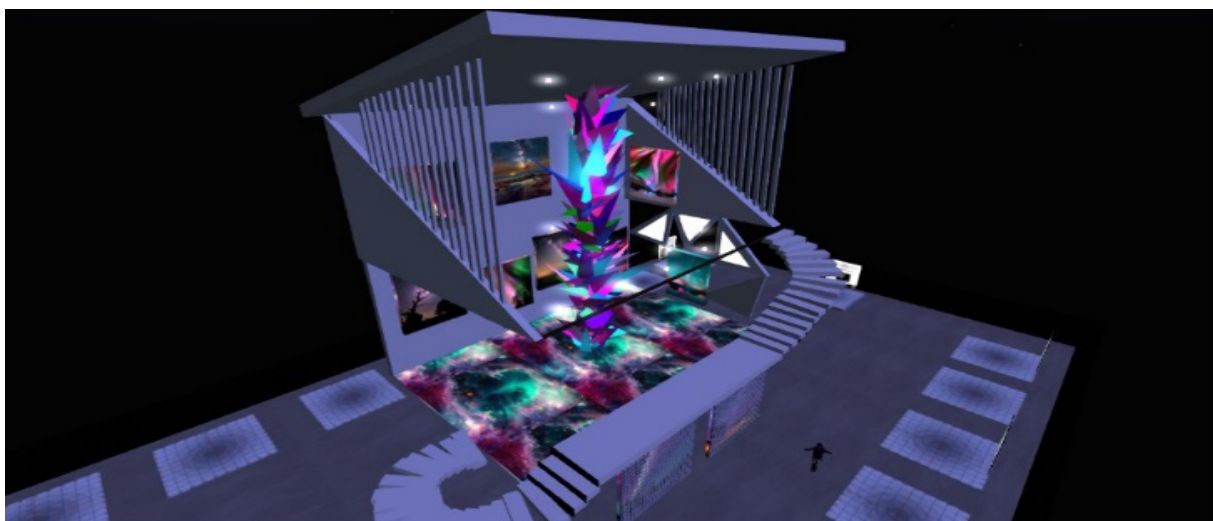


Figure 11. 13th participant's design



Figure 12. 9th participant's design

Findings Regarding the 3rd Research Question

3rd Question of the research is expressed in the form as “How does the Second Life application affect the learning process in art and design education?”

The data regarding the “Effect of Second Life application on the learning process” were analyzed under three main themes. 1) Interactions between researchers and participants in the Second Life application process, 2) Participants' thoughts on art, design and creativity in the practise process of the Second Life application, 3) Participants' suggestions. In Figure 13, the main theme and sub-themes related to the “Effect of Second Life application on the learning process” are included.

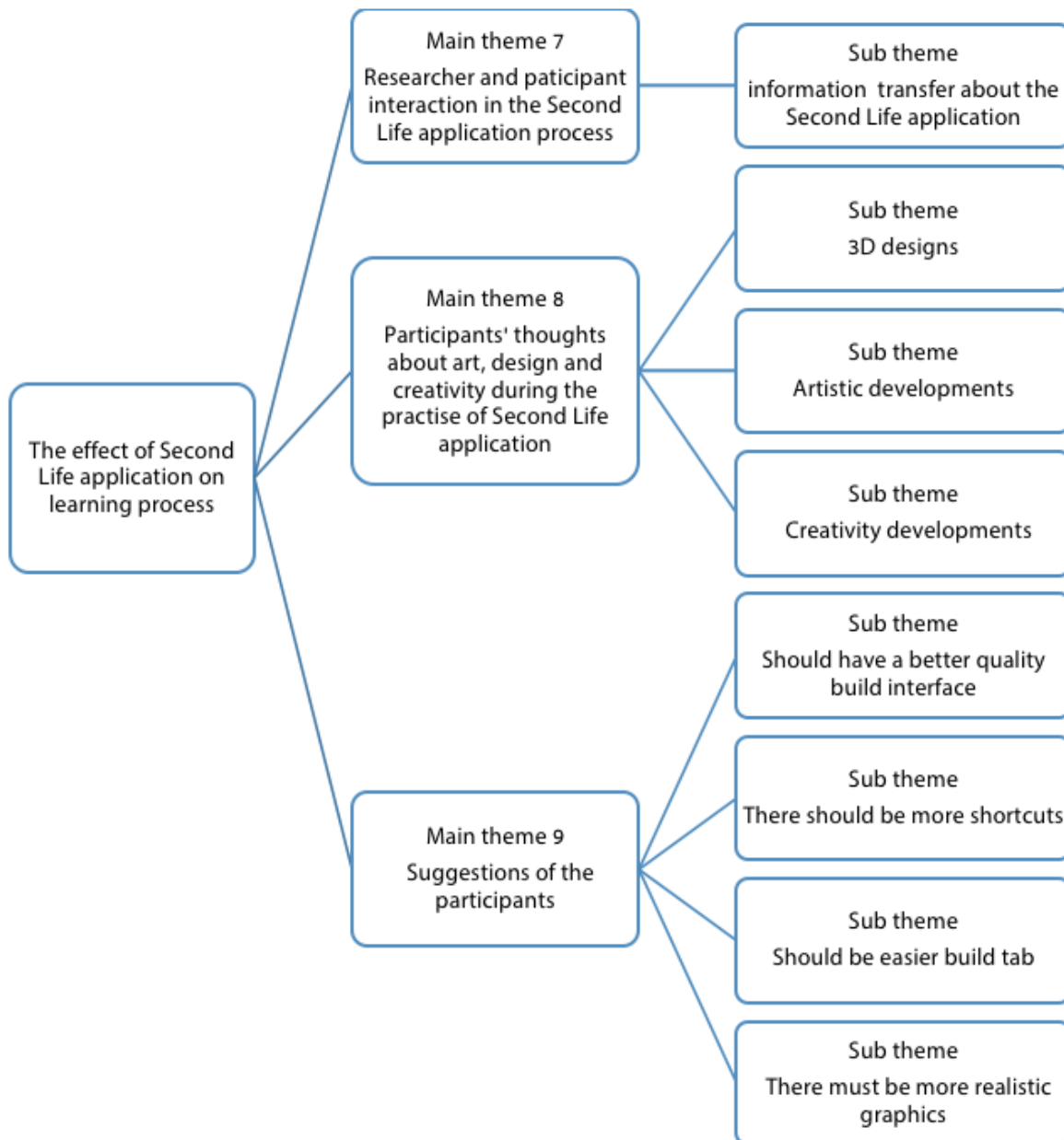


Figure 13. The effect of Second Life application on the learning process

7th main theme; “Interactions between researchers and participants in the Second Life application process”, 1) Information transfer about the Second Life application was examined as a sub-theme. This sub-theme includes the information transfer of the researcher about the general structure of SL (f:53), the subjects related to design-construction (f:219) and the questions of the participants (f:119). Below is an example of “Second Life general information transfer”.

“When you first enter the game, you land on an orientation island. Some basic information is given there. Find out about them. Then paste this into the address link <http://maps.secondlife.com/secondlife/Pandorus/126/108/3400>. This is the area you will build.” (WPdiary, Researcher/ Ln 211-222).

The researcher tried to answer the questions of the participants after the “general information transfer about design-building in Second Life application” was done with basic construction lessons. In the later stages of the research, information was transferred among the participants. The transfer of information for design-building is about understanding SL’s construction program and solving the technical problems that arise, and is the most talked (f:219) topic during the research. Below is an example of information transfer for design-build.

"If you want to add accessories to your buildings, teleport to a Furniture Shop. There is an island that sells a lot of stuff in SL. You can type your search in the address bar and go to the markets. You can buy accessories using the Linden dollars I sent you. The accessories you receive are registered in your inventory. You can come to the area we rebuilt and add accessories to your building. After your design is completed, we will add a note card to your work." (WPdiary. Researcher/ Ln 851-858).

When the findings are examined, it can be seen that the researcher transfers information about the workspace, construction (linking objects, disconnecting, selecting, saving, naming, deleting, script language-scheduling, note cards, shortcuts, scripts), inventory, design issues. The most intense phase of the SL application process is the part where the participants try to learn the program. Therefore, the researcher transferred often information to participants.

Participants asked the researcher and each other questions about SL again and tried to solve the system. Participant questions about SL application; The application process of the research is related to the field of study, design, construction, adding and removing to the inventory, questions about e-mails, making money, shopping. Some of the findings are as follows.

"I think we can import models from Sketchup. Can I use it here?" (SLdiary, 9th stud/ Ln 1558-1559).

"Made it in the video, spiral. How are we doing it?" (SLdiary, 7th stud/ Ln 2658-2660).

Most of the questions directed by the participants to the researcher or to each other are about construction. As I mentioned earlier, this part was challenging. After the construction phase of SL is learned by the participants, the process progressed very quickly and easy.

8th main theme; "Participants' thoughts about art, design and creativity during the practise of Second Life application" (initially, during the process and at the end of their own designs) are evaluated within three sub-themes. These; 1) 3D designs, 2) Artistic developments, 3) Creativity developments. Some of the findings are as follows:

"I think I learned how to think when designing a space, how to design something in a virtual environment, what the basic intellectual structure of 3D modeling is." (SA, 11th stud/ Ln 323-325).

"I tried to think more creatively and interestingly." (SA, 3rd stud/ Ln 395).

"... .. at first you don't know, you feel as if you are constrained, but then as you master the program, you get free on the contrary... there is an endless choice." (FG Interview Record 2, 11th stud/ Ln 218-227).

Most of the participants defined the Second Life virtual environment and its design as more free and original (f:20). It is observed that the participants have mentioned that the 3D design process has improved their three-dimensional thinking and design skills (f:28). Only one of the opinions (f:15) about the effect of the application of the SL application on the artistic development of the participants is evaluated as negative. Therefore, it can be said that the application process positively affects the artistic development of the participants.

9th main theme; opinions (f:10) about the "Suggestions of the participant students about the process of using the Second Life application" are collected under four sub-themes. These; 1) There should be a better quality build interface, 2) There should be more shortcuts, 3) There should be an easier build tab, 4) There should be more realistic graphics. After the practise process of the SL application, the participants were asked to evaluate the process and share their suggestions for improving the SL application. Some of the findings are as follows:

"I would like a better quality build interface." (PA, 9th stud/ Ln 348).

"I think there is everything necessary ..." (PA, 5th stud/ Ln 299-300).

"I wish it was a little easier to use and that some products could be bought free of charge from the market." (PA, 14th stud/ Ln 328-329).

"Second Life can be used with more realistic graphics, and doing so can attract more players to the game." (PA, 7th stud/Ln 322-323).

Participants suggested that there should be a better quality build interface, more shortcuts, easier build tab, better quality graphics. The most emphasized subject of the participants is "Having an easier construction tab" (f:3). When the findings are examined, it is observed that the Second Life application is found sufficient by most of the participants and no suggestions were made.

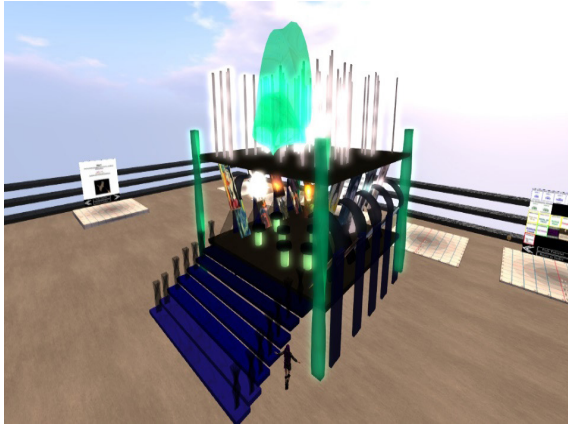


Figure 14. 7th participant's design

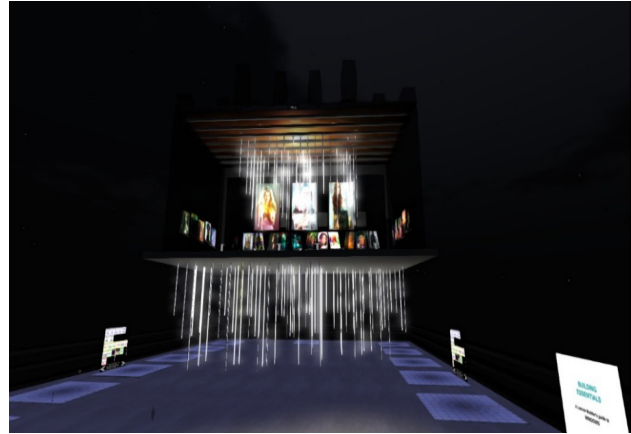


Figure 15. 11th participant's design

DISCUSSIONS

In this article, students' views on the use of SL application in higher education art and design education were examined. Below is the first question of the research purpose, "What are the students' views on the use of Second Life application in art and design education?" the findings obtained within the framework of the discussion were discussed.

Participants stated that they mostly used virtual worlds for visual data search, visual inspection, social media etc. before SL application, and they mentioned that they had negative experiences in distance education. After the SL application, it was observed that the participants' thoughts about education in virtual worlds changed positively. Erturk and Sahin (2019) in their study investigating experiential learning in virtual environments; they stated that the participants who thought the training in SL was negative, gave a positive opinion afterwards. This can be explained by the fact that learning Second Life initially takes time.

It was observed that the participants act very responsibly in completing the assigned tasks. Ciftci (2013, p.110) listed student duties in educational digital games as follows: "Students are aware of the goals, follows their processes, controls the processes of other players in multiplayer games, know the game goals and develops strategies accordingly, requests support from his teachers or friends when necessary, evaluate their process, repeats the current task when they cannot find their performance sufficient, terminates the process by checking whether the target has been achieved." Basen upon this thought of Ciftci, it can be said that the findings obtained from the statements of the participants during this research and the views of Ciftci (2013) coincide. 16 of the 17 participants fulfilled the exhibition design task and all their responsibilities in the implementation process.

In recent years, many experts have realized the enormous educational and motivational potential of video games and virtual worlds (Palomo-Duarte et al, 2021). Bulbul (2016) stated that the fact that three-dimensional virtual worlds are visually rich, making learning interesting, offering close to real life experience, rich communication and interaction affect student motivation. In our study, participants made similar views. For example, the participants stated that SL provides the opportunity to practice on graphic education and positively affected their application skills. Besides, using expressions such as exploring shortcuts, having fun, learning, 3D design, working to strengthen meaning, solving SL, paying attention to color harmony, composition, and being creative, the participants focused on the positive effect of the SL application on their learning processes.

With the increasing interest of educational institutions in 3D virtual worlds, it is known that researches have been made on the effects of these environments on the learning process. For example, Girvan and Savage (2019) argued that Second Life and other virtual worlds support the constructivist learning approach with the opportunity to learn by doing and experiencing. Erbas and Demirer (2015) state that virtual reality technology can maximize students' learning by interacting with artificially created virtual environments, and students can learn by doing and experiencing. Participants were able to learn many things by doing and

experiencing during the Second Life application process. With the SL application, participants were able to manage their own learning processes both with the object and content they have created and interacting with other participants.

According to Niemi et al. (2014), students can produce content and consume content in digital environments. Therefore, students need the skills of working, creating, discussing in virtual environments and developing ethical behavior. In this research, participants demonstrated a range of work, discussion, and creative skills throughout the process. In addition, they produced content in the Second Life environment and used ready-made productions. What has been done in this research process overlaps with Niemi's discourses. Davis, Phillips and Kulm (2018) define digital education environments as platforms that offer unique opportunities for creative and transformative experiences to students of all ages. Participants also have a similar view and state that the SL application improves creativity and SL's own structure is free and creative. In addition, the Technology Society in International Education (2016) student standards for the "Creative Communicator" focus area states: "Students communicate clearly and express themselves creatively for a variety of purposes using the platforms, tools, styles, formats and digital media appropriate to their goals." In this study, it was observed that the participants behave in accordance with ISTE standards, and in the light of these information and findings, it suggests that the using of the SL application has a positive effect on the learning process and creativity.

Below is the second question of the research purpose, "What are the views of the students about the works obtained in the art and design course where Second Life application is used?" the findings obtained within the framework of the discussion were discussed.

Participants preferred some a research-study approaches, in order to learn the technical part of the application and to generate an idea about the exhibition design during the use of the SL application. Observed approaches are as follows; they conducted internet research, planned their designs, benefited from the information e-mails sent by the researcher, benefited from the information transfer made by the researcher, used the trial and error method and question-answer technique. Reisoglu and Kocak (2017) stated that the educational activities carried out on the SL platform enable e-learning, experimental learning and social interaction. Karakus Yilmaz (2017) stated that thanks to the many pedagogical elements that virtual worlds contain, students are able to learn by accessing the information they want at any time and by structuring the information that is meaningful to them. For this reason, Karakus Yilmaz defines virtual worlds as a technology where constructivist approaches are used extensively and appeals to all learning areas. In this study also, when the research-study approaches of the participants were examined, it was seen that they could access information in many ways and transform the information in line with their own purposes.

Regarding the participants' opinions about designing in SL virtual environment; as in every new learning, the technical skill and application part of the SL application was initially defined as difficult by the participants, and this situation changed positively in the later times. Han (2016) argued that while learning in virtual worlds, the learning process takes place with the senses and is based on experiences. Researcher stated that the learning experiences experienced in virtual environments are as real as the learning experience living in the physical world. As a result of the use of the SL application, the participants made a self-assessment and talked about their opinions including criticism, appreciation, concern and deficiencies. When the findings were examined, the participants stated that they worked hard and devotedly but they could not use time effectively, they needed a wider study area for practice, they needed to learn the program better and they needed to produce more creative products.

Participants noted the strengths of the SL application; they defined it as developing 3D thinking, free and creative environment, easy and useful, developing perspective, having unlimited examples, helping language learning. Reisoglu and Goktas (2017) on how SL can develop 3D thinking; they stated that drawing on the blackboard or notebook, clicking on the computer or tablet screen, and watching the two or three dimensional visuals brought by the teacher are no longer sufficient for the students. They argued that 3D virtual environments can be effective in developing spatial skills, especially in lessons that require students to think three-dimensionally such as mathematics and geometry. In this study also, as a result of the interviews, the participants frequently stated that virtual environments improved the ability to think in three dimensions.

On the subject of SL being a free and creative environment, Ball and Pears (2009) gave a very simple example

of the relationship between virtual environments and creativity and stated that the fact that the avatar design can be shaped according to the user's own wishes allows the players to develop their perspectives and creativity by thinking on the design. Depending on the limits of their imagination, users can create various objects in the 3D virtual environment, make changes on the objects, and dive into a world created with imagination (Tokel & Topu, 2017). This research is based on design. Participants focused more on being creative while making their designs. Throughout the research, it was observed that SL provides various opportunities for creativity. The views of the aforementioned researchers overlap with our findings.

Virtual reality-based educational platforms have the ability to provide students and teachers with a wide range of training procedures and are used in many challenging areas (Grivokostopoulou et al., 2020). Regarding the ease and convenience of SL; Erbas and Demirer (2015) stated that the use of three-dimensional environments is easier than two-dimensional options and that three-dimensional virtual worlds can be used for education with these features. While virtual learning environments give the user the opportunity to gain experience in subjects that cannot be reached in the real world, they provide a better concretization of abstract concepts. In this study, most of the participants found SL easier and more useful than other three-dimensional modeling programs. The discourses of these researchers overlap with the discourses of the participants.

