About the Journal

Journal of Educational Technology and Online Learning (JETOL) is an open-access, double-blind-peer reviewed academic educational technology and online learning journal. The Journal targets researchers, practitioners and policy-makers of educational technology and online distance learning fields. JETOL is available free-of-charge to anyone with access to the internet, and there are no article submission or access charges for publication. JETOL has been published triannually since 2018 and is released on the last days of January, May, and September.

JETOL is currently indexed by ERIC - Education Resources Information Center, ProQuest, Google Scholar, J-Gate, BASE - Bielefeld Academic Search Engine, ResearchBIB - Academic Resource Index, ROAD - Directory of Open Access Scholarly Resources, Asos Index. The following names constitute the editorial board.

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From the Editors

Dear JETOL readers,

We are proud to announce that Volume 4 Issue 3 has been published with 12 articles. After being indexed in Education Resources Information Center (ERIC), which is an important database with international recognition sponsored by the Institute of Education Sciences (IES) of the U.S. Department of Education, there has been a significant increase in the number of articles submitted to our journal. At this point, we are happy to present you with more quality studies with the meticulous work of our referees.

With the spread of vaccines, the effects of the Covid-19 pandemic have begun to diminish, and face-to-face classes have started intensively again these days. At the K12 level, all classes have begun face-to-face classes as they did before the pandemic, and universities have planned some remote and some face-to-face classes. As life returns to normal, we witness that distance education become an indispensable part of our lives. We are witnessing that distance education applications, especially at higher education level, have become much more widespread than before the pandemic. At this point, we think it is very crucial to study the distance education technologies and techniques, which have an essential place in our lives, and to evaluate them from various aspects such as sociological, psychological, pedagogical, etc. In this context, we are pleased that JETOL will collect studies that will make an important contribution to the literature.

In this issue, JETOL introduces 12 articles. These articles emphasize many of the important dimensions related to current issues in educational technology and online distance education. We are sure that the topics will gain our readers' attention immediately. In this connection, we would like to thank to all authors and reviewers who contributed to the advancement of scientific knowledge and to the field of educational technology and online learning.

We strongly believe that as an open access journal, JETOL will move forward and contribute the universal knowledge ecology. Hope you enjoy reading this issue.

Yours respectfully,

Editorial Team

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The effect of emergency remote teaching on the university students' end-of-term achievement

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Article Info	Abstract
	This study aimed to examine the effect of emergency remote teaching (ERT) on the end-of-term achievement of university students. Accordingly, two sets of end-of-term achievement scores of all students attending Kahramanmaraş Sütçü İmam University, a Turkish state university were compared in terms of educational modality. More specifically, the first set was comprised of scores the students obtained from the tests at the end of 2019-2020 academic year when the courses were delivered via face-to-face education while the second set consisted of scores they obtained from the tests at the end of 2020-2021 academic year when the courses were virtually conducted due to ERT exerted by Covid-19 pandemic. In addition, the views of students and instructors about the differences between the achievement scores driven by ERT and reflection of actual learning in scores during this period were analyzed. The findings indicated that the achievement scores obtained in associate degree and undergraduate degree programs were significantly increased during ERT while no statistically significant difference was found in the scores obtained in graduate degree programs. The findings also showed that the students and instructors are well aware of the increase in achievement scores, which they attributed to various factors such as lack of exam security and devoting more time to the lesson. They generally agreed that the achievement scores obtained in ERT do not reflect the actual learning level of students. Finally, it was revealed that the subjective perceptions about the change in the achievement scores largely overlapped with the objective statistical results.

1. Introduction

Events that deeply affect large masses such as war, disaster and pandemic cause very serious changes in the communal living. The most recent example of this is the Coronavirus (Covid-19) pandemic which has had a lasting effect worldwide since the early months of 2020. Global and large-scale changes have been introduced in many facets of life by the pandemic. Within a few months of its declaration as a global pandemic (World Health Organization, 2020), schools were closed down in 190 countries and 1.57 billion students stayed away from their schools (Giannini et al., 2020). Considering these students with their families, education has been one of the areas severely affected by the pandemic. The transition from face-to-face education to emergency remote teaching has been the most serious change introduced in education during this period.

Although it dates back to the 18th century (Holmberg, 2005), remote teaching has become a worldwide must –beyond a common need- as a result of the latest pandemic. Due to the sudden and compulsory

occurrence of this transition, the proposal of the concept of emergency remote teaching (ERT) for this type of distance education (Bozkurt & Sharma, 2020; Hodges et al. 2020) can be considered as an indication that the process has unique characteristics. In this process, traditional education methods had to be abandoned and new applications such as learning management systems, educational social media platforms and television channels were implemented (Gonzalez et al., 2020). Similarly, activities for measurement and evaluation, which are among the basic elements of education programs, have undergone remarkable changes through ERT. During this process, many tools including synchronous and asynchronous tests, assignments and portfolio tasks were utilized to conduct enriched measurement and evaluation practices (Khan & Jawaid, 2020). By doing so, the instructors aimed to overcome the limitations of the assessment and evaluation practices employed in ERT and to obtain similar results that could be obtained from the non-virtual practices. However, all these remote measurement and assessment practices have entailed a couple of significant questions such as whether the test questions are responded by the students who are supposed to take the tests in concern, how to evaluate the practice-based skills, and how to design reliable remote evaluation processes (OECD, 2020).