The weaknesses of the Second Life application has been defined by the participants as difficulty of the program, unfamiliarity with the interface, shortcuts, inadequate mouse use, simplicity of the program, save-loading problems, avatar density, internet connection and technical problems, plot problem (for construction), and the problems with creativity. These problems are not related to the method but rather the technical part and are individual. For example, a participant with a strong internet connection does not show the internet connection as a weakness or a participant student who has received the necessary information about saving and uploading will not encounter this problem. Apart from the avatar density and the plot problem (for building), the situations defined as weaknesses are individual and stem from technical competence. The weaknesses of SL encountered in this study overlap with the findings of the study of Coban, Kalkan and Hınıslıoğlu (2017). During the use of SL, many problems may arise due to the features of the program. For example, connecting many students to the game at the same time puts a lot of load on the server. Some universities have blocked SL for this reason. In this research, the participants encountered many problems caused by SL or the internet. Some of the difficulties and limitations encountered in 3D virtual worlds in Tokel and Topu's (2017) research named "3D virtual worlds and their usage areas" are listed as follows.

- Usability and accessibility issues in interface and environment control.
- Problems arising from lack of computer skills and orientation skills.
- Cognitive load due to the limited representation of reality.
- Problems experienced due to technical insufficiency. In our study, the participants stated that they faced similar problems.

Digital games; it is one of the educational tools that can be used in many areas from problem solving to the development of creativity, from real-life simulations to teaching (Gelibolu, 2013). Second Life is also a digital game (MMORPG -Massive Multiplayer Online Role Play Game). Students' views on the possibilities of using Second Life application in art and design education; it provides support for the analysis of 3D programs, provides real-life design possibilities, provides virtual exhibition, offers simple 3D modeling and the program is creative. SL includes a simple building tool. Therefore, the participants think that they have benefited from simple modeling and say that they have entered professional 3D programs. According to the findings; features such as the ability to build into the air and the sea in SL, the creative rich visuals created by the users, the ability to create simulations, easy teleportation between location, the possibility to build in designated areas and the transfer of designs prepared, make SL functional than other software such as Maya, 3D Max.

Below is the third question of the research purpose, "How does the Second Life application affect the learning process in art and design education?" the findings obtained within the framework of the discussion were discussed.

Within the scope of researcher and student interaction in the SL application process; the researcher transferred information about working area, build (linking objects, disconnecting, selecting, saving, naming, deleting, scripting language-scheduling, adding scripts, note cards, shortcuts) and inventory. Both general and design-building information transfer is the most important and longest stage of the SL application process. Because,

most of the participants made 3D construction trials in SL for the first time, and they spent a long time to achieve this. Yilmaz (2017) stated that student-teacher interaction is the most used type of interaction. Because researcher states that the teacher is an important source of support for the students by directing and communicating with them, as well as the transfer of content. In the learning process, the teacher defines the responsiveness of the students to the messages, showing a positive attitude and valuing them as important points in the teacher-student interaction. In this study, the researcher interacted with the participants throughout the whole process and undertook the task of conveying information.

Participants' thoughts on art, design and creativity during the SL implementation process; 3D designs were evaluated in terms of artistic development and creativity development. Participants stated that the design process developed spontaneously and that they made an effort to be more artistic while making their designs. Participants said that SL is free-original, they learned SL through trial and error, and as a result, they were able to design in their minds, and that SL contributed to their creativity. Erbas and Demirel (2015) state that virtual environments offer potentially freer opportunities than real environments. Researchers stated that the users do not have any problems in freely navigating virtual environments, observing the environment and interacting with their environment. For example, some 3D virtual environments may offer opportunities such as teleportation, while some virtual environments allow users to switch between characters or use non-human characters. In addition, individuals do not encounter physical obstacles during these activities while participating in activities as in real life. Bulbul (2016) Learning-teaching activities in SL; stated that it gives positive results in triggering the creative power of students, strengthening cooperation, developing virtual literacy and communication skills, participatory learning and learning the features of digital culture. The views of the participants overlap with these statements.

Participants' suggestions after the application process of the SL implementation; it should have a better quality build interface, more shortcuts, an easier build tab, more realistic graphics. When the participants have difficulty in making three-dimensional designs, they think that this is due to the construction tab of SL. Therefore, they suggested that there should be a better quality construction interface. However, 3D virtual worlds offer a rich graphical interface where audiovisual elements and contents (video, sound, graphics, text-based information, web content, etc.) supported by 3D objects can be integrated (Warburton, 2009 as cited in Tokel & Topu, 2017). Therefore, students need help to learn the main skills in SL (Wagner & Ip, 2009).

CONCLUSION

This case study tried to determine the students' opinions related to the use of Second Life application in higher education art and design education. In this regard it provides description of the attributes of Second Life and its role in higher education. This case study, conducted with 17 participants, on the use of the SL application in art and design education, focused on the participants' perception of the tool and its effect on the learning process.

In the context of the 1st research question, it was observed that after the SL application, the participants' thoughts about education in virtual worlds changed positively and this environment improved their application skills. It has been observed that the participants behave very responsibly in completing the given tasks and SL has a positive effect on the learning process. Most participants consider the SL application to enhance creativity. Therefore, the use of the SL application has a positive effect on the learning process and creativity.

In the context of the 2nd research question, the participants as a research-study approach; they used trial and error method and question-answer technique frequently. Therefore, the learning situation of the student took place in this research. It has been observed that the most expressed strength of the SL application is that it "develops 3D thinking and design skills". Therefore, it can be said that the strongest aspect of the SL application is that it improves the 3D thinking style. In addition, Second Life's strengths are shown as: SL is an easy and useful program, SL improves its perspective, SL is a free and creative environment, SL has unlimited examples, SL helps to learn languages. Therefore, these qualities can be developed with the SL implementation. The weaknesses of the SL application; difficulty of the program, not being used to the interface, shortcuts, insufficient use of the mouse, simplification of the program, save-loading problems, avatar density, internet connection problems and technical problems, plot problem (for build). There have

been many technical problems during the use of the SL application. These problems are thought to be possible problems that will be faced by participants who are trying to solve a new program and make a three-dimensional design in this program. The SL application provides support for the analysis of 3D design programs, provides real-life design possibilities, and provides opportunities such as virtual exhibition. Therefore, it can be said that the use of the SL application will contribute to art and design education students.

In the context of the 3rd research question, the participant-researcher interaction is generally about construction. This situation reveals that learning how to construct with the SL application is the most challenging part. After the application process of the SL application, the participants suggested that there should be a better quality construction interface, there should be more shortcuts, an easier construction tab, and more realistic graphics.

According to the researcher's evaluations;

This research initially contained many challenges for both the researcher and the participants. Because both the participants were learning a new program and the researcher had to provide continuous technical and motivational support. Once the program was learned, the process became easier for both sides. The researcher did not need to provide support as most students solved technical problems and focused solely on the quality of their design. The researcher's guidance was very important in this research.

While the participants had negative thoughts about Second Life when they were included in this research, they were more positive about the research after learning about the program. Many participants stated that they need more time to complete their 3D designs. Participants stated that the best part of the SL process was the development of 3D thinking skills. All participants encountered Second Life for the first time and were generally described with positive statements such as creative, free, engaging, easy to use. The negativities of the students were related to technical problems. Participants were highly skilled in creating 3D designs. Most of the students completed their work with great devotion. Participants stated that they felt both creative and successful at the end of the process.

Participants from different cities contributed to this research. During the research, communication often took place in the Second Life virtual world. Information transfer and data collection was done via the internet (e-mail, Whatsapp etc.). The entire application process was carried out in virtual environment and over the internet. Therefore, it is thought that Second Life can be used as a tool for distance education.

Working with Second Life comes with financial difficulties. Participants' access to the internet and technical features of the computers are also among the difficulties of the study. In order to enable concurrent classroom education in the Second Life environment, the days and times the teacher will be online in the Second Life classroom must be determined in advance. Flexible working hours should not be used, its very difficult for the researcher to handle.

In summary, it is thought that Second Life application has a positive effect on students' opinions as a result of this research. Art and design education at university level in the SL virtual environment is considered to be a suitable environment for students. As we can see from the statements of the participants, the SL application had a positive effect on the participants despite some difficulties.

RECOMMENDATIONS AND FUTURE WORKS

Suggestions for this study are as follows;

- 3D virtual worlds can make a great contribution to the design of educational environments. As a result of this research, it has been seen and suggested that 3D, online virtual environments can be used in art and design education.
- The existence of a program that should be learned in the research and the degree of difficulty negatively affected the participants at the beginning of the study. The discourses of the participants differ at the beginning of the study (without learning the program) and at the end of the research (after the program is learned). For this reason, in studies using SL, first teaching the program and then conducting the relevant research may give healthier results.

- This research was carried out with a limited group of students studying art and design in a limited time and environment and the results obtained were evaluated within this framework. With a more comprehensive and detailed study, richer and more satisfying results can be obtained.
- Considering today's pandemic conditions and the need for social distance, Second Life virtual environment can provide various opportunities for distance learners in terms of tools, environments, educational opportunities and socialization. Thus it is recommended to investigate the effect of virtual environments on the learning of distance learners.

Authors' Note: In this article, the doctoral dissertation titled "The effect of virtual environment on creativity in art and design education (Second Life example)" prepared has been utilized.

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APPENDIX A

FOCUS GROUP INTERVIEW QUESTIONS 1

1- What do you know about virtual worlds?

Probe: Social media
Game, simulation
Website, computer, internet
Application (Apps)

2- What place do you think virtual worlds have in your life?

Probe: All recreational activities
Education
Culture
Contact
Disappearance of borders (time, space, etc.)

3- What aspects of your artistic development do you use the virtual world for?

Idea
Communication with the artists
Follow art
Production

4- What do you know about the 3D, online, multi-user “Second Life” virtual environment?

Probe: Social media
Simulation game
Website computer, internet
Application (Apps)

5-What do you think about using virtual worlds in education?

Probe: Virtual training
Distance learning
Simulation training
Creativity

6- What do you think about the fact that 3D designs can be made in online virtual environments?

Probe: Creativity
Abolition of borders
Cost
Ease of application

7- What do you understand from the expression of creativity?

Probe: Originality
Imagination
Doing research
Wonder
Break the boundaries
Push the limits
Invent
Aesthetic regulation

8- What are the examples of artistic creativity you encounter in virtual environments?

Probe: Designs
Artworks

9- Do you have any artistic creativity work in virtual environments before?

Probe: Designs
Artworks
Invention

10- Do you have any other opinions on the subject?

FOCUS GROUP INTERVIEW QUESTIONS 2

1- What do you think about what you have learned about virtual worlds?

2- What do you think about what you learned about “Second Life”?

3- What do you think about using virtual worlds in education?

4- What kind of roles and responsibilities do you think you have during the applications you have done in the training given to you in the Second Life virtual environment?

Probe: In the learning environment
Accessing information, activities, tasks
In communication

5- What kind of research did the Second Life virtual environment lead you to do?

Probe: Artworks
Museums and galleries
Virtual exhibition venues
Two and three dimensional designs

6- What kind of 3D designs did the Second Life virtual environment direct you to? Can you describe the effect it has on you?

Probe: Motivation
Willingness to research
Going beyond expectations
Creativity
Artistic arrangement elements and principles
Ease or difficulty of application

7- In what ways do you think the Second Life virtual environment will contribute to your artistic development?

Probe: Idea
Process
Product

8- What do you think are the strengths and weaknesses of designing in Second Life virtual environment?

Probe: Motivation
Willingness to research
Going beyond expectations
Creativity
Ease or difficulty of application

9- How does it make you feel to share the assesment criteria with you?

Probe: Positive

Negative

10- How did you feel during the design process in the virtual environment?

Probe: Researcher, excited, enthusiastic, learner, creative, critical thinker, curious, etc.

11- How do you think designing in Second Life contributed to your artistic creativity?

Probe: Cognitive Aspect

Critical thinking

Aesthetic questioning

Creative thinking

Problem solving

In terms of learning

Socially

Participation

Interaction

Taking responsibility

Cooperation

In terms of affective

Motivation

Wonder

12-Do you have any other opinions and suggestions on the subject?

APPENDIX B

STUDENT SELF-ASSESSMENT

Student number:

Dear students, this self-assessment sheet has been designed for you to make specific determinations about your own work. Please answer the questions below.

- 1- What is the meaning of my artistic work for me?
- 2- How much did I like this artistic work?
- 3- How do I find this artistic work when I compare it with my previous works?
- 4- What unexpected things did I encounter while doing my artistic work, how did I solve them?
- 5- What do I think I learned with this work?
- 6- What have I tried to do in my artistic work that I haven't tried before to strengthen the expression?
- 7- Could I use Second Life effectively enough to increase the creativity of my artistic work?
- 8- What did I think to strengthen the expression in my artistic work? What are the important choices I made in the implementation process?
- 9- Where can I use what I learned in this work? What is the benefit of this application for me?
- 10- If I did this work again, I would do it as follows:
- 11- What should I pay attention to in my next study?

APPENDIX C

STUDENT PEER-ASSESSMENT

Student number:

Dear students, this peer-assessment page is designed for you to make specific decisions about your friend's work. Please answer the questions below.

The best part of this work is;

.....
.....
.....

Three other things I like about this work;

- 1.....
- 2.....
- 3.....

Three aspects that I think should be improved in this study;

- 1.....
- 2.....
- 3.....

APPENDIX D

STUDENT'S ASSESMENT OF THE PROCESS

Student number:

Dear students, this process assessment sheet has been designed for you to make determinations about your own work process. Please answer the questions below.

1- What do you think you learned in this lesson / process / practice?

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.....

2- What do you like about the Second Life application?

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3- What do you dislike about the Second Life application?

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4- What kind of ideas for future work did you gain as a result of the Second Life application?

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.....

5- Do you think there will be studies that you will use the Second Life application outside of school?

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6- What else would you like to have in the Second Life application?

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THEMATIC ANALYSIS OF ARTICLES ON FLIPPED LEARNING IN MATHEMATICS EDUCATION

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ABSTRACT

Researchers strive to create learning environments where they can apply technology and different teaching methods together. Flipped learning has been a popular approach in recent years because it offers opportunities for both online and offline learning. The present study aims to conduct a thematic analysis of articles on the use of the flipped learning model in mathematics courses. Meta-thematic analysis was adopted as the research method. In this context, for the study, 69 articles were selected from among those published between 2015 and June 2020. As a result, it was found that these studies on flipped learning in mathematics education were conducted primarily with undergraduate students, whereas insufficient numbers of studies have been conducted with primary school, middle school, and high school students and pre-service teachers. Researchers have often preferred the subject of analysis while implementing the model. Studies on the flipped learning model in mathematics have mainly aimed to examine academic performance and students' perceptions regarding the model. Although it can be argued that the flipped learning model positively affects the mathematical performance of students, studies have also reported that it had no effect on performance compared to traditional teaching methods. In addition, the present study provides comprehensive data on the positive and negative aspects of the use of the flipped learning model in mathematics courses. However, comprehensive, extensive, and long-term studies are needed to provide more clear results on the implementation of flipped learning in mathematics courses.

Keywords: Flipped learning approach, mathematics education, meta-thematic analysis.

INTRODUCTION

Flipped learning is a teaching model that represents a combination of the direct teaching method based on constructivist learning with behavioral principles, which are often thought to be incompatible (Bishop and Verleger, 2013). Jeong (2015) defines flipped learning as a mixed model in which both online and offline learning environments are used together. In this model, the traditional classroom environment is flipped by transferring learning content out of the classroom and activities are incorporated into the classroom environment (Hwang and Lai, 2017). The flipped learning model is defined as a pedagogical approach in which students are responsible for both pre- and post-course activities by Abeysekera and Dawson (2015), while Patterson, McBride, and Gieger (2018) define it as a type of active learning that focuses on the expectations of instructors and students in the classroom by ensuring pre-classroom preparation. Flipped classrooms offer a rich learning environment that enables independent learning as well as problem-solving, proper handling of materials, and development of high-level thinking (Murphy et al., 2016). They also play a role in the adoption of new learning technologies and tools (Pelletier et al., 2021).

In the literature, the terms “flipped learning,” “inverted learning,” and “flipped classroom” are used interchangeably (Muir, 2017). The term “flip” was adopted to refer to the combination of a Flexible environment (or a flexible learning space independent of time and space), Learning culture (an opportunity to deeply research topics in a student-centered and rich learning environment), Intentional content

(considering what should be taught and what students should discover), and Professional educators (less conspicuous educators who are the main components in the realization of learning) (Flipped Learning Network [FLN], 2014). In this model, the instructor delivers recorded course videos to students before the class meets and conducts learning activities that ensure interaction and collaboration with students during classes (Mok, 2014). In other words, learning attained through videos and supporting materials provided before classes is supported with activities designed to enhance comprehension, practice, analysis, evaluation, and creation processes in the classroom (Cheng, Ritzhaupt, and Antonenko, 2019). Therefore, instructors take on new roles in the process of implementing the model. The instructor is a consultant who guides student groups in problem-solving and gives feedback and ideas during activities (Carter et al., 2018).

PROS AND CONS OF THE FLIPPED LEARNING MODEL

In the traditional classroom environment, the teacher is the source of information. However, as the flipped learning model entails a planned transition from a teacher-centric approach to a student-centered one, a number of changes occur in the learning culture. For example, topics are discussed more thoroughly and students can take part in information-building as they participate in interactive learning in an interactive classroom environment (Muir and Geiger, 2016). This model allows students to develop high-level thinking and active and collaborative learning skills (Long et al., 2017), and it ensures that they can engage in study and discussion with more activities (Zengin, 2017). Other perceived benefits of the model include exposing students to new materials outside the classroom, ensuring their preparedness for lessons, and empowering them as self-sufficient learners (Zack et al., 2015). It is further emphasized that the flipped learning model provides positive contributions such as diversified teaching, motivation, participation in the course, and increased student-teacher interaction (Muir and Geiger, 2016; Muir, 2017; Van-Sickle, 2015).

Flipped learning eliminates the comfort zone and offers many unknowns, and this creates changes in expectations (Wang, 2017). Therefore, in the process of implementing the model, both the teacher and the students may encounter certain difficulties. For example, the positive effects of the flipped learning model are not expected when students do not complete the activities prepared for them as planned outside of the classroom and the guidance of teachers (Zengin, 2017). Lo and Hew (2017a) argue that some students prefer to abandon the model when they do not fulfill the responsibility of learning or when they are challenged. Soliman (2016) notes that the group-work-centered nature of the model may be disliked by students who prefer individual study, while Heuett (2017) asserts that the model may not appeal to students who want to learn from the teacher and not through videos. In addition, it was reported that students resisted the model when they were not satisfied with the course materials (Lo and Hew, 2017a). Therefore, instructors must be very careful in preparing presentation content, videos, study notes, and activities (Zengin, 2017). However, some instructors perceive the material preparation process as an extra burden (Lo and Hew, 2017a) and this may cause them to have difficulty in adopting the model (Wang, 2017; Heuett, 2017). On the other hand, technological problems are one of the major disadvantages of this learning model. This is because some students may lack the technological infrastructure for watching course videos outside of the classroom (Kennedy et al., 2015; Soliman, 2016; Zengin, 2017). In addition, videos may not meet expectations if they do not have quality, consistent, clear, and concise contents (Mok, 2014).