End-of-term achievement scores and grades are the most concrete indicators of the student's academic achievement. Displaying a student's ultimate achievement in a given course, grades serve as a notification to the students themselves, their families, teachers and all future stakeholders who want to be informed about their educational achievements (Yakar, 2020). Moreover, they can affect students' further education (Sarı, 2020). To be more specific, cumulative grade point average is one of the factors that largely determine admission to graduate programs in Turkey as the applicants with higher cumulative GPA are likely to be admitted to such programs unless they obtained significantly lower scores on other tests such as Academic Personnel and Postgraduate Education Entrance Exam. Grades also fulfil such functions as encouraging and guiding students, and rewarding their individual efforts (Ebel & Frisbie, 1991). Considering all these issues, it is necessary to investigate how grades, which are of critical importance in education, are affected by the radical change in the regular education system.

Although the change in the scores is put forward objectively, this change and its reasons may be perceived and interpreted differently by the subjects and parties of the change. Expectations and opinions of students and instructors may differ due to their different roles with ERT (Bork & Rucks-Ahidiana, 2013). For example, the student may attribute the increase in grades to external help when responding to the difficult questions (Eastman et al., 2008) or the increase in study time for classes (Hansen et al., 2020) while the instructors may attribute it to cheating behavior (Rane & MacKenzie, 2020). It is important to examine views of students and lecturers, who are the most important stakeholders of higher education, about the possible change in their achievement scores during this period and the underlying factors in order to gain a multi-faceted insight into the concrete outcomes of ERT.

Many studies have been conducted to compare academic achievement scores obtained from courses delivered in the form of remote education and face-to-education and/or to reveal students' views on remote measurement and evaluation practices. Some of them were experimental studies that were conducted with a focus on a single course for which the test setting was differentiated in the pre-pandemic period (Alexander et al., 2001; Brallier et al., 2015; Stowell & Bennett, 2010; Yağcı, 2012). Other studies have investigated the views of students and instructors on e-tests (Wibowo et al., 2016), and compared achievement scores of students and reported on students' views on e-tests (Al Salmi et al., 2019; Ilgaz & Afacan-Adanır, 2020; Rane & MacKenzie, 2020). Further studies have been mostly intended to compare achievement scores obtained pre-pandemic period when the courses were taught face-to-face and those obtained during the pandemic when the courses were delivered in the form of remote education (Gonzalez et al., 2020; El Said, 2021; Hansen et al., 2020; Iglesias-Pradas et al., 2021; Tinjić & Halilić, 2020). Some other studies, on the other hand, exclusively probed the views of students on remote measurement and evaluation practices (Aksu- Dünya et al., 2021; Şenel & Şenel, 2021a). Review of the existing literature shows that the possible differences between the achievement scores of tertiary level students obtained from

face-to-face evaluation practices and those from remote evaluation practices were not previously analyzed based on students and instructors' views. Hence, this study is hoped to bridge the research gap in concern and to contribute to the literature via its findings and practical implications developed in the light of these findings.

The study aims to reveal to what extent the end-of-term achievement scores of university students in ERT differ from the ones they got during face-to-face education, and to elicit students and instructors' views on (possible) differences and the reflection of actual learning levels in the achievement scores obtained in ERT. For this purpose, answers to the following research questions were sought:

1) Is there a statistical difference between the students' end-of-term achievement scores obtained in the 2019-2020 fall semester (face-to-face) and 2020-2021 fall semester (remote)?

2) Is there a statistical difference between the associate degree, undergraduate and graduate students' end-of-term achievement scores in the 2019-2020 fall semester (face-to-face) and 2020-2021 fall semester (remote)?

3) Is there a statistical difference between the students' end-of-semester course scores of the 2019-2020 fall semester (face-to-face) and 2020-2021 fall semester (remote) for the programs offered via daytime education, evening education and remote education?

4) Do students and instructors think the students' end-of-term achievement scores in the 2019-2020 fall semester (face-to-face) differ from the ones in 2020-2021 fall semester (remote)? If so, what are their views on the underlying factors?

5) What are students and instructors' views on the reflection of actual learning level in the end of term achievement scores in ERT?

6) To what extent does the possible quantitative difference in the students' end-of-term achievement scores overlap with the students' and instructors' views on it?