REVIEW OF THE LITERATURE

Due to the significant trend toward flipped learning in recent years (Wang, 2017; Heuett, 2017), the model's effects have been investigated with content and thematic analysis studies. For example, Zainuddin et al. (2019) evaluated 48 experimental studies in different fields using content analysis. They determined that the model offers positive outcomes for students in terms of motivation, participation, social interaction, and self-managed learning skills. Another study using content analysis, conducted by Akcayir and Akcayir (2018), identified the advantages and disadvantages of the flipped learning model by examining 71 articles. As a result, it was established that the model positively affects learning performance, but there may be difficulties in practice in the event of inadequate preparation. O'Flaherty and Phillips (2015) evaluated 28 articles involving higher education applications of the flipped learning model using the scope study

method. They found that the model positively influenced academic success and satisfaction, but there was no conclusive evidence that it developed 21st-century thinking skills. Karabulut-Ilgu et al. (2018) evaluated the model in terms of engineer training using 62 studies. Noting that the model had begun to gain popularity in engineering faculties, they described the benefits that it provided to students and trainers as promising. Tutuncu and Aksu (2018) examined 38 theses and articles on the flipped learning model in Turkey. They determined that the studies focused mostly on success, attitudes, motivation, and student perspectives. Lo and Hew (2017a) reviewed 15 experimental studies at the K-12 level in different fields. They found that the model had a positive impact on academic success compared to the traditional method, but it also introduced different challenges regarding practice, students, the classroom, and operational aspects. In another study on the impact of the flipped learning model on participation at the K-12 level, Bond (2020) examined 107 studies in different fields and established that the model affected behavioral, affective, and cognitive participation. In some studies, the meta-analysis method was used. For example, Karagol and Esen (2019) evaluated the impact of the flipped learning model on academic success using 55 theses and articles in different fields. They concluded that the model positively affected academic success in small groups, but this effect did not depend on the application process. Van Alten et al. (2019) investigated 114 studies and found that the model positively affected learning outcomes but had no effect on the learning environment or student satisfaction. Lo et al. (2017) evaluated 21 articles on mathematics education and determined that the flipped learning model had a significant impact compared to traditional classroom methods. Cheng et al. (2019) examined 55 studies in different fields and found that the flipped learning model had a significant impact on learning outcomes.

Aim of the Study

The present study focuses on articles exploring the use of the flipped learning model in mathematics courses. As the application area of the model is becoming increasingly wide and the model attracts growing attention (Mok, 2014), it is necessary to investigate how effective it is and what conclusions can be drawn from it, as well as evaluating the applications of the model in existing studies (Cheng et al., 2019). In addition, the findings to date need to be analyzed in order to obtain information about the positive and negative sides of the model, identify possible challenging situations, shed light on avenues for future research, and observe the developments (Karabulut-Ilgu et al., 2018). It was also thought that it would be helpful to provide a perspective for researchers who would like to evaluate the model from the point of view of mathematics education. In this context, the present study will contribute to the literature in several ways. This study aims to conduct a meta-thematic analysis of articles on the flipped learning model in mathematics courses. In accordance with this aim, answers to the following questions will be sought:

1. What are the publication years of the articles on the flipped learning model in mathematics courses and in which indexes were they published?
2. What are the study groups and mathematics subjects considered in the articles on the flipped learning model in mathematics courses?
3. What are the aims of the articles on the flipped learning model in mathematics courses?
4. What are the research methods, research durations, and sample sizes of the articles on the flipped learning model in mathematics courses?
5. What are the methods, techniques, and Internet access platforms used in the articles on the flipped learning model in mathematics?
6. What are the results of the articles on the flipped learning model in mathematics courses?
7. What are the suggestions of the articles on the flipped learning model in mathematics courses?

METHOD

The research was designed qualitatively. The data of the research were evaluated using meta-thematic analysis. Meta-thematic analysis is used to analyze, combine, and interpret each of the data in the scope of the study. The main goal here is to take the main concepts from and among the studies and present a synthesis instead of solely bringing together their findings (Batdi, 2019).

The thematic analysis process was carried out taking into account the steps defined by Batdi (2019). These stages are: (1) determining the research problem, (2) creating a conceptual framework for the problem, (3) determining the research questions, (4) determining the population and sample, (5) collecting data, (6) reviewing and examining the data, (7) coding data by categories, (8) creating definitions of data sources, (9) creating themes and testing hypotheses, and (10) reporting and interpretation.

Data Collection and Analysis

The research data were obtained from the Web of Science, British Education Index (BEI), Education Resources Information Center (ERIC), Google Scholar, Scopus, and TR-Index databases. The research sample of the study was limited to scholarly articles published in national and international journals between 2015 and 2020 (June). The publication language of the articles was usually English. In addition, Turkish articles from the TR-Index database were also reviewed, but only one article in Turkish was included in the study. Arksey and O'Malley (2005) suggest that broad keyword definition should be employed for search terms. In international articles, key terms such as “flipped” or “inverted teaching” and “flipped” or “inverted classroom” have been adopted (O’Flaherty and Phillips, 2015). A literature survey was conducted using the key concepts of “flipped,” “flipped classroom,” “flipped learning,” and “inverted learning.” The search using only these keywords produced many articles. Since the present study focuses on articles on the flipped learning model in mathematics courses, keywords describing the aim of the study or the mathematics domain and subjects such as “mathematics,” “mathematics education,” “geometry,” “algebra,” and “calculus” were also used. The selection criteria presented in Table 1 below were established for the articles that were planned to be included within the scope of the study.

Table 1. Selection criteria for articles

Criteria	Admissible	Non-admissible
Date	Between January 2015 and June 2020	Studies conducted outside this period
Language	English, Turkish	Articles not written in English or Turkish
Article type	Original article, peer-reviewed journals	Non-peer-reviewed journals, theses, and presentations
Accessibility	Full text available or accessible via libraries	Not accessible without permission
Subject area	Mathematics, mathematics education	Other fields
Application	Flipped classroom applied	Flipped classroom not applied

In this context, a preliminary evaluation was conducted at the beginning of the research process. In the preliminary evaluation, 235 articles published between 2015 and June 2020 were identified. The titles, abstracts, and keywords as well as the aims of the articles were examined to decide whether to include them within the scope of the study. For example, articles on healthcare were eliminated. Some articles were eliminated due to the lack of adequate explanation about the implementation of the flipped classroom model. Others were not included because they studied other fields in addition to mathematics or did not focus only on the field of mathematics. As a result, 69 articles were included within the scope of the study as they served the purpose of the study.

Data Analysis

Data were analyzed by thematic analysis. For such data analysis, studies on the same topic need to be critically synthesized and interpreted by creating themes and templates (matrix) (Calik and Sozbilir, 2014). Table 2 below provides detailed information about the thematic analysis matrix used for this study.

Table 2. Thematic analysis matrix used in the study

Features	Themes	Description
General	Year	The year of publication of the study
	Type	The index in which the study was included
Content	Study group	Participants of the study (e.g., students, teachers, pre-service teachers)
	Mathematics subjects	Mathematics subjects of the studies (e.g. analysis, numbers, geometry)
	Aim	Main purpose of the study
	Method	Research method used in the study (e.g., qualitative, quantitative, mixed)
	Duration	Duration of the study
	Sample size	Number of people participating in the study
	Method-technique	Methods and techniques used in the study (e.g., group work, discussion)
	Internet access platform	Internet access platforms used in the study (e.g. YouTube, Khan Academy)
	Results	Main results of the study
	Suggestions	Basic suggestions of the study

First of all, 69 articles in the scope of the study were subjected to document review with the help of the matrix used in Table 2. The articles were analyzed using content and descriptive analysis methods. Content analysis was used for general features and descriptive analysis for content features. Analytical coding was performed after the data were explicitly coded for descriptive analysis. For this coding process, the path indicated by Batdi (2019) was followed. Its stages include the following: (1) editing and analyzing the data; (2) re-examining and regenerating the data with different codes; (3) combining the codes and reducing them to a sufficient number of categories, and recording the data with the latest codes; (4) editing, summarizing, and creating descriptions; (5) creating large and small themes; and (6) performing the final analysis and interpreting the data.

To ensure the validity and reliability of the study, the coding process was conducted while obtaining the opinions of three different field experts. First of all, the individual opinions of the field experts were obtained in the creation of the initial encodings. A field expert regularly reported his or her opinions in the process of rebuilding the data with different codes. During the final coding phase, the reliability ratio was evaluated using the reliability coefficient of Miles and Huberman (1994). In this context, the reliability score was calculated as 83%. Agreement was sought through discussion in the event of disagreement among expert opinions.

FINDINGS

In this section, the findings obtained as a result of the evaluation of the 69 articles within the scope of the study are given.

- a. Findings related to the publication year and indexing of the studies

Table 3 below provides information on the publication year of the articles in the scope of the study and the indexes in which they were published.

Table 3. Publication year and indexing of the articles

	Publication year of the article						n	%
	2015	2016	2017	2018	2019	2020		
SSCI	1	3	5	4	3	1	17	24.7
ESCI	2	3	4	—	3	4	16	23.2
ERIC	18	3	4	7	—	2	34	49.3
TR-Index	—	—	—	1	—	—	1	1.4
BEI	1	—	—	—	—	—	1	1.4
n (%)	22 (31.9)	9 (13.1)	13 (18.8)	12 (17.4)	6 (8.7)	7 (10.1)	69	100

As seen in Table 3, 34 (49.3%) articles on the flipped learning model in mathematics courses were published in journals indexed in ERIC, whereas 17 (24.7%) articles were indexed in SSCI and 16 (23.2%) articles in ESCI. Only 1 (1.4%) article was indexed in the TR-Index database. The highest number of articles was published in 2019 with 22 (31.9%) articles, while the smallest number of articles was published in 2015 with 6 (8.7%) articles. When the first half of 2020 was included in the study, the number of articles published in 2020 accounted for 10.1% of all articles covered in the study.

b. Findings related to the study groups and mathematics subjects of the studies

Figure 1 below provides information regarding the study groups of the articles in the scope of the study.

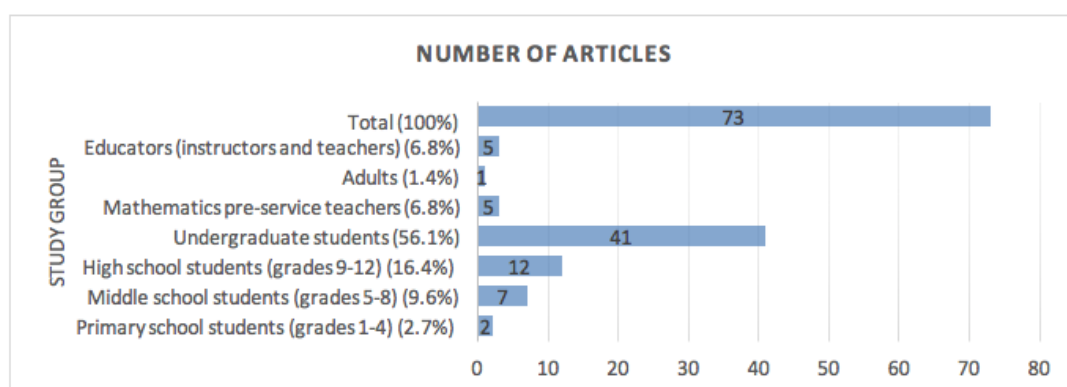


Figure 1. Study groups of the articles

As shown in Figure 1, 41 (56.1%) studies were conducted with undergraduate students while 12 (16.4%) studies were conducted with high school (9th-12th grade) students. The scarcity of studies carried out with primary and middle school students as well as with instructors and pre-service teachers was noted. In addition, the total number of articles reflected in Figure 1 is greater than the total number of studies within the scope of the present work, because three studies were conducted with both middle and high school students (e.g., Hung, Sun, and, Liu, 2019) and one study was conducted with both high school students and instructors (Muir and Geiger, 2016).

Figure 2 below provides information about the mathematics subjects of the studies within the scope of the present work.

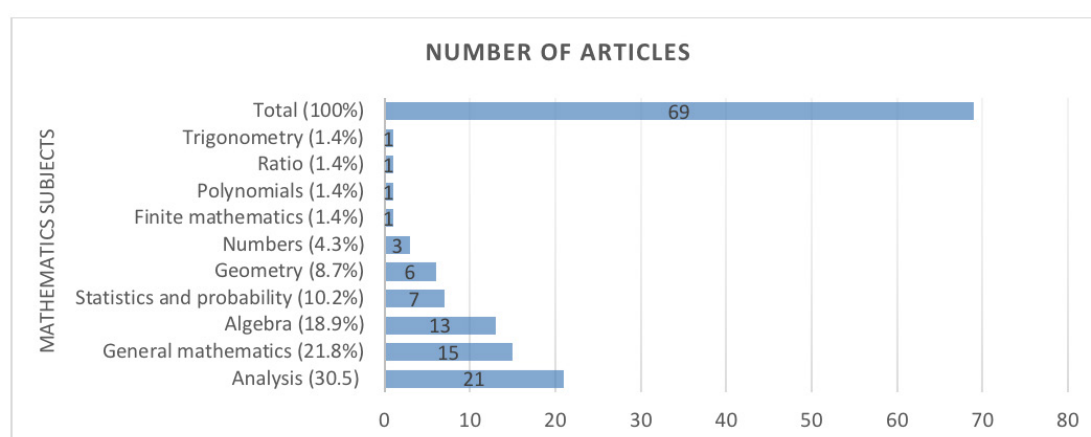


Figure 2. Mathematics subjects of the articles

As seen in Figure 2, in 21 (30.5%) articles, the flipped learning model application was carried out during a course in which the subject of analysis was taught, whereas general mathematics was the subject matter of 15 (21.8%) articles and algebra was that of 13 (18.9%) articles. Statistics and probability, numbers, finite mathematics, polynomials, trigonometry, and ratio were less preferred as subjects.

c. Findings related to the aims of the studies

The aims of the studies on the flipped classroom model in mathematics courses were gathered within four different themes. These themes were general, cognitive, and affective studies and studies aiming at evaluating the development of the model. Table 4 below provides information about the aims of the studies.

Table 4. Breakdown by study aims

Theme	Categories	f	%	Source
General	Academic performance	38	27.8	Wei et al. (2020)
	Participation	8	5.9	Kaya (2018)
	Motivation	6	4.5	Bhagat et al. (2016)
	Variables (e.g. gender, socioeconomic level)	4	2.9	Turra et al. (2019)
	Individual differences	2	1.4	Lo and Hew (2017b)
	Study habits	1	0.7	Sahin et al. (2015)
	Total	59	43.2	
Cognitive	Conceptual learning	4	2.9	Kirvan et al. (2015)
	Perception	3	2.2	Adams and Dove (2018)
	Learning strategies	2	1.4	Kennedy et al. (2015)
	Meta-cognition	1	0.7	Yong et al. (2015)
	Problem-solving	1	0.7	Anderson and Brennan (2015)
	Total	11	7.9	
Affective	Attitude	6	4.5	Guerrero et al. (2015)
	Self-efficacy	4	2.9	Krouss and Lesseig (2020)
	Interest	1	0.7	Chen et al. (2016)
	Anxiety	1	0.7	Dove and Dove (2017)
	Self-regulation	1	0.7	Lai and Hwang (2016)
	Self-evaluation	1	0.7	Lai and Hwang (2016)
	Target-setting	1	0.7	Lai and Hwang (2016)
	Engagement	1	0.7	Ichinose and Clinkenbeard (2016)
	Student needs	1	0.7	Muir (2020)
	Total	17	12.3	
Model Development	Student's point of view	20	14.7	Novak et al. (2017)
	Instructor's point of view	9	6.6	Naccarato and Karakok (2015)
	Teaching tips	7	5.2	Adams and Dove (2018)
	Positive and negative sides	4	2.9	Heuett (2017)
	Classroom design	4	2.9	Kraut (2015)
	Satisfaction	3	2.2	Nielsen et al. (2018)
	Effectiveness	2	1.4	Song and Kapur (2017)
	Course materials	1	0.7	Gouia and Gunn (2016)
	Total	50	36.6	
General Total		137	100	

As seen in Table 4, 38 (27.8%) studies aimed to measure the impact of the flipped learning model on academic performance in mathematics courses. Akcayir and Akcayir (2018) point out that the flipped learning model's being a current subject plays a role in investigating its effects on academic performance. In 8 (5.9%) articles, the impact of the model on participation was investigated. Of all articles within the scope of the present work, 21.3% focused on the point of view of students and instructors, whereas 36.6% focused on the aims for developing the model. What should be noted regarding Table 4 is the scarcity of studies investigating the

cognitive and affective dimensions of the flipped learning model in mathematics courses. The number of studies on topics such as perception, learning strategies, attitude, anxiety, and interest is quite small.

d. Findings related to research methods, research durations, and sample sizes of the studies

Figure 3 below provides information about the research methods of the studies.

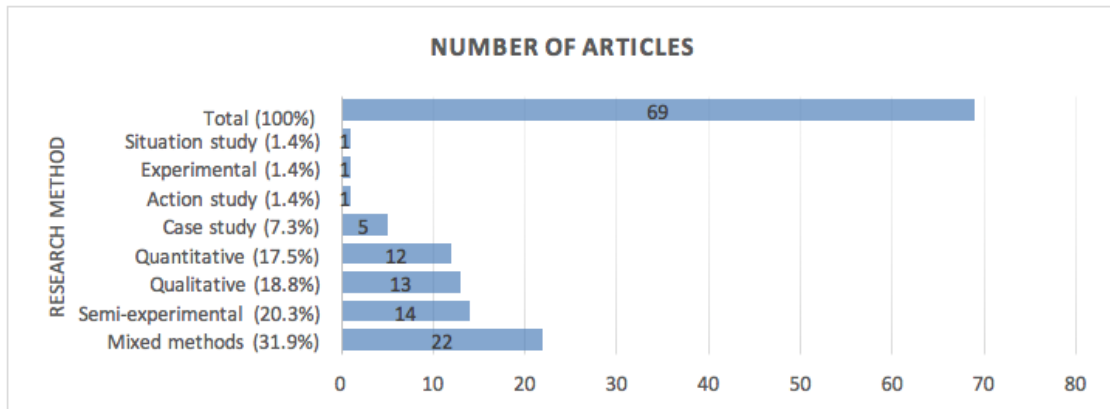


Figure 3. Research methods of the studies

As seen in Figure 3, 22 (31.9%) articles evaluated the flipped learning model in mathematics courses using a mixed method. Regarding other articles, 14 (20.3%) employed a semi-experimental research method, 13 (18.8%) a qualitative method, and 12 (17.5%) a quantitative method. Furthermore, the percentages of studies employing situation, action, experimental, and case study methods were lower than those of other studies.

Table 5 below provides information about the research durations and sample sizes of the studies.

Table 5. Research durations and sample sizes of the studies

Duration	f	%	Sample size (number of people)	f	%
1-5 weeks	7	10.4	Small scale (1-50)	39	56.5
6-11 weeks	7	10.4	Medium scale (51-100)	12	17.4
1 semester	34	50.8	Large scale (101 and above)	17	24.6
Longer than 1 semester	16	23.9	Not specified	1	1.5
Not specified	5	4.5	Total	69	100
Total	69	100			

As seen in Table 5, 34 (50.8%) studies implemented the flipped learning model in mathematics courses for one semester (e.g., Nielsen, Bean, and Larsen, 2018) and 16 (23.9%) studies for longer than one semester (e.g., Carter et al., 2018). Of all studies, 74.7% were long-term studies, while 7 (10.4%) studies each implemented the model for 1-5 weeks and 6-11 weeks. Of all studies, 20.8% were shorter than others and those were usually conducted with primary, middle, and high school students (e.g., Chen, Yang, and Hsiao, 2016; Kaya, 2018). Two studies (Hodgson et al., 2017; Naccarato and Karakok, 2015) were not included in the table above as they solely examined teachers' observations.