2. Methodology

In this study, it was aimed to compare the university students' achievement scores obtained in face-to-face and remote education and to examine the views of students and instructors on the end-of-term achievement scores the students obtained from the courses which were offered in the form of ERT. In lien with the research objective, a mixture of quantitative and qualitative research methods was adopted in it and quantitative and qualitative data were collected, respectively. It is noteworthy that the qualitative data collection tool was not formed based on the quantitative results and that the participants' views on the situation as well as underlying factors were scrutinized. Objective and subjective reality were tried to be brought together. Considering that the participants of the qualitative part of the research represented a small part of the universe of its quantitative part, this mixed research employed an embedded design (Creswell & Plano Clark, 2015).

2.1. Sampling

Two sets of data were used in the study. The quantitative data were comprised of end-of-term achievement scores of all students registered in Kahramanmaraş Sütçü İmam University, a state university in Turkey in the fall semesters of 2019-2020 and 2020-2021 academic years. There were 33,000 enrolled students in both years. All data were used for analysis without constructing a particular sampling. Since the data were drawn from the submitted end-of-term achievement scores for a specific semester, scores of the students who were studying at the faculties of Medicine and Dentistry were not included in the data sets due to the

distinctive nature of the programs implemented at these faculties. More specifically, each academic year does not consist of two semesters as in other degree programs; therefore, they did not have any test scores submitted to the students' information system at the time of data collection. As a result, the first set of the quantitative research data were comprised of 215271 end-of-term tests scores obtained from 5707 courses identified in 273 programs offered by 151 departments in a total of 23 academic units affiliated to the university during 2019-2020 academic year (eight vocational schools, three colleges, nine faculties and three institutes). The second set of the quantitative data consisted of 235392 end-of-term test scores for 5985 courses identified in 287 programs offered by 158 departments in the same 23 academic units during 2020-2021 academic year. As such, the data were used only to compare letter grades across years.

In the selection of the sample in the qualitative part of the research, it was aimed to elicit the views of the students and instructors in all units. For this purpose, at least one instructor and one student from each unit were tried to be reached. However, no student response was received from nine units. Thereupon, views of two students from two units and two instructors from four units were obtained in order to recruit the target number of participants. In order for the students to have both face-to-face education and ERT experiences, the participants were chosen among the 2nd grade students. Similarly, the participant instructors were chosen from those with administrative duties considering that they know the unit well and reflect it correctly. The participants from whom the qualitative data were elicited were selected using the criterion sampling, which is one of the non-random purposeful sampling methods. Distribution of these participants across degree programs are summarized in Table 1.

Table 1.

Number of Participants for Degree and Status

Degree	Student	Instructor	Total
Associate	5	9	14
Undergraduate	10	15	25
Graduate	1	3	4
Total	16	27	43

As seen in Table 1, the qualitative data were gathered from 14 participants from associate degree programs offered in 8 units, 25 from undergraduate degree programs offered in 12 units and 4 from graduate degree programs offered in 3 units.

2.2. Data Collection and Processing Procedure

Quantitative data of the research were taken from the Directorate of Student Affairs affiliated to Kahramanmaraş Sütçü İmam University. The data drawn from the student information system include the units, departments and degree programs the students are enrolled in as well as the course code, course title, end-of-term achievement scores and the end-of-term letter grades attained by the students. The end-of-term achievement scores are calculated by taking 40% of the midterm exam score and 60% of the end-of-term exam score. In remote education programs, which can also be offered under normal circumstances, only end-of-term tests are held face-to-face and the scores obtained from these tests constitute 80% of the end-of-term achievement.

During the pandemic, midterm and end-of-term tests were conducted over the learning management system (LMS) and only open-ended written tests, multiple-choice tests or assignments were allowed to evaluate the students' achievement. Non-proctored written tests comprised of open-ended items were held simultaneously and required the students to upload the answer sheets, prepared either electronically or in handwriting, to the LMS within the given duration. Likewise, non-proctored multiple-choice tests were conducted online and simultaneously. For the multiple-choice tests, certain criteria such as consisting of 20 to 40 items and lasting for 30 to 60 minutes were established. In order to ensure the test security, the instructors were supposed to prepare at least twice as many items to be posed in the multiple-choice test.

In addition, the test security was attempted to be increased with the randomly asked multiple-choice items and options for each student in LMS. The assignment option covered process-oriented activities such as project assignments, performance-based assignments and oral presentations. Different from the pre-pandemic assessment practices, all students who could not attend these tests were allowed to attend re-sit tests irrespective of having an excuse (Kahramanmaraş Sütçü İmam University, 2020). End-of-term achievement scores were calculated on the scores students obtained from the afore-mentioned single or multiple measurement tools developed and utilized based on the course contents.

Qualitative data of the research were collected through an online questionnaire administered on May 07-20, 2021. The ethical consent for data collection was obtained from the Social and Human Sciences Ethics Committee of Kahramanmaraş Sütçü İmam University, Turkey. The initial section of the questionnaire was designed to elicit the programs participants were studying/teaching and their title (for instructors). Subsequently, the questionnaire required the participants to complete the following statement with "decreased", "not changed" or "increased: "*When I compare it with face-to-face education, the end-of-term achievement scores of the students generally .... during the emergency remote teaching*". As a follow-up question, they were asked to justify the option they chose. Lastly, they were asked to share their opinions as to what extent actual learning levels are reflected in the end-of-term achievement scores in ERT. It is significant to note that similar studies in the existing literature were extensively reviewed prior to the generation of the questionnaire items (Aksu-Dünya et al., 2021; Iglesias-Pradas, et al., 2021; Şenel & Şenel, 2021a). In addition, the tool was piloted with an instructor specialized in the field of teacher education after obtaining the expert opinion from another instructor with the same specialization and finalized based on their feedback.

2.3. Data Analysis

The above-mentioned quantitative and qualitative research data were analyzed in accordance with their nature and research questions.

2.3.1. Quantitative data analysis

There are two main indicators of academic achievement in the quantitative data obtained. End-of-term achievement is graded from 0 to 100 while some end-of-term letter grades, which are formed independently from the end-of-term test scores, are listed as DS (Failed due to absenteeism), B (Successful), BS (Failed) and MF (Exempted). The other letter grades are obtained by transforming the end-of-term achievement scores to the equivalents of the 4-point-score grade system based on absolute criteria for graduate level and relative or absolute criteria for other levels. Equivalents of letter grades for 4-point-score grades are AA (4.00), BA (3.50), BB (3.00), CB (2.50), CC (2.00), DC (1.50), DD (1.00), FD (0.50) and FF (0.00) (Kahramanmaraş Sütçü İmam University, 2017).

Categorical letter grades were used in the descriptive analysis of the university achievement in general. In order to better reflect the general situation of this review, raw data covering all units except faculties of dentistry and medicine were used. Being numeric in nature, the data set including end-of-term achievement scores were primarily included into quantitative analysis. In the use of the end-of-term achievement scores, only the data with a success score were included in the analysis; therefore, the scores corresponding to the grade letters of B/BS, MF and DS were excluded from the data set. Since the compulsory attendance to virtual classes was abolished during ERT (Kahramanmaraş Sütçü İmam University, 2020), it has been observed that DS letter grade was not submitted for the registered students who did not attend the classes and tests. Instead, their end-of-term achievement was graded "0". In order to eliminate the effect of this situation on the analysis results, these scores were excluded from the data sets analyzed. In conclusion, a set of data comprised of 183145 end-of-term tests scores obtained from 5292 courses identified in 258 programs offered by 146 departments in a total of 23 academic units affiliated to the university during 2019-2020 fall and another set of data consisting of 209985 end-of-term tests scores obtained from 5653 courses identified in 275 programs offered by 154 departments in a total of 23 academic units affiliated to the

university during 2019-2020 fall semester were analyzed to provide answers to the first three research questions.

Before the analysis, whether the data sets have a normal distribution or not, the skewness and kurtosis statistics were examined with a normal distribution graph. After this examination, which was done separately for the groups used in the analysis, it was decided to use parametric or non-parametric statistics. In the analysis of the whole data, the skewness (-.27) and kurtosis (-.48) values of the data 19-20 and the skewness (-.59) and kurtosis (-.05) values of the data 20-21 were within the ±1 limits. Similar results were obtained in the examinations of the subgroups. However, data for both years of graduate programs were an exception for the normal distribution.

Students, courses and thus the samples were different in the fall semesters of the 2019-2020 and 2020-2021 academic years. For this reason, the academic year was taken as the independent variable and the independent samples t-test or the Mann Whitney U test was used to answer the first three research questions. For responding to the first research question, the independent samples t-test was conducted to see whether the students' end-of-term achievement scores significantly differ across two academic semesters. Independent samples t-tests were separately carried out for the registered programs (associate / undergraduate / graduate) and the types of program (daytime education/ evening education and remote education) for responding to the second and third research questions, respectively. For the latter, a two-way ANOVA analysis was also conducted to examine whether the use of virtual tests instead of face-to-face tests is a source of the score increase found in emergency remote assessment practices. For this analysis, in addition to the academic years (2019-2020 face-to-face, 2020-2021 remote education), two separate groups, namely remote education programs and face-to-face education (daytime and evening education) programs, were treated as independent variables. Mann Whitney U test, which is one of the non-parametric methods, was used in the analysis of data that did not display normal distribution. The independent samples t-test was used for the data with normal distribution. Finally, for responding to the fifth research question, which is a mixed research question, separate analyzes were performed according to 23 units (eight vocational schools, three colleges, nine faculties and three institutes) and related effect sizes were calculated.

Hedge's g effect size statistic was used to examine the size of the possible difference in the independent samples t-tests due to the different sample sizes. The effect sizes of possible differences in Mann Whitney U tests were examined with Cohen d statistics (Lenhard & Lenhard, 2016). Cohen's d statistic and Hedge's g value indicate weak when it is between 0-0.2, low between 0.21 and 0.5, and between 0.51 and 1.00 moderate and above 1.00 a strong effect (Cohen, Manion, & Morrison, 2007).