The sample sizes of the studies within the scope of the present research were coded as having small, large, and medium scales of samples. In terms of sample sizes, 39 (56.5%) articles presented small-scale (1-50), 17 (24.6%) articles large-scale (101 and above), and 12 (17.4%) articles medium-scale (51-100) studies.

e. Findings related to the methods and techniques used in the studies and Internet access platforms

Table 6 below provides information about the methods and techniques used in the reviewed studies.

Table 6. Methods and techniques used by the studies

Category	f	%	Source	Category	f	%	Source
Videos	52	18.4	Van-Sickle (2015)	Question-answer	13	4.6	Wei et al. (2020)
Group work	44	15.5	Capaldi (2015)	Individual study	11	3.9	Yong et al. (2015)
Discussion	34	12.0	Steen-Utheim and Foldnes (2018)	Cooperative	11	3.9	Ogden (2015)
Problem-solving	28	9.9	Lo and Hew (2020)	Online exams	9	3.2	Lo and Hew (2017b)
Homework	21	7.4	Cilli-Turner (2015)	Projects	6	2.1	Murphy et al. (2016)
Note-keeping	16	5.7	Palmer (2015)	Real-life situations	4	1.4	Lo et al. (2018)
Feedback	15	5.3	Novak et al. (2017)	Worksheets	3	1.1	Song and Kapur (2017)
Activities	15	5.3	Collins (2019)	Diaries	1	0.3	Lai and Hwang (2016)
				Total	283	100	

As seen in Table 6, during the implementation of the flipped learning model in mathematics courses, videos were used in 52 (18.4%) studies, group work in 44 (15.5%), discussion in 34 (12%), and problem-solving in 28 (9.9%). The other methods and techniques employed included homework, note-keeping, feedback, activities, question-answer, individual and collaborative work, online exams, projects, real-life situations, worksheets, and diaries.

Table 7 below provides information about the Internet platforms used in the studies.

Table 7. Internet access platforms used in the studies

Category	f	%	Source	Category	f	%	Source
YouTube	12	16.3	Heuett (2017)	Edpuzzle	1	1.3	Kaya (2018)
PowerPoint	9	12.2	Jeong (2015)	Okulistik	1	1.3	Kaya (2018)
Camtasia	6	8.5	Yong et al. (2015)	Maxima	1	1.3	Zengin (2017)
Moodle	5	6.8	Lo and Hew (2020)	Teacher Tube	1	1.3	Van-Sickle (2015)
Massive open online course	4	5.5	Chen et al. (2016)	Learning Management System	1	1.3	Amstelveen (2019)
Blackboard	4	5.5	Jensen-Vallin (2017)	Wiley Plus	1	1.3	Carter et al. (2018)
Khan Academy	4	5.5	Dove and Dove (2017)	SmoothDraw	1	1.3	Muir and Geiger (2016)
WebWork	3	4.1	Maciejewski (2016)	My StatLab	1	1.3	Cilli-Turner (2015)
Desire2Learn	3	4.1	Sun et al. (2018)	Sophia	1	1.3	Van-Sickle (2015)
GeoGebra	2	2.7	Weinhandl et al. (2020)	Dropbox	1	1.3	Bhagat et al. (2016)
Piazza	2	2.7	Ziegemeier and Topaz (2015)	Socrative	1	1.3	Song and Kapur (2017)
WebAssign	2	2.7	Patterson et al. (2018)	Google Hangouts	1	1.3	Murphy et al. (2016)
Google Docs	1	1.3	Murphy et al. (2016)	MyMathLab	1	1.3	Adams and Dove (2018)
Coursera	1	1.3	Salinas-Martinez and Quintero-Rodriguez (2018)	Maple Lab	1	1.3	Adams and Dove (2018)
Promethean ActivBoard	1	1.3	Clark (2015)	QQ Learning Platform	1	1.3	Wei et al. (2020)
				Total	74	100	

As seen in Table 7, 12 (16.3%) articles used YouTube as an Internet access platform, whereas 9 (12.2%) articles employed PowerPoint and 6 (8.5%) articles Camtasia. Other platforms used included Moodle, Khan Academy, and WebWork. It should be noted that instructors used their own videos instead of ready-made videos in 42 (60.8%) articles.

f. Findings related to the results of the studies

The results of the studies within the scope of this research were categorized according to three themes. These themes are the positive, negative, and ineffective results of the flipped learning model in mathematics courses. Table 8 provides information about the positive results of using the model in mathematics courses. The themes of positive results were determined as results that contributed positively to the use of the flipped learning model for students, instructors, the learning environment, and technology in mathematics courses.

Table 8. Positive results of the studies

Theme	Categories	f	%	Source
Student	Academic performance	29	9.9	Albalawi (2018)
	Learning	24	8.2	Wei et al. (2020)
	Peer communication	18	6.1	Lo and Hew (2017b)
	Positive overview of the model	17	5.8	Touchton (2015)
	Motivation	11	3.8	Chen et al. (2016)
	Participation	10	3.4	Kaya (2018)
	High-level thinking	8	2.7	Jensen-Vallin (2017)
	Learning responsibility	8	2.7	Lo et al. (2018)
	Study habits	8	2.7	Schroeder et al. (2015)
	Self-confidence	6	2	Ford (2015)
	Getting prepared before the lesson	6	2	Cilli-Turner (2015)
	Learning at your own pace	5	1.7	Gouia and Gunn (2016)
	Giving/getting help	5	1.7	Lo and Hew (2020)
	Attitude	4	1.4	Guerrero et al. (2015)
	Individual differences	4	1.4	Touchton (2015)
	Self-efficacy	3	1.1	Sun et al. (2018)
	Setting/achieving a goal	3	1.1	Lai and Hwang (2016)
	Decreased fear/anxiety	3	1.1	Ogden (2015)
	Satisfaction	2	0.7	Tse et al. (2019)
	Persistence of knowledge	2	0.7	Zengin (2017)
	Self-regulation	1	0.3	Lai and Hwang (2016)
	Access to information at will	1	0.3	Zack et al. (2015)
	Total	178	60.8	
Teacher	Teacher-student communication	13	4.4	Dove and Dove (2017)
	Recognition of the student	6	2	Anderson and Brennan (2015)
	Planning the classroom time	6	2	Dove and Dove (2017)
	Focus on deep and difficult topics	5	1.7	Lo and Hew (2017b)
	Preparing your own videos	3	1.1	Naccarato and Karakok (2015)
	Positive point of view on the model	3	1.1	Petrillo (2016)
	Feeling its presence in the classroom	1	0.3	Cronhjort et al. (2018)
	Intervening with students in time	1	0.3	Collins (2019)
	Total	36	12.9	

Learning Environment	Entertainment/engaging	8	2.7	Murphy et al. (2016)
	Different teaching methods	7	2.3	Fredriksen and Hadjerrouit (2020)
	Asking questions	7	2.3	Wei et al. (2020)
	Sharing ideas	5	1.7	Wasserman et al. (2017)
	Rich materials	4	1.4	Zengin (2017)
	Feedback	4	1.4	Naccarato and Karakok (2015)
	Doing math	4	1.4	Guerrero et al. (2015)
	Rich content	3	1.1	Clark (2015)
	Real-life applications	2	0.7	Yong et al. (2015)
	Unlike memorization	2	0.7	Combs et al. (2018)
	Flexible learning environment	2	0.7	Muir (2020)
	Student-centered	1	0.3	Clark (2015)
	Long-term	1	0.3	Hsiao et al. (2019)
	Effective teaching	1	0.3	Tse et al. (2019)
	Total	51	17.3	
Technology	Diversity of technology (e.g., online discussion and practice platforms, gamification, interactive e-books)	9	3.1	Fredriksen and Hadjerrouit (2020)
	Watching videos at will	5	1.7	Sahin et al. (2015)
	Videos	5	1.7	Steen-Utheim and Foldnes (2018)
	Repetition	4	1.4	Clark (2015)
	Watching videos at the desired speed	3	1.1	Johnston (2017)
	Total	26	9	
General Total		293	100	

As seen in Table 8, 29 (9.9%) articles stated that the flipped learning model made positive contributions to the mathematical performance of students while 24 (8.2%) articles reported its positive effects on learning. The positive contributions of the model for students accounted for 61.5% of the total results. Positive contributions of the flipped learning model in mathematics courses for students included peer communication, motivation, participation, high-level thinking, study habits, self-confidence, persistence of knowledge, learning at one's own pace, learning responsibility, and reduced fear and anxiety about mathematics.

It was stressed in the articles that the flipped learning model in mathematics courses provides instructors with various opportunities including student-teacher communication, recognition of the student, correct usage of classroom time, ability to focus on profound and difficult topics, and timely intervention with students.

The flipped learning model in mathematics courses offers an interesting and entertaining learning environment, allowing the use of different methods and making it possible for students to ask more questions while providing rich materials and content. Technologically, it offers the possibility of using various technological tools and watching course videos at the desired time and speed with the option of re-viewing them.

Table 9 below provides information about the negative consequences of the flipped learning model in mathematics courses.

Table 9. Negative results of the studies

Categories	f	%	Source
Passively watching/not watching videos	13	18.3	Adams and Dove (2018)
Difficulty in adapting to the model	10	14.1	Chen et al. (2016)
Workload	10	14.1	Lo et al. (2018)
Time-consuming	8	11.2	Anderson and Brennan (2015)

Inability to ask questions while watching videos	4	5.7	Zack et al. (2015)
Technical problems	4	5.7	Lo et al. (2018)
Learning topics from the instructor	4	5.7	Jeong (2015)
Limited resources	2	2.8	Anderson and Brennan (2015)
Failure to ensure consistent participation	2	2.8	Steen-Utheim and Foldnes (2018)
Having fewer lessons	2	2.8	Ziegemeier and Topaz (2015)
Difficulty in self-learning	2	2.8	Zack et al. (2015)
Technological incompetence	1	1.4	Zengin (2017)
Poor quality of videos	1	1.4	Wasserman et al. (2017)
Costs	1	1.4	Touchton (2015)
Anxiety	1	1.4	Heuett (2017)
Applying it for the whole semester	1	1.4	Guerrero et al. (2015)
Superfluity of the school	1	1.4	Heuett (2017)
Seeing the teacher's function as insufficient	1	1.4	Van-Sickle (2015)
Difficulty in following the lesson	1	1.4	Yong et al. (2015)
Lack of motivation	1	1.4	Tse et al. (2019)
Finding the model insufficient	1	1.4	Lesseig and Krouss (2017)
Total	71	100	

As seen in Table 9, 13 (18.3%) articles reported students coming to class without watching videos or attending the course as a passive audience as factors disrupting the flipped learning model in mathematics courses. In 10 (14.1%) articles, it was emphasized that the model introduced a burdensome workload to students and teachers and they had difficulty adapting to the model. The fact that the flipped learning model in mathematics courses takes times to apply, may have technical problems, entails fewer lessons, involves difficulty in self-learning, might lead to the perception of the teacher's function as insufficient, is applied for the entire semester, leaves students unable to ask questions while watching videos, and impacts the desire to learn topics from the instructor were determined as negative results.

In addition to the studies reporting positive or negative consequences of the flipped learning model in mathematics courses, there are also studies comparing the model with traditional methods and reporting the ineffectiveness of the model. Although the percentage of these results is relatively small compared to other results, there are points to consider. Table 10 below provides information about the results on the ineffectiveness of the model.

Table 10. Results for the ineffectiveness of the model

Categories	f	%	Source
Academic performance	11	48	Yong et al. (2015)
Individual differences	2	9	Bhagat et al. (2016)
Understanding the course contents	1	4.3	Guerrero et al. (2015)
Self-efficacy	1	4.3	Krouss and Lesseig (2020)
Learning strategies	1	4.3	Kennedy et al. (2015)
Meta-cognitive and affective gains	1	4.3	Yong et al. (2015)
No clear conclusion that it increases learning	1	4.3	Guerrero et al. (2015)
Belief in learning mathematics	1	4.3	Adams and Dove (2018)
Ability to calculate	1	4.3	Anderson and Brennan (2015)
Gender attitudes	1	4.3	Turra et al. (2019)
Short-term learning	1	4.3	Hsiao et al. (2019)
Video preferences	1	4.3	Gouia and Gunn (2016)
Total	23	100	

As seen in Table 10, 11 (48%) articles concluded that the flipped learning model did not make a significant difference in students' academic performances in mathematics education. In addition, others reported no effect of the model on understanding the course contents, self-efficacy, learning strategies, meta-cognitive gains, increasing learning, belief, ability to calculate, attitude, short-term learning, or video preferences.

g. Findings related to the suggestions of the studies

The suggestions of the studies for the flipped learning model in mathematics courses are divided among themes of research topics, technical infrastructure, students, instructors, and teaching tips. Table 11 below provides information about the suggestions of the studies.

Table 11. Suggestions of the studies

Theme	Categories	f	%	Source
Research Topics	Different variables (e.g., causes of failure, attitude, effectiveness of the model, STEM, gamification, classroom structure, economic level, individual differences, impact of different types of training)	15	12.7	Bhagat et al. (2016)
	Comprehensive and experimental research	10	8.5	Lo and Hew (2017b)
	Large-scale	9	7.6	Kaya (2018)
	Long-term	9	7.6	Dove and Dove (2017)
	Different mathematics subjects	4	3.4	Hung et al. (2019)
	Classroom design	2	1.7	Clark (2015)
	Primary and middle school students	1	0.9	Muir (2020)
	The point at which technology will lose its effect	1	0.9	Clark (2015)
	Total	51	43.3	
Technical	Technical infrastructure	7	5.9	Touchton (2015)
	Rich content (e.g., videos, games)	5	4.2	Kirvan et al. (2015)
	Video time	3	2.5	Carney et al. (2015)
	Video design	2	1.7	Carter et al. (2018)
	Total	17	14.3	
Instructor	Time	3	2.5	Chen et al. (2016)
	Making your own videos	3	2.5	Muir and Geiger (2016)
	Expressing expectations clearly	2	1.7	Weinhandl et al. (2020)
	Guidance for students	1	0.9	Jeong (2015)
	In-service training	1	0.9	Albalawi (2018)
	Making efforts	1	0.9	Chen et al. (2016)
	Total	11	9.4	
Student	Coming to class unprepared	4	3.4	Lo et al. (2018)
	Consistent participation	3	2.5	Adams and Dove (2018)
	Note-keeping	1	0.9	Palmer (2015)
	Study habit	1	0.9	Jeong (2015)
	Total	9	7.7	
Teaching Tips	Well-organized classroom environment	8	6.8	Chen et al. (2016)
	Assessment tools (e.g., absenteeism, video watching, online discussion)	7	5.9	Lo and Hew (2017b)
	Feedback	5	4.2	Jeong (2015)
	Individual differences	3	2.5	Cronhjort et al. (2018)
	Not being suitable for every student	3	2.5	Petrillo (2016)
	Group work	3	2.5	Palmer (2015)
	Multiple instructors	1	0.9	Ogden (2015)
	Total	30	25.3	
General Total		118	100	

As seen in Table 11, 15 (12.7%) articles suggested that different variables should be used, 10 (8.5%) articles suggested that comprehensive and experimental studies should be conducted, and 9 (7.6%) articles suggested that large-scale and long-term studies should be carried out. It was stated that instructors who want to use the flipped learning model in mathematics courses should be given time. It was also suggested that training will be more effective if instructors make their own videos, explain their expectations at the beginning of the application, and act as guides throughout the process. Students were advised to prepare for the lesson in advance and ensure consistent participation in order to benefit from the model efficiently. At the same time, instructional tips for those who would apply the model included preparing technical infrastructure with rich content, taking care of video time and design, ensuring well-organized courses and diversity in evaluation tools, providing feedback, and paying attention to individual differences.

DISCUSSION, CONCLUSIONS, AND SUGGESTIONS

Within the scope of the present study, 69 different articles on the flipped model in mathematics education were examined and evaluated. It was found that most of the articles were published in 2015 and in journals indexed by ERIC. The scarcity of relevant articles included in the TR-Index database was noted.

More than half of the studies on the flipped learning model in mathematics courses were conducted with undergraduate students. Although there were some studies conducted with primary school, middle school, and high school students applying the flipped learning model in mathematics courses, it can be said that their numbers were inadequate. In the studies conducted, it was argued that the flipped learning model gains momentum at K-12 and undergraduate levels (Cheng et al., 2019; Bergmann and Sams, 2012), but the scarcity of studies conducted at the K-12 level was also highlighted (Lo and Hew, 2017a; Akcayir and Akcayir, 2018). This, in turn, leads to limited knowledge of the difficulties experienced in the process of implementing the model in pre-undergraduate age groups (Lo and Hew, 2017a). Another observation made in the present study was the scarcity of studies conducted with mathematics pre-service teachers and instructors. It is necessary to create learning environments for mathematics pre-service teachers in order to enable them to gain experience in applying this method when they start to work as instructors in the future. In addition, carrying out studies examining the perspectives of mathematics instructors is important to learn how to apply the model in mathematics classes and how it can be developed.

Researchers primarily preferred the subject of analysis to implement the flipped learning model. It is believed that this was because undergraduate students were chosen for studies and analysis is usually one of the compulsory subjects taught in mathematics education in the first years of university.

The research methods employed in the studies on the flipped learning model in mathematics courses were diverse. These studies mostly adopted the mixed method (e.g., Guerrero et al., 2015; Muir, 2020; Murphy et al., 2016; Schroeder et al., 2015) or the semi-experimental method (e.g., Kirvan et al., 2015; Lo et al., 2018; Touchton, 2015), while the number of studies choosing the qualitative method (e.g., Jeong, 2015; Larsen, 2015; Ogden, 2015) or the quantitative method (e.g., Anderson and Brennan, 2015; Patterson et al., 2018; Sun et al., 2018) was also noteworthy. To study the effectiveness of the flipped learning model, Bishop and Verleger (2013) recommend experimental and semi-experimental methods, while Karabulut-Ilgu et al. (2018) suggest that qualitative and mixed methods should be used to understand how the model supports learning.

It was found that the majority of the studies on the flipped learning model in mathematics courses took place for an entire semester or longer. However, Cheng et al. (2019) indicate that long-term studies have a smaller impact than short-term ones. They suggest undergraduate students for long-term studies and primary, middle, and high school students for short-term studies. Lo and Hew (2017a) state that long-term studies are needed at the K-12 level in order to be able to evaluate the model. When we look at the sample sizes of the studies within the scope of the present work, it is noted that more studies have been carried out with groups of less than 50 people. Karagol and Esen (2019) recommend groups of 30 or fewer for the flipped classroom model.

Active learning and group work are the main themes of the flipped learning model (Novak et al., 2017). Overall, the flipped learning provides opportunities to use many teaching methods and techniques. In this

regard, the model allows the use of different methods rather than adopting a specific method and technique. Most of the studies examined different combined methods such as videos, group work, discussion, problem-solving, homework, note-taking, feedback, activities, question-answer, and individual and collaborative work. Similarly, Akcayir and Akcayir (2018) indicate that there are many methods that can be used both inside and outside the classroom, and most researchers prefer to use multiple methods together. Thus, the development of 21st-century thinking skills and students' technology and information literacy can be supported (Zainuddin et al., 2019).