2.3.2 Qualitative data analysis

With the analysis of the qualitative data, it is aimed to reveal the students and instructors' views on the end-of-term achievement scores in ERT. Content analysis method was used in the qualitative analysis of the data to respond to the fourth research question which was designed to reveal their views on the underlying factors that trigger possible differences in the scores obtained in ERT and face-to-face education. For this process, codes were detected by the researcher and a doctor in the field of teacher training. After that, three themes were created, "Scores decreased", "Scores not change", and "Scores increased" and matched with related codes. Similarly, content analysis method was used to respond to the fifth research question with a focus on the reflection of the actual learning level in the scores in ERT and its possible reasons. The obtained data were associated with the created themes as "True reflecting" and "False reflecting".

2.4. Validity and Reliability

The quantitative data set comprised of the end-of-term achievement scores obtained from various measurement tools such as virtual tests, project assignments and oral presentations were accepted as reliable and valid due to the fact that examination of the score sources was beyond the research. To ensure credibility in the research concerning the qualitative data, the research model, the collection and analysis of data and

all processes of the research were explained in detail. In addition, the expert opinion was elicited from two instructors with specialization in teacher training. In this research, every stage of the study was presented to the reader in detail in order to ensure transferability and serious attention was paid to the production of a reader-friendly text throughout the manuscript. In addition, in order to ensure credibility, direct quotations from the views of the participants were included into the interpretations of the findings and participant confirmation was elicited (Yıldırım & Şimşek, 2018). For the latter, a student and an instructor's views as to what extent the given codes reflect their views correctly were obtained.

In order to ensure consistency in the research, the researcher and a PhD degree holder in the field of teacher training independently created codes and processed them into the themes. The common codes were combined and unnecessary codes were removed. Subsequently, disagreements on codes were resolved after discussion. For the confirmation review, all research components including data collection tools, the raw data, the codes constructed and data analysis results were stored in the researcher's personal computer and a hard disc (Yıldırım & Şimşek, 2018).

3. Findings

In this section, the results of the analysis related to the research questions are given respectively. For the first research question of the study, the students' end-of-term achievement scores in the 2019-2020 (face-to-face) and 2020-2021 (remote) fall semesters were compared and the result of the independent samples t-test were given in Table 2.

Table 2.

End-Of-Term Scores Comparison for University-Wide

Year	Score N	$\bar{X}$	Sd	t	Hedge g
19-20	183145	57.11	22.61	164.33*	.53
20-21	209985	68.33	19.82		

*$p < .001$.

As indicated in Table 2, the mean of the end-of-term achievement scores obtained from ERT courses were found to be 11.22 points higher than that of the courses conducted face-to-face. It was seen that the difference was statistically significant ($t(367100) = 164.33$, $p < .001$) and the difference had a moderate ($g>.5$) effect size according to the Hedge g statistics.

Figure 1 displays the way the difference in scores was reflected on letter grades across years.
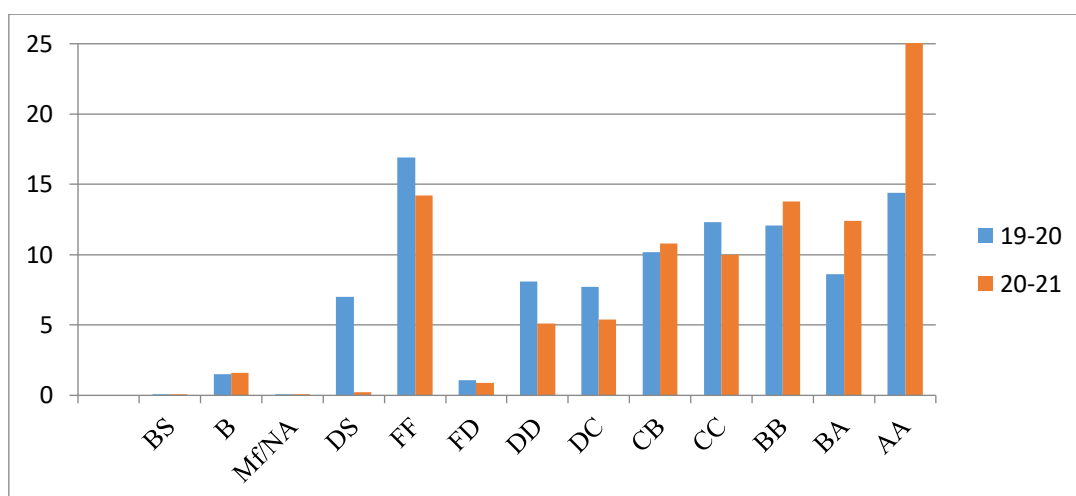
Fig. 1. Prevalence of End-Of-Term Letter Grades for University-Wide

As shown in Figure 1, the significant increase in the end-of-term achievement scores was mirrored in the end-of-term letter grades. While the percentage of the letter grades was close to each other in the 2019-2020 fall semester, the higher letter grades prevailed in the 2020-2021 fall semester. The most frequented letter grade in the 2019-2020 fall semester was FF whereas AA was seen in one of every four letter grades, making it the most frequented letter grade in the 2020-2021 fall semester.

For the second research question, the end-of-term achievement scores obtained in the 2019-2020 (face-to-face) and 20-21 (distance) fall semesters were compared for each degree program and the analysis results were presented in Table 3.

Table 3.

End-Of-Term Scores Comparison for Each Degree

Degree	Year	Score N	$\bar{X}$ / Mean Rank	Sd	t / U	g
Associate	19-20	65866	57.13	20.54	-89.42*	.48
	20-21	77553	66.68	19.69		
Undergraduate	19-20	112434	55.95	23.19	-143.66*	.59
	20-21	126749	68.66	19.65		
Graduate	19-20	4845	5297.27		13608307	-
	20-21	5863	5236.56			

*$p < .001$.

It was indicated that mean of the end-of-term achievements scores obtained in associate degree programs during ERT were 9.55 points higher than that obtained in face-to-face education. Besides, the difference was found statistically significant ($t(137592.6) =- 89.42$, $p < .001$) and had an effect size very close to the medium level ($g=.48$) although the its effect size was in the low range according to the Hedge g statistics. It was also found that the mean of the end-of-term achievement scores obtained in the undergraduate degree programs during ERT was 12.71 points higher than that obtained during face-to-face education. It was seen that the difference was statistically significant ($t(221551.84) = -143.66$, $p < .001$) and had a medium level effect size according to the Hedge g statistics ($g>.5$). When the Mann Whitney U results for the graduate degree are examined, no significant difference was found in ranks of end-of-term course scores of the face-to-face and ERT ($p>.05$).

For the third research question, the end-of-term achievement scores obtained in the 2019-2020 (face-to-face) and 20-21 (distance) fall semesters were compared for each program type and the related results were demonstrated in Table 4.

Table 4.

End-Of-Term Scores Comparison for Each Program Type

Program Type	Year	Score N	$\bar{X}$	Sd	t	g
Daytime	19-20	133377	58.22	22.38	-135.90*	.51
	20-21	157047	68.95	19.79		
Evening	19-20	46879	53.25	22.63	-91.16*	.59
	20-21	48987	65.81	19.87		
Remote	19-20	2889	68.56	23.32	-11.98*	.27
	20-21	3951	74.85	18.60		

*$p < .001$.

Table 4 displays that the mean of the end-of-term achievement scores obtained in daytime education programs during ERT were found 10.73 points higher than that obtained during face-to-face education. This difference was statistically significant ($t(268409.04) =-135.901, p < .001$) and had a moderate effect size according to the Hedge g statistics ($g>.5$). In the evening education programs, the mean of the end-of-term achievement scores obtained during ERT were found 12.56 points higher than that obtained during face-to-face education. This difference was also statistically significant ($t(93085.258) =-91.162, p < .001$) and had a moderate effect size according to the Hedge g statistics ($g>.5$). Considering the mean of the end-of-term achievement scores obtained in the remote education programs, which were also offered in pre-pandemic period, during ERT was calculated 6.29 points higher than that obtained during face-to-face education period. The difference was found statistically significant ($t(5353.34) =-11.98, p < .001$) had a low effect size according to the Hedge g statistics ($g>.2$).

In order to compare the increases in the end-of-term achievement scores across the given academic years, two-way ANOVA was performed and the type of program was established as the independent variable. The statistical results were presented in Table 5.

Table 5.

Two-way ANOVA Results for Programs Type and Year

Source	Type III Sum of Squares	df	F
Intercept	118291299.69	1	264916.99*
ProgType.* Year	12871283.48	3	9608.55*
Error	175539457.55	393126	

*$p < .001$.

Table 5 indicated a significant interaction between the independent variable of program type and the academic year [$F(3-393126)=9608.55, p<.001$)]. Accordingly, the score increases observed during the ERT differ according to the type of programs. The increase seen in remote education programs (6.29/100 points) was less than face-to-face programs (11.27/100 points).

Concerning the fourth research question, the participants' views on the effect of ERT on the end-of-term achievement scores were analyzed and the statistical results were provided in Table 6.

Table 6.

Participants' views on the end-of-term achievement in ERT

Participant view	Student (f)	Instructor (f)
Decreased	-	3
Not Changed	4	3
Increased	12	21

As displayed in Table 6, the majority of the participants, comprised of students and instructors, are of the opinion that the end-of-term achievement scores obtained in ERT were increased when compared to those obtained in face-to-face education. Three instructors expressed that there was a decrease in the scores (11%) while none of the students agreed on that. In return, four students (25%) and three instructors (11%) stated that there was no change in the scores.