The studies on the flipped classroom model in mathematics courses generally aimed at examining academic performance and student perspectives. Akcayir and Akcayir (2018) state that academic performance is the overall objective of studies on the flipped learning model. Guerrero et al. (2015) note that although the studies on students' learning and academic performance in mathematics courses are limited, they are promising. Accordingly, many articles focused on the comparison between academic achievements in flipped classrooms and traditional classrooms (Karagol and Esen, 2019; O'Flaherty and Phillips, 2015). However, there is little consensus on which method is more effective (Karabulut-Ilgu et al., 2018; Cheng et al., 2019). This is due to the fact that there are few extensive studies on the model (DeLozier and Rhodes, 2017). Other variables besides academic performance are important for mathematics courses. Therefore, studies examining the effects of the flipped learning model in mathematics courses on factors such as participation, motivation, cognitive skills, and attitudes are needed. At the same time, the perspective of students and instructors that will provide information about the positive and negative aspects as well as aspects that need to be improved in the process of implementing the model can be examined. The scarcity of different studies on the impact of the model on mathematics education such as classroom design and material usage to provide instructional tips is noteworthy.

The vast majority of the studies evaluating academic performance came to the conclusion that the model positively influenced students' mathematical achievements. On the other hand, there are studies that argued that although there were no negative results for academic performance, the model did not have any positive impact on academic success. As an interesting finding, Bond (2020) reports that flipped learning positively affects attitudes, motivation, interest, self-efficacy, and attendance even if it does not improve students' academic performance. Experimental studies are needed to say that the flipped learning model is more effective compared to the traditional method (O'Flaherty and Phillips, 2015; Akcayir and Akcayir, 2018). The reported positive results of the studies within the scope of the present review are greater in comparison with negative and ineffective results. These positive aspects may be promising for mathematics education. Akcayir and Akcayir (2018) report an encouraging number of advantages (e.g., motivation, attitude) of the model in the studies conducted, whereas Karabulut-Ilgu et al. (2018) emphasize that the model is more effective than the traditional method. O'Flaherty and Phillips (2015) state that the results of studies focusing on the perspectives of students on the model are generally positive and few report negative views.

The flipped learning model offers a broad conceptual teaching framework that gives responsibility to students for learning outside the classroom (Phillips and Trainor, 2014). This model has promising as well as challenging aspects (Chen, Wang, and Chen, 2014). When students do not fulfill their responsibilities sufficiently, certain difficulties occur in the implementation of the model. The majority of the negative results of the studies within the scope of the present review occurred when students did not fulfill those responsibilities. Zainuddin et al. (2019) found that instructors faced the biggest challenge when students failed to watch videos, whereas Lo et al. (2017) reported that problems arose when students were not familiar with the model and when instructors perceived the model as adding to their workload. Many students find it hard to change their passive learning habits inherited from traditional classroom environments (Chen et al., 2014). Examining the reflections of the flipped learning model in mathematics courses, the present study identified watching videos passively, resistance to the model, time, and workload as the most common challenges. When out-of-class learning is not achieved, students have difficulty understanding the different forms of representation and different situations of concepts even if they understand the general framework of mathematical concepts (Zengin, 2017). In addition, there may be other challenges for mathematics courses, such as students wanting to learn the subject from the instructor, difficulty learning on their own, technical problems, and seeing the teacher's function as inadequate. However, Lo and Hew (2017a) argue that negative comments from students are important in terms of contributing to the development of the

model. To overcome these adverse situations, activities that enable student and instructor engagement to enhance gamification, digital transformation, and creativity are proposed (Murillo-Zamorano et al., 2019).

The suggestions of the studies on the flipped learning model in mathematics courses include instructors preparing their own videos for trainings. Although online platforms such as YouTube and Khan Academy provide educational videos, videos on every topic are not available. Therefore, this suggestion may mean extra time and workload for instructors (Chen, 2016), but the impact will be greater.

The findings of this study will provide guidance for researchers who want to use the flipped classroom model in mathematics education. In conclusion, there are both positive and negative aspects of the flipped classroom model in mathematics lessons. Comprehensive, large, and long-term studies are needed to interpret the effects of the flipped classroom model for mathematics education from different perspectives.

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EXPLORING CORRELATION BETWEEN METACOGNITIVE ONLINE READING STRATEGY USE AND ONLINE READING COMPREHENSION OF EFL STUDENTS

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ABSTRACT

The study sought to explore the correlation between the use of Metacognitive Online Reading Strategies (MORS) and the Online Reading Comprehension (ORC) of Indonesian university students learning English as a Foreign Language (EFL). Specifically, it investigated three issues: (1) the levels of MORS use and ORC of the students majoring in languages, social sciences, and sciences, (2) the correlation between the MORS use and the ORC, and (3) whether the overall MORS use and category MORS use serve as predictors of the ORC. By using purposive sampling technique, 602 students were taken as the research sample. The Online Survey of Reading Strategies (OSORS) and an ORC test were used as the research instruments. Data were analyzed using descriptive statistics, Pearson correlation coefficient (r), and simple and multiple linear regression. The results showed that the overall MORS, the problem-solving strategies, and the support strategies were used highly, while the global reading strategies were used moderately by students from the three majors. A significant correlation was only found between the overall MORS use and the ORC, and between the problem-solving strategy use and the ORC among the students from language major. The overall MORS use and the global reading strategy use predicted the ORC of the students majoring in languages. These results should be interpreted with caution since the strategy use was not assessed based on classroom observations but based on self-reports.

Keywords: Academic majors, EFL students, metacognitive online reading strategies, online reading comprehension.

INTRODUCTION

Reading skills need to be mastered by students to ensure success in their English as a Foreign Language (EFL) learning. In higher education context, students' success in learning EFL is highly dependent on their reading ability, because they are required to read learning materials to acquire content, procedural knowledge, and areas of specialization (Anderson, 2003; Ghaith & El-Sanyoura, 2019; Mokhtari & Sheorey, 2002). However, the rapid development of internet technology has had a significant impact on teaching and learning activities. This technology has shifted the current teaching and learning processes from traditional face-to-face using printed materials to online learning activities using digital materials. The use of internet in learning is seen as providing educational advancement for students, especially in higher education (Azmuiddin et al., 2017; Ozturk, 2018). In this learning environment, the use of online materials has become a common practice, where students are required to access and read them effectively to understand and synthesize them. However, many researchers warn that in online learning activities, students must have strategies and skills that play an important role in supporting their learning success. (Anderson, 2003; Broadbent & Poon, 2015; Coiro & Dobler, 2007). More specifically, in EFL classes, online learning provides students opportunities to experiment with transformative learning experiences (Cheng, 2016). Online learning activities tend to be viewed positively by EFL university students because of several benefits such as affordability of learning materials at all times and user-friendly learning features (Rianto, 2020b).

In an online reading process, readers are required to have certain strategies and abilities to navigate the materials to achieve their reading comprehension. This is due the structure of the online materials which is usually complex hypertext and related to problem solving (Azmuiddin et al., 2017). Reading involves metacognitive awareness allows readers to check and evaluate their reading process (Akyel & Ercetin, 2009). Here, metacognitive awareness is associated with techniques to plan, organize, and manage online reading to help readers achieve their reading goals (Anderson, 2003; Ramli et al., 2011; Sheorey & Mokhtari, 2001). Students who are trained in using metacognitive strategies such as setting goals, making plans, assessing information, monitoring, and evaluating themselves show much better learning outcomes than those who are not trained (Bannert et al., 2009). Given the crucial role of online reading strategies in supporting the success of EFL learning, research on the strategy use and its correlation with reading achievement among EFL learners needs to be further investigated. More specifically, research aimed at exploring possible relation between metacognitive online reading strategies and online reading comprehension is considered vital because these strategies are believed to assist students achieve their reading goals.

The current study, which investigated the relationship between metacognitive online reading strategy use and online reading comprehension achievement of Indonesian EFL university students, is significant and necessary because it provides numerical evidence on the levels of use of these strategies and reading comprehension achievement of students with various academic majors, particularly in higher education. Additionally, this research is significant because it adds to the theoretical framework of the relationship between metacognitive online reading strategies and online reading achievement in an EFL setting. Furthermore, this study adds to the body of research on the subject of whether the usage of metacognitive strategies in general or in specific categories like global strategies, problem-solving strategies, and support strategies might predict students' online reading performance.

LITERATURE REVIEW

This research is framed in metacognitive awareness theory in reading comprehension. An important aspect of reading skills is awareness of readers to monitor their reading comprehension. This is known as metacognition, which is defined as the strategic awareness of a person's cognitive abilities when engaged in reading tasks, and a mechanism used to control and regulate text comprehension (Sheorey & Mokhtari, 2001). Metacognitive strategies have a crucial function in language learning because they supervise, organize, and direct tasks and involve thinking about the learning process (Rianto, 2021; Marboot et al., 2020). More importantly, these strategies can improve students' language learning because once they understand how to organize their learning by using these strategies, the learning will take place at a faster rate (Anderson, 2003). The present study assumes that through metacognitive knowledge readers are able to generate critical reflections and evaluate their thinking which can lead to specific changes in the way they read. In order to achieve maximum reading comprehension, readers must be metacognitively aware of what they are doing. For example, when engaging in an online reading task, readers should have a metacognitive awareness by linking their strategy to their online goals. Phakiti (2008) claims that these strategies can predict learners' reading comprehension because they know the means used to achieve their reading goals.

To assess metacognitive reading strategies among native English speaking students, Mokhtari and Reichard (2002) created an instrument called Metacognitive Awareness of Reading Strategies Inventory (MARSİ). Then, Mokhtari and Sheorey (2002) developed an instrument called Survey of Reading Strategy (SORS) to measure metacognitive awareness for EFL/ESL students. MARSİ and SORS are specifically intended to measure metacognitive awareness of offline reading strategies. Furthermore, Anderson (2003) modified SORS to be Online Survey of Reading Strategies (OSORS) to assess readers' metacognitive online reading strategies. Metacognitive strategies consist of three categories: global reading strategies, problem-solving strategies and support strategies. Global reading strategies such as judging what to read, paying attention to text features, and guessing the reading topic are commonly used to set the reading stage activities. Problem-solving strategies are usually employed when readers face problems in understanding textual information. Some examples of these strategies are rereading, returning to previous sections, and taking pauses. Support strategies such as underlining words, paraphrasing, and going back and forth are typically used to sustain a response to a reading.

Research on metacognitive reading strategies has been conducted over the past two decades, both in the offline and online reading contexts. In many offline reading studies, researchers examined the use of these strategies among EFL students and analyzing differences in the strategy use based on several different variables (Aziz et al., 2019; Deliany & Cahyono, 2020; Ismail, 2016; Marboot et al., 2020; Mokhtari & Sheorey, 2002). In addition, other researchers examined the correlation between the strategy use of EFL learners and their reading comprehension achievement (Dardjito, 2019; Fitriisa et al., 2015; Kutluturk & Yumru, 2017; Miller, 2017; Mohseni et al., 2020; Takallou, 2011; Usman et al., 2017; Wahyuni et al., 2012). More interestingly, several other researchers focused their investigations the strategy use among students with special learning needs (Chevalier et al., 2017; Cox-Magno, 2018; Girli & Ozturk, 2017). In general, the researchers believe that readers are required to have metacognitive awareness to help them reach their reading objectives more effectively.

In the online reading context, research investigating the metacognitive strategy use among ESL and EFL learners was initiated by Anderson (2003) by using the Reading Strategy Online Survey (OSORS) as the data collection instrument. The study revealed that there was no significant difference in the use of global reading strategies and support strategies between the ESL and EFL learners. However, problem-solving strategies were used more frequently by EFL learners than by ESL learners. Meanwhile, other research among EFL students in Iran revealed that problem-solving strategies were used more often than support and global reading strategies (Ahmadian & Pasand, 2017; Marboot et al., 2020; Taki & Soleimani, 2012). In addition, Azmuddin et al. (2017) found that Malaysian ESL students used problem-solving strategies most frequently followed by global and support strategies. Other researchers investigating these strategies among EFL students in the Middle East also found that problem solving was the most widely used strategy (Darwish, 2017; Mukhlif & Amir, 2017; Omar, 2014). Ramli et al. (2011) who investigated adult ESL students in Malaysia reported slightly different results that the global reading strategies were favored over the problem solving strategies and the support strategies.

Regarding the strategy use and reading comprehension correlation among EFL students, studies in the international context have shown less conclusive results. For example, a study involving EFL students in Lebanon found that problem-solving strategies related to and predicted high-level literal reading comprehension (Ghaith & El-Sanyoura, 2019). Other studies involving engineering students in India (Madhumathi & Ghosh, 2012), preparatory year students in Saudi Arabia (Meniado, 2016), and EFL students in Iran (Tavakoli, 2014) found a significant relationship between the strategy category use and the reading comprehension. In contrast, studies involving Indonesian EFL students found that there was no significant correlation between metacognitive reading awareness and reading comprehension of academic English (Dardjito, 2019; Wahyuni et al., 2018). Meanwhile, another study involving EFL students in Iran found a significant relationship between the use of problem-solving strategies and global reading strategies and the reading comprehension, but no significant relationship was found between the support strategy use and the reading comprehension (Karbalaee Kamran, 2013). The regression analyses of the study showed that the use of overall reading strategies and the global reading strategies was found to be a predictor of reading comprehension test scores. In addition, a study involving Yemeni EFL students found a significant relationship between problem-solving strategies and global strategies and reading skills, but found no relationship between support strategies and reading skills (Al-sohbani, 2013).

Previous studies on metacognitive reading strategies have generally emphasized the fundamental role of reading skills in enhancing EFL learning. However, most studies in this area tend to focus on EFL students with general characteristics and in settings different from Indonesia. In fact, studies that focus on the correlation between the reading strategy use and the online reading comprehension among Indonesian EFL university students with different majors have not been revealed. Therefore, this study was carried out to explore the correlation between the metacognitive online reading strategy use and the online reading comprehension achievement of Indonesian EFL university students from three different majors, namely languages, social sciences, and sciences. In this connection, this study specifically aimed at determining levels of the strategy use and the reading comprehension achievement, examining the strategy use and the online reading comprehension correlation, and investigating whether the overall and category use of the strategies predict the reading comprehension achievement. Therefore, three research questions below are presented to address the research objectives:

1. What are the levels of Metacognitive Online Reading Strategy (MORS) use and Online Reading Comprehension (ORC) of Indonesian EFL students majoring in languages, social sciences, and sciences?
2. Does the students' MORS use correlate significantly with their ORC?
3. Does the students' overall MORS use and category MORS use predict their ORC?

METHOD

Design

This study followed a quantitative paradigm, in that it systematically explored phenomena using quantitative data and statistical techniques. It made use of survey and correlational research methods (Fraenkel et al., 2012). The survey method was used to ask questions related to the use of online metacognitive reading strategies to a sample of respondents using an online questionnaire. The correlational method was used to correlate the use of those online strategies with the online reading ability of the respondents. The study's findings were presented in numerical form.

Participants

The participants were selected using a purposive sampling technique. Since the aim of this study was to explore the correlation between the metacognitive online reading strategy use and the online reading comprehension achievement of Indonesian EFL students majoring in languages, social sciences, and sciences, the researcher determined specific criteria as population requirements, namely the students taking a compulsory English course that was taught through blended learning. The use of this sampling technique allows researchers to target certain groups of individuals to become research participants so that the data collection process can continue until the required number of samples is met (Cohen et al., 2007). The selection of target participants was carried out by inviting students from the majors of languages, social sciences, and sciences at the University of Borneo Tarakan to take part in the study. The researcher also sent requests to faculty and department staff to distribute the online survey in their social media groups as part of targeted sampling. The students were told that participation was voluntary and had no impact on academic performance. A total of 602 students participated in this study that consisted of 160 participants from the language major, 135 from the social science major, and 307 from the science major. Based on gender, the research participants consisted of 426 women and 176 men.

Instruments

The Online Survey of Reading Strategies (OSORS) adopted from Anderson (2003) and a reading comprehension section taken from the university's English test were used as the research instruments. OSORS was employed to assess the participants' awareness and use of metacognitive online reading strategies. Since this study involved Indonesian EFL students, slight modifications were made to items 37 and 38 of the support strategies. Item 37 was changed from 'When reading online, I translate from English to my native language' to 'When reading online, I translate from English to Indonesian' and item 38 from 'When reading online, I think of information in English and my native language' to 'When reading online, I think of information in English and Indonesian.' Overall, OSORS in this study consisted of 39 items, which were divided into three categories, namely global reading strategies (17 items), problem-solving strategies (12 items), and support strategies (10 items). These strategies were measured using a 5-point Likert scale ranging from 1 (Never or almost never do this) to 5 (Always or almost always do this). In this study, the reliability coefficient values for the strategy categories and the overall strategy were as follows: global reading strategy ($\alpha = 0.892$), problem-solving strategy ($\alpha = .849$), support strategy ($\alpha = .808$), and overall strategy ($\alpha = \alpha = .935$). These values indicate that the instrument can be relied upon to measure the strategy use.

Procedures

Data for the strategy use were collected through the Google Form application with the help of the English lecturers who shared the form link with their students. The questionnaires were completed outside of class hours. In the first part of the questionnaire, the students were asked to fill out background questions. In the next part, they were asked to respond to each strategy item by clicking on one of the numbers 1-5. For the online reading comprehension achievement, data were taken from the scores of the reading comprehension section of the online English test conducted by the Language Center of the University of Borneo Tarakan. The test, which was compulsory for every student, was adopted from the TOEFL ITP model. In this study, only reading comprehension scores were taken for analysis. In the reading comprehension section, the students were tested to understand, interpret, and analyze the reading passages. In addition, they were also tested on knowledge of English vocabulary. More specifically, the reading comprehension section consisted of 50 items, with questions about implied details, main ideas, idea organization, references, specific information, stated details, vocabulary, and transitions. The students took this test according to the schedule provided by the Language Center. Overall, this test was carried out for 120 minutes.

Data Analysis

To address the first research question, analyses of descriptive statistics were performed for the strategy use and for the reading comprehension achievement. Levels of the strategy use were determined through a mean rank order. According to Mokhtari and Sheorey (2002) scores of the strategy use are categorized into three levels: 3.5 - 5.0 (high level), 2.5 - 3.4 (moderate level), and 2.4 - 1 (low level). Meanwhile, scores of the reading comprehension were grouped into the following levels: 31-47 (elementary level), 48-55 (lower intermediate level), 56-62 (upper intermediate level), and 63-67 (advanced level). Data regarding the second research question were analyzed using Pearson correlation coefficient (r). The third research question data were analyzed using simple and multiple linear regression, where scores of the online reading comprehension were as used the dependent variable, and scores of the overall and category use of the strategies served as the predictors.