Content analysis results of the participants' views on the underlying factors that triggered changes in the end-of-term achievement scores were given in Table 7.

Table 7.

Reported Factors that Entailed the Change in End-of-term Achievement Scores

Theme	Code	Student	Instructor	Total
Decreased	Nonattendance in classes		3	3
	Ignoring homework		2	2
	Watching the video-record of the classes instead of joining them online		2	2
Not	Lack of variety in the teaching/learning methods used	2	2	4
Chanced	Theoretical nature of courses		1	1
	Use of measurement tools consisting of many questions in ERT-oriented evaluation practices	1		1
Increased	Lack of test security	5	12	17
	Devoting more time to the courses	4	1	5
	Changing structure of classes (regardless of time and place)	3	1	4
	Benefiting from technological facilities	1	2	3
	Emphasizing the sections that could be tested more during classes		3	3
	Elimination of the test anxiety	2		2
	Tests being conducted online		2	2
	Less challenging tests (comprised of easy-to-answer items)		2	2
	Instructors' disregarding the significance of the tests	1		1
	Easy access to the answers of the test items over the internet		1	1

In general, Table 7 displays that the reported factors that contributed to the increase in the end-of-term achievement scores during ERT are prevalent. The participant students did not report any possible reasons for decreasing scores since, as noted above, they did not believe there was a decrease in the end-of-term scores during ERT. On the other hand, three instructors attributed the decrease in the scores to the students' nonattendance in classes, ignoring homework and watching the video-record of the classes instead of joining them online. For example, an instructor working at the institute of naturel sciences, who expressed his opinion about ignoring homework and watching the video-record of classes instead of the joining them online, said, "I think that the overall success has decreased because the indifferent students do not fulfill the given tasks and they try to learn subjects, which could be better understood by joining the online classes, by watching their video-records."

Some of the participants who reported no change in the end-of-term achievement scores during ERT attributed this to the lack of variety in teaching and learning methods used (f=4). In that regard, a college student stated that "*I learned best from the lecture notes in face-to-face education, now I do the same in remote education*". Besides, the coexistence of the factors that increase the scores and those that decrease them was reported as one of the reasons why the mean of end-of-term achievement did not change. For example, an instructor who teaches at the faculty said, "*There can be many reasons for this. First of all, the fact that the courses I teach were theoretical in nature may have been effective. In addition to this, as in face-to-face education, my synchronous teaching through the zoom program may have been effective in students' success. Furthermore, …, the students' overcoming the disadvantages exerted by the change in educational modality by accessing to answers of the questions asked on the internet and getting help from someone else while responding to these questions... Another reason may be that I explain the questions I will ask in the exam in more detail during emergency remote education.*"

The reasons mostly reported by the students and instructors for the increase in the end-of-term achievement scores were evaluated under the code of lack of test security. Students (*f*=5) and instructors (*f*=12) exemplified this with such expressions as cheating in the tests, non-proctored tests and students' getting help from peers. It is seen that the students differed from the instructors in the other reasons they reported the most. They frequently stated that they could devote more time to the courses during remote education (*f*=4) and that the classes became independent of time and place (*f*=3). Stressing both the increased time

devoted to courses and lack of test security, an undergraduate student stated that "*Students who stay away from social life and stay at home may focus on their courses, or, as a more possible possibility, the remote education process makes it easy to cheat in the tests and do similar things*". Similarly, an instructor who teaches at a vocational school noted that "*You cannot monitor the students during the exams because they are not conducted in physical classrooms. The probability of cheating in the exam is high. The students have an access to technological facilities that will help them answer the questions*".

For the fifth research question, the participants' views on the reflection of the learning level in ERT were analyzed via content analysis and the results were displayed in Table 8.

Table 8.

Reported Reasons for Reflecting of Learning Level in Score in ERT

Theme	Code	Student	Instructor	Total
False Reflecting	Answers not given by the students	4	5	9
	Getting high scores without studying	3	1	4
	Availability of the answers on the Internet	1	2	3
	Low learning level	2		2
	Lack of participation in classes		2	2
	The scores being very different from the face-to-face exam		2	2
	Taking the make-up exams without excuses		1	1
	Lack of reliability in measurement and evaluation		1	1
	Low efficiency	1		1
	Memorization-based questions	1		1
	Studying to pass the course not to learn it		1	1
True Reflecting	Students with high motivation learn more	1	2	3
	Practice-based classes		2	2
	Correlation between decreased scores and reduced learning		2	2
	Study regularly and effectively	1		1
	Low probability of cheating in applied courses		1	1
	Asking high quality questions		1	1
	Use of similar teaching/learning strategies	1		1