RESULTS

The first research question was aimed at finding out the levels of Metacognitive Online Reading Strategy (MORS) use and Online Reading Comprehension (ORC) of Indonesian EFL students majoring in languages, social sciences, and sciences. Table 1 illustrates the results of descriptive statistics for the MORS use and the ORC. Students from the three majors experienced a high level of MORS use (Language major: $M = 3.58$, $SD = .54$; Social science major: $M = 3.56$, $SD = .56$; Science major: $M = 3.50$, $SD = .57$). By category, problem-solving strategies and support strategies were used highly, while global reading strategies were used moderately by the students from the three majors. Students from the three majors used most frequently the problem-solving strategies (Language major: $M = 3.77$; Social science major: $M = 3.77$; Science Major: $M = 3.69$), followed by the support strategies (Language major: $M = 3.61$; Social science major: $M = 3.59$; Science major: $M = 3.53$), and the global reading strategies (Language major: $M = 3.43$; Social science major: $M = 3.38$; Science major: $M = 3.31$). Meanwhile, the students' ORC level was categorized elementary (Language major: $M = 36.99$; Social science major: $M = 34.28$; Science major: $M = 34.42$). The maximum ORC score for the students from the three majors was 66 and the minimum score was 24 for language students, 18 for science students, and 17 for social science students.

The second research question data were analyzed using the Pearson correlation coefficient (r). Results of the analysis are illustrated in Table 2. For the students majoring in languages, a significant correlation was found between the overall MORS use and the ORC ($r = .211$, $p = .014$), and between the global reading strategy use and the ORC ($r = .25$, $p = .003$), at a significance level of .05. However, no significant correlation was found between the problem-solving strategy use and the ORC ($r = .129$, $p = .136$) and between the support strategy use and the ORC ($r = .141$, $p = .102$). In contrast, for the students majoring in social sciences and in sciences, no significant correlation was found between the MORS use and the ORC.

Table 1. Results of descriptive analyses of MORS use and ORC

Major			N	Min	Max	Mean	SD	Level
Languages	MORS	Global	135	1.71	4.71	3.43	.61	Moderate
		Problem-solving	135	2.50	5.00	3.77	.58	High
		Support	135	1.90	5.00	3.61	.66	High
		Overall	135	2.31	4.72	3.58	.54	High
	ORC		135	24	66	36.99	8.22	Elementary
Social Sciences	MORS	Global	160	2.00	5.00	3.38	.61	Moderate
		Problem-solving	160	2.33	5.00	3.77	.59	High
		Support	160	1.80	5.00	3.59	.73	High
		Overall	160	2.18	5.00	3.56	.56	High
	ORC		160	17	66	34.28	6.00	Elementary
Sciences	MORS	Global	307	1.59	5.00	3.31	.65	Moderate
		Problem-solving	307	1.75	5.00	3.69	.62	High
		Support	307	1.40	5.00	3.53	.70	High
		Overall	307	1.74	5.00	3.50	.57	High
	ORC		307	18	66	34.42	7.26	Elementary

Table 2. Results of Pearson correlation between MORS use and ORC

Major			Global Strategy	Problem-Solving Strategy	Support Strategy	Overall Strategy
Languages	Pearson Correlation	ORC	.251**	.129	.141	.211*
	Sig. (2-tailed)		.003	.136	.102	.014
	N	135	135	135	135	135
Social Sciences	Pearson Correlation	ORC	-.013	-.110	-.090	-.073
	Sig. (2-tailed)		.867	.168	.260	.361
	N	160	160	160	160	160
Sciences	Pearson Correlation	ORC	.087	.038	.019	.062
	Sig. (2-tailed)		.128	.503	.744	.278
	N	307	307	307	307	307

* Correlation is significant at the 0.05 level (2-tailed).

The third research question was meant to investigate whether the students' overall MORS use and the category MORS use predicted their ORC. To address the question, the simple and multiple linear regression analyses were performed. The analysis results for the simple linear regression are reported in Table 3, and for the multiple linear regression are in Table 4. As seen in Table 3, for the students majoring in languages, their overall MORS use was significantly correlated with their ORC ($F = 6.173$, $p = .014$). It was revealed that the students' overall MORS use explained 4.4% of the variance ($R^2 = .044$, $F = 6.173$, $p = .014$), and served as the predictor of their ORC ($\beta = .211$, $p = .014$). In contrast, for the students majoring in social sciences and in sciences, their overall MORS use was not significantly correlated with their ORC (social science major: $F = .839$, $p = .361$; science major: $F = 1.183$, $p = .278$). It was revealed that the overall MORS use of the students majoring in social sciences explained only 0.5% of the variance ($R^2 = .005$, $F = .839$, $p = .361$), and did not serve as the predictor of their ORC ($\beta = -.073$, $p = .361$). In addition, the overall MORS use of students majoring in sciences explained only 0.4% of the variance ($R^2 = .004$, $F = 1.183$, $p = .278$), and did not serve as the predictor of their ORC ($\beta = -.062$, $p = .278$).

Table 3. Summary of simple regression analyses for overall MORS use predicting ORC

Major	Variable	Online Reading Comprehension (ORC)				
		R^2	F	β	t	p
Languages	Overall MORS use			.211	2.485	.014*
	Model	.044	6.173			.014*
Social Sciences	Overall MORS use			-.073	-.916	.361
	Model	.005	.839			.361
Sciences	Overall MORS use			.062	1.088	.278
	Model	.004	1.183			.278

* $p < 0.05$

Furthermore, the multiple regression analyses were performed to examine whether the students' category MORS use (global, support, and problem-solving strategies) predicted their ORC. As shown in Table 4, for the students majoring in languages, their category MORS use was significantly associated with their ORC ($F = 3.036$, $p = .031$). It was revealed that the global strategy use explained 6.5% of the variance ($R^2 = .065$, $F = 3.036$, $p = .031$), and served as the predictor of the ORC ($\beta = .288$, $p = .015$). However, the problem-solving strategies and the support strategies were excluded as predictor variables of the ORC (Problem-solving: $\beta = -.060$, $p = .636$; Support: $\beta = .003$, $p = .979$). In contrast, the category MORS use of students from social science and science majors was not significantly correlated with their ORC (social science major: $F = .994$, $p = .398$; science major: $F = .898$, $p = .443$). Thus, the use of the three strategy categories did not predict the ORC (Social science major: Global: $\beta = -.108$, $p = .312$; Problem-solving: $\beta = -.145$, $p = .243$; and Support: $\beta = -.048$, $p = .677$; Science major: Global: $\beta = -.115$, $p = .139$; Problem-solving: $\beta = -.015$, $p = .870$; and Support $\beta = -.033$, $p = .687$).

Table 4. Summary of multiple regression analyses for category use of MORS predicting ORC

Major	Variable	Online Reading Comprehension (ORC)				
		R^2	F	β	t	p
Languages	Global strategies			.288	2.463	.015*
	Problem-solving strategies			-.060	-.474	.636
	Support strategies			.003	.026	.979
	Model	.065	3.036			.031*
Social Sciences	Global strategies			.108	1.014	.312
	Problem-solving strategies			-.145	-1.172	.243
	Support strategies			-.048	-.417	.677
	Model	.019	.994			.398
Sciences	Global strategies			.115	1.483	.139
	Problem-solving strategies			-.015	-.164	.870
	Support strategies			-.033	-.403	.687
	Model	.009	.898			.443

* $p < 0.05$

DISCUSSION

This study discovered that when reading online texts, Indonesian EFL students employed a variety of metacognitive strategies to control, analyze, and enhance their reading comprehension. This implies that the students were generally metacognitively aware when reading English texts online. Several prior research have found that metacognitive awareness helps students become more strategic readers, and that employing these strategies helps students make considerable advances in reading comprehension (Marboot et al., 2020; Mukhlif & Amir, 2017; Rianto, 2020a). Furthermore, in dealing with the online EFL learning environment, the students in this study seemed to realize the importance of developing more effective strategies to achieve their reading comprehension. This supports Taki's (2016) assertion that in online reading activities, students must learn to build effective techniques using high-level digital and cognitive capabilities. This scholar also suggests that higher-order cognitive abilities must be included into reading curricula since digital competence is more than simply technical knowledge.

Regarding the first research question, it was found that the overall strategies were used at a high level by Indonesian EFL students from all three majors (languages, social sciences, and sciences). By category, the problem solving strategies and support strategies were used highly, while the global strategies were used moderately. These findings also indicate that the students had metacognitive awareness to plot, organize, and set online reading to help achieve their reading goals. Related to the problem-solving strategies that were used with the highest frequency, this was very likely due to the high awareness of the students towards the complex structure of the online reading. Reading in this way required the students to have certain strategies such as adjusting the speed of reading, reading again the complex parts, and guessing the new word meaning to reach their reading comprehension. This is in line with the claim made by researchers that the structures of online materials are usually complex hypertext which requires readers to have certain strategies and the ability to online navigation (Azmuiddin et al., 2017). The results also corroborate the findings of previous studies which revealed that the problem-solving strategies were most frequently used and the support strategies were least frequently used (Ahmadian & Pasand, 2017; Darwish, 2017; Ghaith & El-Sanyoura, 2019; Marboot et al., 2020; Mukhlif & Amir, 2017; Omar, 2014; Taki & Soleimani, 2012). The results of the present study imply that the problem-solving strategies play a significant role in helping readers achieve their reading goals. The students were indicated to use this strategy category when working directly with text and to perform several focused techniques such as rewording, slow reading, noticing, rereading, and making reading speed adjustment when facing problems in understanding textual information.

In relation to the problem-solving strategies that were utilized most frequently by the students in the present study, this differs slightly from the findings of previous research on reading strategies in offline settings (Coiro & Dobler, 2007; Leu et al., 2004; Sheorey & Mokhtari, 2001). According to these studies, EFL readers used support strategies more than problem-solving strategies in offline contexts, and one of the causes might be the learning environment (offline/online). Online reading is considered as a problem-based inquiry (Leu et al., 2004) that entails a process in which readers build texts in their heads (Coiro & Dobler, 2007), necessitating new abilities and techniques. As a result, it is reasonable that EFL students utilize more problem-solving strategies while reading online. It is also supported by prior studies (Coiro & Dobler, 2007; Leu et al., 2004), which assert that online reading comprehension is possibly more difficult and sophisticated than offline reading comprehension, and that there are some variations in reader preferences and strategy usage frequency. Furthermore, as Pookcharoen (2009) points out, online readers require additional strategies to deal with their online reading process in addition to those utilized in offline contexts. Similarly, the present study's larger usage of problem-solving strategies may corroborate Alhaqbani and Riazzi's (2012) finding that readers of L2 Arabic academics considered problem-solving techniques more useful than support strategies.

Concerning the second research question, the existence of a significant relation between the overall MORS use and the ORC emphasizes that these strategies play an important role in helping EFL Indonesian readers achieve better comprehension while reading online. It was revealed in the previous study that EFL students who faced problems achieving reading comprehension were helped by these strategies (Karbalae Kamran, 2013). The present study also revealed that the correlation between the strategy use and the online reading comprehension was only found in students majoring in languages. In addition, compared to the students from social science and science majors, the students from the language major had higher mean scores both for the problem-solving strategy use and for the online reading comprehension. This finding can be interpreted that readers with a higher reading comprehension level tend to use problem-solving strategies and those with lower level tend to employ global and support strategies in their efforts to achieve reading objectives. This finding is supported by the finding of previous research that EFL students with lower reading comprehension prefer to use supporting strategies such as taking notes, rewording, and using reference tools. Meanwhile, students with higher reading comprehension prefer to use problem-solving strategies such as reading slowly, guessing unusual word or phrase meaning, visualizing understanding, and paying more attention to difficult texts (Tavakoli, 2014).

The analysis results of the third research question showed that a significant correlation was found between the global reading strategy use and the ORC and that the global strategies served as predictors of the ORC. This finding was most likely related to the function of the global strategies in the reading process that is to set the stages for reading activities. Global reading strategies such as having a goal in mind while reading, thinking about background knowledge, looking at the entire passage before reading, and using context clues were commonly used by the students to achieve general understanding of text comprehension. A global understanding of a text is believed to be the first step towards achieving a comprehensive understanding of the text (Karbalae Kamran, 2013). Another previous study also revealed that the higher students used global reading strategies, the more they improved their reading comprehension (Ramli et al., 2011). Regarding the support strategies that were not significantly related to the students' reading comprehension achievement, this was most likely caused by students who did not take advantage of these strategies. In fact, these strategies are very important to implement because they serve as a basic support mechanism to help students understand the text through the activities such as underlining important words, taking notes, and translating to L1 while reading (Mokhtari & Sheorey, 2002).

The findings of this study have three important pedagogical implications. First, all parties involved in EFL learning are encouraged to become more aware of the strategies and take advantage of them as they can lead to better achievement in reading comprehension. Second, the results of the study showed that the strategy use was correlated with reading comprehension level, indicating that students with higher reading comprehension scores tend to use problem-solving strategies to process online text compared to the other two strategy categories. In addition, it was noted that problem-solving strategies were most often used by students from the three majors. These results imply that although EFL students with higher online reading proficiency levels are more likely to benefit from implementing problem-solving strategies, students with lower reading comprehension will also be helped in their reading comprehension if they are aware

of the strategy use. The students' online reading comprehension can be improved through training on the problem-solving strategy use as these strategy categories serve as a mechanism to improve self-monitoring especially when reading challenging online texts. Proven to be more widely used by the students and effective in helping students read more difficult texts, problem-solving strategy instruction should be included in the official curriculum of EFL learning and textbooks. Third, problem-solving strategies will also be very useful if they are integrated into EFL teacher development programs because they will support the teachers in improving students' reading comprehension through intellectual development and conscious efforts to control their reading processes.

CONCLUSION

The study was carried out to explore the correlation between the metacognitive online reading strategy use and the online reading comprehension achievement of Indonesian EFL students majoring in languages, social sciences, and sciences. Regarding the first research question, it was found that the overall strategies were used at a high level by the students from the three majors. By category, the problem solving-strategies and support strategies were used highly, while the global strategies were used moderately. The problem solving strategies were used more often than the support strategies and the global strategies by the students from the three majors. The students' level of online reading comprehension was elementary. The analysis results of the second research question found a significant relation between the overall strategy use and the online reading comprehension, and between the problem-solving strategy use and the online reading comprehension of the students from the language major. Analysis of the third research question showed that the overall strategy uses and the global reading strategy use predicted the online reading comprehension of the students from the language major. Since the strategy use in this study was not based on classroom observations, the results should be interpreted with caution.

SUGGESTION FOR FURTHER RESEARCH

The results of this study suggest the need for further research on the interaction between the category use of the strategies (global, problem solving, and support) and the types of online texts. More specifically, research of this kind would answer the question of whether these strategy categories could be applied effectively according to students' reading comprehension levels and the text types they read. More broadly, further research needs to be done to address the question of whether the use of these strategies predicts other language skills such as listening comprehension or grammar knowledge.

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IMPACT OF CRITICAL THINKING INSTRUCTION THROUGH FLIPPED TEACHING ON IRANIAN EFL LEARNERS' LISTENING COMPREHENSION

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ABSTRACT

The present study investigated the effects of critical thinking instructions through a flipped teaching method on English Language learners' listening comprehension. The sample consisted of 80 Iranian intermediate English language learners that were divided into two experimental and two control groups. The two experimental groups that experienced flipped classrooms were given listening materials before the start of the class. Then cooperative learning took place in a face-to-face learning environment. The two control groups were taught in conventional language classrooms. Besides, one class from each group received instructions during the treatment phase on critical thinking. The International English Language Testing System (IELTS) was used to collect listening comprehension data on pretest and posttest. The Statistical Package for Social Sciences version 25 was used to run statistical analysis and t-tests on the data. The results of the study revealed that the flipped approach was more effective when language learners were given instructions on critical thinking. Language teachers can benefit from critical thinking instruction in flipped teaching to enhance the learners' listening comprehension ability by activating higher-order mental capacities such as critical thinking.

Keywords: Critical thinking, flipped teaching, Google Classroom, listening comprehension, non-critical thinking.

INTRODUCTION

Learning English is important as it is the most commonly spoken language. People all over the world study it in numerous different language learning settings. In most of these settings, learners play no or little role in the listening practices that are given. Listening has been considered a crucial skill to accelerate the development of language proficiency (Nunan, 2002).

Despite the many attempts that have been made to train language learners to become successful in the process of language learning, many EFL learners still struggle with listening comprehension (Ahmad, 2016). Listening is one of the most challenging skills for EFL learners due to the complexity of its process and the different types of knowledge needed for successful listening (Graham & Macaro, 2008). The learners' difficulties in listening comprehension can be attributed to the factors like the difficult nature of listening (Gonen, 2009), the speed of delivery of texts and the speaker's accent (Graham, 2006) as well as underestimating the vital role of this skill in language classrooms (Brownell, 2013). In Iranian educational settings, several studies have demonstrated the existence of learners' difficulties in listening comprehension (Manzuri, Shahraki, & Fatemi, 2016; Nowrouzi, Sim Tam, Zareian, & Nimehchisalem, 2015), this calls for an effective teaching methodology to help learners develop their listening comprehension.

In traditional classrooms, learners sit passively in the classroom and listen to their teachers. The problem is that the learners are so passive, and they are not actively engaged in the process of listening exercises due to their problems in listening comprehension. It seems that using technology or, in other words, a different way of methodology helps learners improve their listening comprehension. Rath (2014) points out that the accessibility of online content and advances in technology challenge the traditional notion of teaching and learning. Datig and Ruswick (2013) believe that the traditional lecture is becoming an old-fashioned style of teaching. Today most learners have easy access to the internet and they prefer to learn in a more active and collaborative environment (Vaughan, 2014).

In addition to an effective teaching methodology, developing learners' autonomy through creating a student-centred learning environment is one of the most important goals in education through which learners' critical thinking ability is promoted as well (Brown, Afflerbach, & Croninger, 2014). In this regard, critical thinking is highly emphasized in the current educational trend and different teaching techniques and methods (Paul, 2012; Tyson, 2015). Group activities, the use of conceptual diagrams, as well as reasoning and inferring, are suggested for the development of critical thinking (Marijic, 2016; Peralta, 2017).

The continuous access to technological devices and the world of the internet causes language learners' needs to no longer be met through course books. Likewise, Collins and Halverson (2009) believe that today's language learners are less patient with teachers' lectures. Similarly, it has been stated that the time for genuine educational reforms is now available through the widespread use of technology in many language classrooms across the world (Ahmadi, 2018). The introduction of the flipped teaching method and digital technologies has the potential to encourage and promote active learning, learner-centeredness, and critical thinking skills of language learners in EFL classrooms (Alsulami, 2016; Kong, 2014). Flipped teaching moves lectures outside the classroom and provides more interaction, engagement, participation, feedback, and different types of learning activities inside the classroom, which can help practicing listening comprehension. The flipped teaching model has the potential to address the problems of listening and the lack of critical thinking abilities by focusing on student-centred learning and by integrating technology in the classroom to support a hybrid or blended learning design (Boucher, Robertson, Wainner, & Sanders, 2013).

Iranian EFL situations in which language learners are not sufficiently exposed to the target language may lead to the learners' poor achievement of the English language. The flipped teaching method can help language learners have access to the target language outside of the classroom by watching educational videos that are created by their teachers or from other widely used sources such as YouTube. They will have access to material through PowerPoint slides that have been chosen and prepared by their teachers, listen to audios files or review papers related to the course that is being taught. Teachers can also benefit from in-class time to enhance students' thinking, encourage collaborative learning, and to provide different student-centred activities. Problems facing listening comprehension and lack of attention to critical thinking abilities in the Iranian EFL context have been inspiring enough for EFL researchers to investigate the impact of the flipped teaching method on listening comprehension and to examine the impact of critical thinking instructions in this setting in comparison to traditional teaching methods.

LITERATURE REVIEW

Flipped Teaching: Background and Contributions in ELT Research

A flipped classroom is an instructional strategy that reverses the traditional class. According to Pink (2010), the modern use of online videos, followed by face-to-face teaching, is often attributed to Jonathan Bergmann and Aaron Sams. The idea occurred to them when they were struggling to re-teach lessons to absent individuals (Fulton, 2012). They found that learners who had difficulties with certain homework concepts could not accomplish subsequent homework problems until they received help the next day in the classroom (Bull, Ferster, & Kjellstorm, 2012). The two teachers combined video demonstrations and real-time explanations, then put them on the internet. Their videos were highly welcomed by both learners who had missed the classes and those who needed to review the lessons. Since then, there has been growing interest in the flipped teaching method articles, and the press appears on this method almost daily.

The development of flipped pedagogy can be linked back to the shift from teacher-centred to learner-centred instructions (Hutchings & Quinney, 2015; Musallam, 2010). In a flipped classroom, teachers use different activity-based elements to create engaging and student-centred environments (Fink, 2003). This model provides learners with more control over their learning and provides them with the opportunity to take responsibility for their learning (Baker, 2000). The flipped classroom moves the students away from a teacher-centred learning setting to another environment where instructors are facilitators and organizers so that students come to class with a piece of basic knowledge about the content,, they can engage in interactive learning during class time (William & Wuensch, 2016). According to Brown (2012), this can be regarded as an adjustment period, because some students have relied so heavily on their teachers.

As to the teachers' role in a flipped classroom, the flipped classroom offers a role change for the teacher from a 'sage on the stage' to a 'guide on the side', which is a fundamental element of flipped approach (Baker, 2000). In flipped education, teachers transmit new knowledge before class time to guide learners through different active learning tasks (Hao, 2016; Morrison, 2014). As Bergmann and Sams (2012) state, teachers do not have to lecture for long hours while students passively listen and take notes. Thus, they can work with students more intensively, providing them with practical support, guiding them through the lessons, helping them apply what they have learned online previously, encouraging them to take part in collaborative activities and to think critically.

Concerning the learners' role, according to Van Veen (2013), students are active individuals who reconstruct knowledge from received information. Although teachers deliver the instructional content, the focus is on engaging and doing things with that knowledge instead of sitting passively and listening to someone else's presentation (Ouda & Ahmed, 2016). Berrett (2012) asserts that learners gather the knowledge outside of class, and then they apply what they have learned to new contexts during class. In the inverted classroom, students are provided with additional time to solve problems while having the teacher there as a guide. Therefore, teachers should remember that the most crucial element of the flipped classroom is to focus on the learners (Bergmann & Sams, 2012). Bergmann and Sams also stated that the flipped classroom is an environment where students are active learners. They take ownership of the content and use their knowledge to guide one another without the teacher's prompting; therefore, it is a constructivist environment. Students collaborate and discuss different content depending on their diverse interests and needs. Moreover, learners can ask exploratory questions and investigate beyond what is taught during the classroom. In this setting, peer instruction and cooperative learning are formed spontaneously.

Regarding the flipped teaching method and listening comprehension on which the current study focuses, Zeng (2016) states that there are some attributes of flipped classrooms that are in alignment with the requirements of English listening. First of all, in traditional settings, learners do the listening exercises in class and struggle to get the right answer. However, it is widely acknowledged that learners need opportunities to learn autonomously at their own pace. Secondly, a flipped classroom setting allows for the repeated use of listening materials. Learners have more time to do the listening practice, and they are exposed to a variety of materials. Thirdly, the pre-recording of materials in flipped education can help students with different competence levels. In a traditional classroom, all learners listen to the same materials at the same time, while individual differences are neglected.

Empirical Research on Flipped Teaching

Flipped teaching has been the focus of attention by second or foreign language scholars. Berrett (2012) compared the flipping model with the traditional lecture. The evidence shows that the flipped teaching-teaching model can be applied in EFL contexts to increase the interaction between teachers and students, to develop students' responsibility, to increase motivation for learning, and to enhance self-reliance.

Zainuddin and Halili (2016) investigated a variety of research and trends in flipped teaching. They concluded that the flipped learning model is used in many fields and it has positive impacts on different aspects of students' learning, including interaction, motivation, engagement, as well as their achievement. Another study conducted by Şengel (2016) proved that learners' progress in the form of homework performance, and the amount of time spent on work before class was significantly higher in the flipped classroom compared to the traditional classroom-based learning setting.

Several research studies examined the impacts of the flipped classroom on learners' English language skills, including listening skill (Ahmad, 2016), writing skills (Yu & Wang, 2016), and grammar (Al-Harbi & Alshumaimeiri, 2016). Soliman (2016) examined the impact of flipped teaching on English for Academic Purposes (EAP) teaching. They observed the efficiency of the flipped teaching method in the EAP class. In another study, Al-Harbi and Alshumaimeri (2016) explored the possible effects of the flipped classroom in teaching English grammar on secondary school students' performance. The results indicated that flipped teaching could enhance learners' grammar performance; besides, students had a positive attitude toward using the flipped strategy. A research conducted by Alsowat (2016) looked into the impact of an EFL flipped teaching model on students' higher-order thinking skills, engagement, and satisfaction. The results revealed the positive effects of using flipped classrooms in acquiring those skills.

One of the features of the flipped classroom that can justify its effectiveness in improving listening comprehension skills is the active learning feature. Literature proved that the use of videos improved listening comprehension skill (Sarani, Behtash, & Arani, 2014; Wagner, 2010). The study conducted by Ahmad (2016) aimed at examining the effectiveness of the flipped teaching method on EFL learners' listening comprehension. Thirty-four 3rd-year EFL students were involved in this study. The result indicated that the flipped classroom could significantly affect the students' listening comprehension.

Samah and Saka (2016) also examined the effectiveness of the flipped classroom model on EFL learners' listening comprehension. Twenty-five university students were involved in this study as an experimental group who participated in the pre/post-listening comprehension test. After the administration of the pre-test, students were taught listening through the flipped teaching technique. The statistical analysis indicated an improvement in the learners' level of listening comprehension.

Similar to the learners' listening comprehension, their reading comprehension was also affected by the flipped model of instruction in the study conducted by Karimi and Hamzavi (2017). The researchers applied flipped teaching in reading comprehension classrooms by providing instructional videos for the learners before their presence in the classroom. The pre- and post-tests of reading comprehension revealed that the flipped model resulted in the EFL learners' improvement in reading comprehension. Moreover, data from the questionnaire indicated the EFL learners' positive attitudes on using flipped teaching. It was concluded, "EFL teachers can develop new and customized ways to improve the flipped model effectiveness in their teaching environments and they can modify it based on their students' needs and interests" (p. 101).

There are also numerous studies regarding the effect of flipped teaching on critical thinking skill. Alsowat (2016) demonstrates the positive effect of flipped education on critical thinking skills. Similarly, Kong (2014) states that flipped teaching is useful in the growth of domain knowledge and critical thinking. In a different study (Kong, 2015) investigated the outcome of critical thinking achievement of students with subjects being taught through flipped teaching, the results indicated that learners' overall competence in critical thinking skills improved significantly.

Nurmasita (2018) investigated the integration of flipped classrooms for increasing student participation in English for specific purposes class for students of engineering. She taught that the students needed to know English to be highly qualified in their field. In her study, she used the flipped classroom as an aid for the learning-teaching process to turn learners into active participants of learning. To do so, she tried to

apply technology in a flipped classroom instead of a conventional classroom. In the study, she used an interview and questionnaire sheet to collect data, and the results of her study showed that students had active participation in the class. They actively joined the discussion between lecturer-students, students-lecturer, and students-students. The outcome of the interview and questionnaire indicated that the students enjoyed the use of flipped classroom method in ESP class since they had more chance to practice their English in peer discussion with the teacher as a facilitator.

In another research by Sarpparaje, Rathiga, and Sasirekha (2018), they investigated the flipped classroom as an approach to utilize the ESL classes for ESL students. They stated that a flipped classroom had been highlighted as an emerging technology for higher education. The Flipped Classroom Approach is chosen to be the thrust area of their study as it has the prospective to prove that how the creation of a piece of communication goes beyond traditional features such as merely learning the grammar and syntax in ESL classes. They investigated two groups of control and experimental, and the results of their study revealed that students had a preference over this Flipped Classroom Approach and that this approach proved to contribute a lot to their communicative experience.

In summary, the literature above clearly denotes that flipped teaching is a learner-centred instructional model in which learners are required to invest in their learning by reviewing and processing information before attending class and applying it through active participation in the classroom. In this setting, the teacher can spend more time interacting with students instead of lecturing (Bergman & Sams, 2012). According to Kong (2014), learners would be expected to think for themselves and find ways for solving problems as well as producing knowledge rather than reproducing it. Flipped teaching uses the concept of active students engaged in learning. The lack of research concerning applying critical thinking in the flipped classroom, particularly in the EFL context, such as Iran, demands the role of using technology in flipped teaching in critical thinking instruction to enhance learners' listening comprehension. In the present study, the focus is on comparing the impact of flipped teaching via Google Classroom based on critical thinking instruction on the listening comprehension of Iranian EFL learners at an intermediate level. Therefore, the following research questions are addressed:

1. Does critical thinking instruction through flipped teaching (via Google Classroom) have any significant impact on Iranian EFL learners' listening comprehension?
2. Is there any significant difference between the effects of flipped teaching with and without critical thinking instruction on Iranian EFL learners' listening comprehension?

METHOD

Design

Following a pretest-posttest Quasi-Experimental Design, the current study investigated the effects of critical thinking instruction through flipped teaching on language learners' listening comprehension. The flipped classroom and instruction on critical thinking were the independent variables, and the learners' listening comprehension was the dependent variable. To establish the internal and external validity of the research, extraneous variables that could affect the learners' listening comprehension test scores were controlled. For instance, environmental clues like the researcher's non-verbal behavior and situational variables such as noise, temperature, and lighting were considered carefully in both flipped and traditional classes. The participants were pretested on listening comprehension before the intervention of the treatment, and then a posttest was given at the end of the study. Differences between the pretest and the posttest data were then analyzed.

Participants

The participants were 80 intermediate female EFL learners from the Training Department of the National Iranian Oil Company (NIOC) in Masjid Suleiman, Iran. They were selected from among 200 female language learners who attended the 2018 summer semester foreign language learning program. Due to the gender constraint in the department, only the female employees were selected for the study based on convenience sampling. Moreover, the inclusion criteria was based on the Quick Placement Test (QPT), and 80 learners

whose score fell within the range of 37-47 were considered to be at the intermediate level based on QPT test direction and were selected as the main sample for the present study. The subjects were all Persian native speakers within the age range of 19 to 29 years old. The participants of the study were divided into two experimental and two control groups, with 20 participants in each group. Before the study, the learners were surveyed to see if they had been in a flipped teaching class before. It was found that none of the participants had been.

Furthermore, the teacher gave the learners a general overview of the study, including the main purpose of conducting such a survey. Finally, to avoid the experimenter's expectancy and bias, the researcher checked the collected data and the results of the statistical analyses carefully and avoided interpreting the data during the study. Moreover, a colleague who was an expert in the field was invited to read the final report and provide the researcher with critical feedback on the research findings.

Instruments and Instructional Materials

The explanations of the instruments and materials are provided below:

Quick Placement Test (QPT)

Since based on a determined level of language proficiency, for the selected sample, only intermediate level learners were included. The paper and pencil version of the Quick Placement Test (Syndicate, 2001) was used to determine this. The test took approximately 30 minutes to be completed. The participants answered three parts that included items related to structure, vocabulary, and reading comprehension in the form of multiple-choice items with a maximum possible score of (60) points. According to Berthold (2011), QPT has been widely utilized as a placement test by second/foreign language researchers and has an acceptable reliability coefficient. Geranpaye (2003) also states that the test includes items, which have gone through Cambridge ESOL quality control procedures. The reliability coefficient of the QPT was estimated through the Cronbach's Alpha test, and it came to ($\alpha = .79$).

The Pretest and Posttest of Listening

Two IELTS listening tests that included 40 items, taken from the listening section of the Cambridge IELTS Practice Test (Cambridge University, 2005), were used in this study. The IELTS test is an international standardized test that is a highly effective instrument and a reliable means of grading learners at all levels from lower intermediate upwards, with a consistent record of predictive validity in the light of examination entry. Two distinct listening tests were selected to minimize the possible memory factor due to the nature of the data collection procedure of the study. The level of difficulty of the test increased through the sections. It included both lecture formats as well as a formal and informal conversational style.

It took approximately 30 minutes for the participants to complete the pretest and posttests of the listening exam, and they were given an extra 10 minutes to transfer the answers to the answer sheet. Different types of questions were classified into four sections, including two dialogues and two monologues that measured the participants' listening for specific information as well as their listening for the main ideas and supporting information. In both tests, the first section was a conversation between two people set in an everyday social context. The second section was a monologue set in an everyday social context. The third section was a conversation set in an educational or training context, and the fourth section was a monologue on an academic subject. The participants were told that they could hear each section once only. Some listening skills were examined, including grasping the main ideas, understanding specific information, identifying opinions and attitudes, recognizing the purpose of the speaker, and following the development of an argument. Each correct answer received one point. The scores achieved out of 40 were then converted to the IELTS 9-band scale. The reliability indices of the pretest and posttest were checked through computing Cronbach's Alpha that is based on an analysis of variance (See Table 1).

Table 2 showed that the reliability coefficients for the pretest and posttest of listening comprehension were .71 and .74, respectively, which were both higher than the minimum possible amount required that is .70, demonstrating an acceptable reliability value (Farhady, Jafarpour, & Birjandi, 1994).

Google Classroom

In google classrooms, the participants of the study received the instruction on listening skills through handouts, brochures, PowerPoint presentations, and online videos. They also listened to the audio files in their preferred time and need, and then they were required to answer some questions that examined their listening comprehension before they attended the class. During the class, the participants were encouraged to ask and answer questions about the content. They were engaged in learning activities where they practised what they had learned before class. The teacher taught the lesson out of the class time, guided the learners to do their homework in class collaboratively, and encouraged them to have lots of interaction with their peers. However, for the first experimental group, the focus was also on teaching how to think critically and improving their listening comprehension through the flipped classroom. The learners in this group were required to process information from different sources that were available through a flipped classroom method and then critically process the information to construct knowledge. The purpose was to help learners develop and apply critical thinking skills in daily learning. To this end, they were encouraged to integrate different elements of critical thinking skills into their learning process in a flipped classroom settings.

Data Collection Procedure

Initially, a quick placement test was administered to 200 EFL learners, of which 80 intermediate EFL learners were selected based on the QPT test direction. They were then randomly divided into two experimental and two control groups. Subsequently, the four groups' listening comprehension was pretested with the IELTS listening proficiency test (Cambridge IELTS, 2005) to assess their entry performance. The two experimental groups received training using a flipped teaching method through a Google Classroom setting, while the two control groups received listening training in traditional classes. The study was carried out for 16 sessions during the summer semester in 2018.

The classes for the experimental groups were equipped with laptop and video projection, where the teacher went on the internet to show the participants how to reach the Google Classroom platform. The participants downloaded the materials three nights before each session, and they watched the videos at home very carefully. The learners were required to take notes, record their questions, and summarize their learning before class. There were some textually elicited questions that were raised by the teacher, and the participants were required to answer them based on the video materials they had received to perform classroom activities. The teacher also asked them some related questions at the beginning of the class to ensure that the participants had watched the learning materials beforehand. However, in the control groups, where the teaching method was traditional classroom-based learning, the learners were not required to do any specific kind of activity before the listening class except for some traditional preparation.

In both experimental groups, listening comprehension was taught according to American English File 1 (second edition) using flipped teaching strategies like problem-solving activities and group work, followed by the teacher's feedback. The flipped teaching consisted of four main sections, including pre-lesson learning through which the learners viewed lesson goals, downloaded worksheets, and completed them after group discussions. However, simply for the first experimental group, the worksheets had been developed in a way that included some questions to help students go through the five essential components of the critical thinking process (i.e., hypotheses identification, making inductive and deductive thinking, and conclusion explanation and evaluation). The next typical section for the two experimental groups was the lesson learning, in which the learners read the learning materials provided to them. The instructional materials comprised of recordings of the short stories, monologues, and dialogues selected from the net for the intermediate language learners. These recordings were sent to the experimental groups before they attended the class; the same material was played in the classroom for the control groups. The primary instructional materials included listening passages accompanied with related audio CD's that were selected from the book 'American English files' series. In the third phase of the flipped teaching that was post-lesson learning, the learners completed self-reflection, and finally, for the fourth section, the learners discussed what they had learned in-groups. The learners were encouraged to engage in concepts by participating in group-work activities with the teacher's guidance. Therefore, in the two experimental groups, language learners were encouraged to cooperate with their classmates in the lessons and solve problems through creating a cooperative environment by the teacher during the class.

For the participants in the first experimental group, the teacher used exercises to develop the participants' critical thinking. For this group, five major views of critical thinking skills, namely, hypothesis identification, induction, deduction, explanation, and evaluation, were worked on when giving instructions were given on listening skills in a flipped classroom setting. These learners were asked to answer different types of listening comprehension questions that enhanced their critical thinking. For instance, they were sometimes required to select a sentence that showed the acceptable hypothesis behind the given statement in the listening passage or sometimes were asked to select a sentence that showed the correct inference that could be derived from the given scenario in the listening passage. Moreover, these language learners selected a sentence that represented the proper conclusion for the given statements in the listening passage. Also, some questions asked them to select a sentence that showed the valid reason behind the given scenario in the audio file. Finally,, they were asked to evaluate their reasoning and examine its validity.

The selected book for the control groups was also American English File1 (second edition). The class was the teacher-centered. The teacher used the traditional way of teaching listening comprehension in which the teacher played the recordings, and the participants listened to them, then they answered the related questions. The teacher used some visual aids like slides or videos in class, and the learners completed the assignments at home. During class time, the teacher verbalized information in a controlled environment, and the learners simply practised note taking. Most of the teaching took place in the classroom with the physical presence of the teacher and learners in the class. The teacher began the class by doing some warm-up activities, and then a review of the previous session was given. Next, the new materials were taught through face-to-face interaction between the teacher and the learners, and finally, the teacher guided them to do the exercises at home.

The post-tests of listening comprehension were run at the end of the study to examine the effect of flipped teaching on learners' listening comprehension.

The researcher asked for the participants' permission to make use of the results of their IELTS tests for the study, and all the learners were asked to complete a consent form. Learners were guaranteed that their test performance would remain confidential. To ensure confidentiality, the participants' test results were not shared with NIOC teachers or administrators for the duration of the study.

Data Analysis Procedure

Descriptive and inferential measures were conducted to address the research questions. The learners' changes in their mean listening comprehension test scores were descriptively reported. However, inferential statistics gathered by running independent samples t-tests were used to investigate the differences between the experimental and control groups as well as the two experimental groups separately. It is worth mentioning that the assumption of normality was checked through computing Skewness and Kurtosis values. Since these values were within the range of +1.99, the assumption of normality was established.

FINDINGS

The results of the study are provided below, taking into account the two research questions of the study.

The First Research Question

To address the first research question, comparisons were made between the language learners who attended flipped classes with critical and without critical thinking and those who were in traditional classes in terms of their listening comprehension test scores. Group statistics for the pre- and post-test scores of listening comprehension are given in Table 1.

Table 1. Group Statistics for the Listening Tests

	Class	N	Mean	Std. Deviation	Std. Error Mean
pre	Flipped class	40	3.7913	.38683	.06116
	Traditional class	40	3.7688	.94331	.14915
	Mean difference = .022				
post	Flipped class	40	5.0119	.63228	.09997
	Traditional class	40	3.7969	.94803	.14990
	Mean difference = 1.215				

As Table 3 shows, for the listening pre-test, the mean scores for the flipped class and the traditional groups were 3.79 and 3.76, respectively, which were very close to each other. The mean scores for the post-test of flipped class and the traditional groups were 5.01 and 3.79, respectively, showing a large difference between the groups. While in the pre-test of listening comprehension the mean difference between the flipped class and the traditional class was .022, the differences between the flipped group and the traditional group in post-test of listening comprehension amounted to 1.215, which descriptively denotes the outperformance of the experimental groups over the control ones' listening comprehension. T-tests were run on the independent samples pre- and post-tests listening comprehension results for both groups to make a comparison between the groups in terms of their performance on the listening test and to see if these differences were statistically significant. The results are shown in Table 2.

Table 2. Independent Samples T-Test for the Listening Tests of Flipped Group versus Traditional Group

		Levene's Test for Equality of Variance		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	95% Confidence Interval of the Difference	
							Lower	Upper
pretest	Equal variances assumed	31.41	.000	.140	78	.889	-.298	.343
	Equal variances not assumed			.140	51.75	.890	-.301	.346
posttest	Equal variances assumed	8.93	.004	6.74	78	.000	.856	1.573
	Equal variances not assumed			6.74	67.96	.000	.855	1.574

Table 4 shows that although the two groups' performance in the pre-test of listening comprehension was almost identical, the results revealed that flipped classes affected the listening comprehension of the two groups differently in the post-test data (pretest=.140, $P > .05$; t posttest=6.74, $P < .05$). According to the results, the learners who experienced a flipped teaching method (via Google Classroom) significantly performed better than the traditional group in the post-test of listening comprehension.

Second Research Question

The second research question looked at the differences between the two flipped classes (with and without critical thinking treatment) in terms of the participants' listening comprehension test scores. Group statistics for the pre- and post-test scores of listening comprehension for the two flipped classes are given in Table 4.

Table 3. Group Statistics for the Listening Tests of Flipped Classes

	Treatment	N	Mean	Std. Deviation	Std. Error Mean
pre	critical thinking based	20	3.9035	.42171	.09430
	Non-critical thinking based	20	3.6790	.32061	.07169
	Mean difference		.23		
post	critical thinking based	20	5.4000	.43800	.09794
	Non-critical thinking based	20	4.6237	.55822	.12482
	Mean difference		.77		

For the first administration of listening test, the mean scores for the flipped classes with critical thinking based instruction and the flipped class without critical thinking based instruction were (M Flipped with critical thinking (pretest) = 3.90; SD= .42) and (M flipped without critical thinking (pretest) = 3.67; SD= .32), respectively. In other words, the results obtained for the pre-test scores were close to each other. For the second administration of the listening test, the mean scores for the two experimental groups were somehow different (M Flipped with critical thinking (posttest) = 5.40; SD= .43) and (M flipped without critical thinking (posttest) = 4.62; SD= .55). In other words, the students in the flipped classes with critical thinking-based instruction had a higher mean score. The mean difference between the two flipped groups in the pre-test of listening comprehension was (mean difference= .22). However, the differences in posttest listening comprehension amounted to (mean difference= .77). T-tests were run on the independent samples pre- and post-test of listening comprehension results for both flipped groups to check if the differences between the two flipped classes were statistically significant. The results are shown in Table 4.

Table 4. Independent Samples T-Test for the Listening Tests of Flipped Classes

		Levene's Test for Equality of Variance		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	95% Confidence Interval of the Difference	
							Lower	Upper
pretest	Equal variances assumed	.89	.350	1.89	38	.066	-.015	.464
	Equal variances not assumed			1.89	35.46	.066	-.015	.464
posttest	Equal variances assumed	2.44	.126	4.89	38	.000	.455	1.097
	Equal variances not assumed			4.89	35.96	.000	.454	1.098

As can be seen in Table 6, although the two groups performed similarly in the pre-test of listening comprehension, the results of the t-tests revealed that critical thinking based instructions in flipped classes were more effective in developing the language learners' listening comprehension as opposed to non-critical thinking. The two groups performed differently in the post-test ($t_{\text{pretest}} = 1.89$, $P > .05$; $t_{\text{posttest}} = 4.89$, $P < .05$). According to the results, in the post-test of listening comprehension, the flipped group who enjoyed critical thinking-based treatment significantly performed better than the flipped group that had non-critical thinking-based instruction.

The results showed that providing critical thinking instructions through a flipped class setting was beneficial, and improved EFL learners' listening comprehension. Furthermore, there were statistically significant differences between critical thinking through flipped teaching and without critical thinking through flipped teaching on Iranian EFL learners' listening comprehension, indicating as to why the group that received critical instructions outperformed those who had not in the second experimental group.

DISCUSSION

The present study was an attempt to investigate the effects of the development of EFL learners' critical thinking through flipped teaching on their listening comprehension ability. The differences between the experimental and control groups were also examined.

The quantitative analysis of the pre-test and post-test of listening scores revealed that flipped teaching had been advantageous in enhancing the learners' listening comprehension compared with the traditional classes. These conclusions are in line with the findings of studies conducted by Freeman, Eddy, McDonough, Smith, Okoroafor, Jordt, Wenderoth (2014), who showed that student performance is enhanced when active learning components like flipped classes are employed. Additionally, the findings are similar to those reported by McGivney-Burelle and Xue (2013), who found that students in flipped classrooms have better opportunities to be involved in purposeful activities. The positive effect of flipped teaching might be due to the nature of a flipped classroom setting in which there are more interactions between the teacher and the language learners, and teachers can provide learners with immediate feedback. It can be argued that flipped classrooms can help learners reflect upon their learning behaviours since they are engaged in the learning environment, leading to being more consciously involved in the target language tasks (Alsowat, 2016; Kong, 2014). Fulton (2012) also emphasizes the role of flipped teaching in providing a thought-provoking learning setting for learners to be more creative in carrying out the learning tasks. Musallam (2010) supports flipped teaching and argues that flipped teaching provides language learners with a ,productive learning environment in which they can freely take part in a cooperative learning setting.

Besides, the results also revealed that critical thinking instructions through flipped teaching could significantly develop the learners' listening comprehension ability. It was found that in a technology-mediated learning environment where a Google Classroom was implemented in a flipped teaching setting, learners were able to develop their inferencing, interpreting, and argumentative skills and were found to be more engaged in the learning environment. This might be related to the fact that the learners in the first experimental group who practised remembering and understanding outside the class. At the same time, they focused on applying, analyzing, evaluating, and creating in the classroom had sufficient time to solve problems individually and collaboratively. Moreover, the teachers in the first experimental group had adequate amount of time to help language learners think and develop group-sharing activities among themselves. The Findings of the study are in alignment with research studies conducted by Bergmann and Sams (2012) and Musallam (2010) who argued that a flipped learning environment could provide sufficient assistance for the learners to be reflective and think as critically as possible in doing the target tasks in the classroom. Alsowat (2016) also acknowledged the role of flipped teaching in paving the way for learners to develop their critical thinking ability. As to the findings of the present study, critical thinking instruction in the flipped classroom led to encouraging the learners to analyze, interpret, and infer their working on the listening tasks, which is in agreement with research studies done by Sarani et al., (2014). When learners are given directions and values to play the role of a critic in a flipped classroom setting, it is expected that they become more autonomous in their learning experience (Wagner, 2010). Also, the students in the flipped classroom were able to self-regulate their learning environment and be critical thinkers while doing the listening tasks (Kong, 2015). It also seemed that stimulating the learners' critical thinking ability boosted the learners' active learning (Tyson, 2015) in the listening classroom (Samah & Saka, 2016), enabling them to enjoy the interactive learning atmosphere caused by flipped classroom simultaneously.

On the other hand, the language learners in the first control group who received instructions on critical thinking through traditional classes did not improve their listening comprehension as much as the participants in the first experimental group who practiced critical thinking instructions in a flipped classroom did. In this respect, Berrett (2012) argues that traditional classroom-based learning appears to reduce the learning opportunities since the teacher cannot apply the entire capacity of teaching. Language learners who simply attended lecture-based traditional classes had fewer chances to receive their teacher's immediate and meaningful feedback as compared to the students in the flipped classrooms. They were rarely encouraged to engage in class activities due to the shortage of time. Besides, they also had limited interactions with their peers. These findings are in line with the results of Bergmann & Sams (2012) who reported that implementing flipped teaching provides an interactive learning atmosphere for learners to get in touch with their peers more eagerly through video and on-line technology.

Concerning the pedagogical benefits of flipped teaching, Kong (2015) believed that flipped teaching could provide a supportive learning environment for the learners to have more cooperation with their peers while being able to foster their critical thinking abilities by taking part in challenging tasks. Using a variety of tasks as well as involving the learners in classroom activities can be convincing enough to defend the pedagogical effect of flipped teaching on the learners' performance.

CONCLUSION

The current study investigated the effects of critical thinking instructions through flipped teaching on Iranian EFL learners' listening comprehension. The results of descriptive and inferential measures were very positive. In favour of flipped teaching, they demonstrated that flipped teaching on its own could have a significant impact on the learners' listening comprehension. Moreover, by comparing the two experimental groups, it was found that critical thinking instructions through flipped teaching significantly resulted in the learners' improved listening comprehension.

The results of the study revealed that although some of the language learners resisted the integration of flipped classrooms into the language learning environments, flipped teaching could be a reliable teaching methodology for teachers to add more variety in their teaching to encourage self-regulated learning. While conducting the present study, it was noticed that running language courses based on a flipped model was highly challenging as it required more time and was financially more expensive, as language learners needed to have technological support. However, the results show that there were benefits for student learning and maintained student engagement and encouraged students to take ownership of their learning. It could be concluded that language learners improved higher-order of thinking was attributed to the active technology-based learning environment created as a result of implementing a flipped classroom setting that brought a different style of teaching listening comprehension. Therefore, the flipped classroom can be considered as an alternative to a traditional class in which the learners are required to do the mandatory tasks and be the classical learners who are listening to the teacher while taking notes (William & Wuensch, 2016). However, the flipped classroom can bring about the learners' liveliness in doing the expected tasks more cooperatively since the teacher plays the role of a facilitator who monitors the classroom interaction to keep students more engaged in the classroom and encouraging them to take ownership of their learning environment (Morrison, 2014; Van Veen, 2013).

The learners in the flipped classroom have the chance to challenge the tasks, share their proposed doubts with the class, and then interpret their findings in collaboration with their peers (Musallam, 2010). Therefore, flipped teaching enhances learning opportunities, and the learners' critical thinking will be developed through challenging classroom interactions. Independent learning will be encouraged since the teacher's concern is directed toward training autonomous learners through active involvement in the classroom is a critical fashion. In the flipped learning environment, the learners are allowed to evaluate, analyze, and interpret the provided tasks while being armed with the teacher's facilitative feedback, aiming to trigger more participation in the classroom by taking advantage of class time in the best way (Brown, 2012). It is suggested that language teachers implement flipped classrooms so that they can play their facilitative role by utilizing differentiated learning approach to guide the learners to get mastery over the content themselves and to clarify the exciting misconceptions collaboratively.

Overall, many studies have investigated different features of EFL flipped classrooms. However, there are still some aspects of flipped teaching that require further investigation. Future studies can examine the possible effects of the flipped classroom approach on EFL learners' critical thinking concerning other skills such as speaking or writing or monitor the effectiveness of flipped teaching for vocabulary instruction. The flipped classroom provides the learners with an excellent opportunity to think reflectively and make decisions on selecting appropriate information for learning.

Limitations of the Study

The main limitation of this research is that the study was designed for female intermediate learners, which means that the results from this study cannot be extrapolated to other contexts, including male learners at different levels. Guaranteeing that all the participants were technologically educated was another limitation

of the study since it was impossible and out of the researchers' control to check the participants' knowledge of using technology. Finally, inaccessibility to native English teachers can be considered as a limitation of the present study, as applying native teachers in an EFL setting can affect the learners' performance.

Thus further research can be done with the participation of a larger sample to meet the issue of generalizability in using flipped teaching in teaching language skills. Furthermore, it is recommended to do an investigation of the impact of flipped teaching on other skills such as writing, reading, and speaking. Prospective researchers are advised to take into account various technological devices, software programs, and mobile apps to provide a more facilitative learning environment through flipped teaching. More significantly, because running flipped teaching might be of a challenge for EFL teachers, further researches can be conducted to provide teachers with training to raise their awareness of flipped instruction and then analyzes their expertise in practice.

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BOOK REVIEW

LEARNING IN THE DIGITAL AGE

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LEARNING IN THE DIGITAL AGE

Tataleni I. Asino, PhD



INTRODUCTION

The main focus of this book is to indicate the supportive role of technology in learning practices and processes. Its intended audience is anyone interested in the nature of learning in the digital age. The book aims at building an understanding of digital learning by emphasizing the role of the learners, and it contributes to Open Educational Resources (OER).

To explain the issues mentioned above, the book covers 12 chapters whose topics are varied from games, blended learning, podcasting, proctoring, personal learning networks, digital divide, digital learning at work, digital literacy and skill, playful approaches, finance and a Resources part.

REVIEW OF THE BOOK

Chapter 1, “Board Games and Learning: Why Care in the Digital Age?” By Rebecca Bayeck, particularly highlights the trendy rise of board games and the association between board games and digital learning. Upon presenting a short description of the board games, some types of board games are mentioned and the difference between board games and video games are stated. The Western World board games and the traditional African board games are compared to some extent. Furthermore, the studies which show that board games promote critical and strategic thinking as well as decision making and collaborative skills are presented. Concisely, the idea that board game play, which is integrated into technology, strengthens the learning and practicing which has an important part in everyday life in the digital era is emphasized.

Chapter 2, “Effective Instruction in Blended Learning Environments” by Corrine McCabe and Raymond W. Francis, specifically focuses on blended learning. The authors define what blended or hybrid learning is and they explain the benefits of blended learning, especially in K-12 teaching environments by putting forward specific reasons and purposes. The Chapter introduces and 5 common models of blended learning: Rotation Model, Flipped Classroom, Flex Model, A La Carte Model, Enriched Virtual Model. It provides explanations of the critical factors that must be taken into consideration while designing a blended learning environment such as establishment of a learning community and culture, learner engagement and motivation, content and organization of the lessons, assessment tools for feedback and essential communication in learning process. Personalized learning is also highlighted. Based on the blended learning and its benefits, the authors also address the chief principles of Universal Design for Learning (UDL).

Chapter 3, “Podcasting As a Mode of Motivation in Online and Blended Learning” by Sarah Lewis and Raymond W. Francis, is about integration of podcasts and vodcasts into online learning. The chapter displays theories of motivation and terms connected to online learning. The authors mention ways of using podcasts as an accessible form of technology which can be used out of class and how to benefit from them pedagogically as supplementary materials. The chapter also mentions some experiences of using iTunes U and podcasts in the lectures.

In Chapter 4, “Virtual Proctoring and Academic Integrity” by Tammi Kolski, it is stated that exam proctoring is common in digital learning environments as well as in classrooms. The author observes that as the usage of online learning means increases, the question how to provide exam proctoring during the digital processes in accordance with academic integrity principles. Based on this observation, the author defines the virtual proctoring and a virtual proctoring tool like LMS features and explains human proctoring and virtual proctoring. Moreover, the author mentions her own experiences with cheating violations and emphasizes the requirement of an academic integrity in the university culture to make the students gain academic honesty.

Chapter 5, “Personal Learning Networks: Defining and Building a PLN” by Cathy L. Green, includes the definition of Personal Learning Networks (PLN) and explanations about their types and features. The chapter focuses on the benefits of PLN as a part of lifelong learning process. Also, the author exemplifies PLN tools and guides how to set up them.

Chapter 6, “Digital Learners in the Workplace” by Tammy Wise, in this chapter, the author expresses that digital learning of the employees is time and money-saving for the companies when it is compared to traditional training practices. It is also mentioned that MOOCs are very convenient as well as a variety of digital platforms for various types of learners according to their needs and age ranges. The overall advantages of digital learning and the problems faced during digital learning process and how to handle these problems are explained by the author.

In Chapter 7, “Digital Literacies and the Skills of the Digital Age” by Cathy L. Green, the concept of digital literacy is scrutinized with respect to its origin, its relationship with language literacy; and the place and importance of the digital literacy are covered in detail. The author also reveals the available frameworks for digital literacies by providing some activities and resources.

Chapter 8, “Playful Approaches to Learning” by Kathhy Essmiller, In this chapter, play is defined and compared to work. It is generally based on the idea that facilitating play in digital classroom can strengthen the learning in terms of creative skills. Also what skills integrating attitudes of play into digital learning environments develop are explained.

Chapter 9, “The Digital Divide” by Wilmon Brown, the chapter 9 thoroughly explains what digital divide is and the factors influencing the expansion of digital divide. The author mentions the history of digital divide throughout the US and then presents several researches carried out and their results and some projects conducted to reduce the extent of digital divide.

Chapter 10, “Ignored Conversations: Higher education funding in the digital age” by Josephine Shikongon, the chapter deals with the issue of access to learning in digital are. Specifically, the author emphasizes the financial problems and their serious influence in learning rates in Namibia higher education. In the chapter, Namibian history and political atmosphere and stemming point of fees must fall movement are mentioned as well. It also presents the arguments revealed as a result of some studies conducted, and implications for future research.

Chapter 11, “Literacy in the Digital Age: From Traditional to Digital to Mobile Digital Literacies” by Tataleni I. Asino, Kushal Jha and Oluwafikayo Adewumi, the chapter embraces the concept of digital literacy. Specifically, the authors explain the literacy and digital literacy terms thoroughly in an expanded definition, and the features of digital literacies from past to now.

Chapter 12, “The Digital Divide and the lack Financial Literacy among First Generation” by Jose “Jay” Fulgencio, in this chapter, the author specifically focuses on financial literacy skills. To support the ideas, the researches comparing the cases of financially-literate and financially non-literate groups are mentioned. The author also proposes practical solutions for the issue.

Resources, in this part, some extra readings on learning in the digital age, and video links are shared.

CONCLUSION

This book is designed to serve as a textbook for classrooms exploring the nature of learning in the digital age. Therefore, it was created to contribute to Open Educational Resources. When discussing learning in the digital age, most focus on technology first. However, the emphasis in this book is that the subject is not just about technology, but about the learner. It can be said that the most important factor that needs attention and direction in learning in the digital age is the learner. Technology is important and has a significant impact, but it should still be remembered that effective learning is about the person using the technology. Many people associate learning in the digital age with technology in today's age. This important misconception is common and stems from our lack of knowledge of what “learning” really is. Some argue that learning is about a change in behavior due to experience, while others argue that learning is simply being able to do something new that you could not do before. Recently, it is said that learning is the ability to access and classify information. Whichever side you choose, it is necessary to understand what learning is in order to understand what learning is in the digital age. In addition, it is thought that technology should be seen as a tool, not an end, in learning in the digital age.

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