It is seen in Table 8 which shows the frequency of the codes according to the participant groups that 82% and 65% of the total codes used by the students and instructors, respectively refer to the reasons for false reflection. Both students (f=4) and instructors (f=5) attributed the fact that the scores did not reflect the learning level correctly to the answers originally not given by the students. The other reasons most frequently mentioned by the students were getting high scores without studying (f=3) and low learning level (f=2). For example, an undergraduate student said, "*I mean it depends on the student. Because if a student works regularly and effectively, their learning level and grade point average may increase. However, a student not of this type may also have a high-grade point average. How? Getting help in the exam increases the grade, but I cannot say that the learning level is directly proportional to the grade. ...*", indicating that the scores reflect actual learning for the students who work regularly and effectively, and they do not for the students whose do not answer the questions on their own. The other reasons most frequently mentioned by the instructors were that the answers of the questions were available on the internet (f=2), the obtained scores were very different from those obtained in the face-to-face exam (f=2) and the lack of participation in classes (f=2). For example, an instructor at a vocational school noted, "*I don't think it reflects actual learning. Students create groups and answer the questions together. In addition, because of finding the answers to the questions with "CTRL+f" from the electronically stored lecture notes, or asking someone who knows the subject well to attend the online tests for themselves by having them do so with their username and password.*".

It has been seen that the reasons for the students to reflect the actual learning level have emphasized the codes of motivated students' learning more, studying regularly and effectively, and using of similar learning strategies. For example, a vocational school student argued that the use of similar learning strategies in face-to-face and remote education ensures the scores' reflecting actual learning levels by saying, "*..., the education was offered in the same way it was during face-to-face education, and those who listened to the lessons attentively and understood the instructions well got very high scores.*" On the other hand, it was seen that the instructors emphasized the codes of the high level of learning of the motivated students, the practice-based classes, and the decrease in the scores with a decrease in learning, twice at most, in the reasons related to the reflection of actual learning level in scores. For example, a faculty member said, "*While I think it reflects correctly for some students, I do not think it reflects correctly for others. Even through Zoom, students learn a lot and get high grades. ...*", indicating that the learning levels of the motivated students are high.

For the sixth research question, the effect size (EF) of difference between scores (not presented in the findings) of the ERT and face-to-face education and the participants' perceived differences in them across units were examined. The related results were provided in Table 9.

Table 9.

The Effect Size of Score Comparisons and Perception of Participants across Units

Unit Type	Unit Name	Quantitative Result	Student	Instructor
Vocational School	Afşin	Mod. EF Increase	-	Increased
	Andırın	Mod. EF Increase	Increased	Increased
	Göksun	Low EF Increase	**Not changed**	Increased
	K.Maraş Health	Mod. EF Increase	-	Increased
	Pazarcık	Low EF Increase	-	Increased
	Social Sciences	Mod. EF Increase	-	Increased
	Technical Sciences	Low EF Increase	**Not changed**	Increased
	Türkoğlu	Low EF Increase	**Not changed**	Increased
College	Afşin Health	Mod. EF Increase	Increased	Increased
	Phys. Edu.&Sport	Mod. EF Increase	Increased	Increased
	Göksun App. Sci.	Mod. EF Increase	Increased	Increased
Faculty	Education	Low EF Increase	Increased	**Not changed**
	Science-Letters	Mod. EF Increase	Increased	Increased
	Fine Arts	Low EF Increase	-	Increased
	Eco. & Admin. Sci.	Mod. EF Increase	Increased	Increased
	Relegion	Low EF Increase	Increased	**Not changed**
	Engineer&Architec	Mod. EF Increase	Increased	**Decreased**
	Forest	Low EF Increase	-	Increased
	Health Sci.	Mod. EF Increase	Increased	Increased
	Agriculture	Mod. EF Increase	-	Increased
Institute	Naturel Sci.	No Change	**Increased**	**Decreased**
	Health Sci.	Mod. EF Increase	-	**Decreased**
	Social Sci.	Weak EF Decrease	-	**Not changed**

The students and instructors' views on the change in the students' end-of-term achievement scores that do not coincide with the quantitative analysis results are highlighted in Table 9. Considering the extent to which the results overlapped, it was seen that all students perceived the change in scores in accordance with the quantitative results except for those who were studying in three vocational schools and who believed that the scores did not change. It was revealed that two and one instructors' views in favor of decrease in the scores were contradicted by the quantitative results with low and moderate effect sizes, respectively. In addition, it was seen that views of the participants from the three institutes did not match with the observed situation. However, the weak effect size of the significant change observed in the institute of social sciences

somewhat coincided with the view of one of the instructors teaching at this institute who stated that there was no change in the end-of-term achievement scores of the students during emergency remote education.

4. Discussion, Conclusion and Suggestions

In this study, the effect of emergency remote teaching (ERT) on university students' end-of-term achievement scores and views of students and instructors on the scores obtained in ERT were investigated. For this purpose, the end-of-term achievement scores and letter grades of the students enrolled in all degree programs at Kahramanmaraş Sütçü İmam University, a state university in Turkey except for the programs offered in the faculties of dentistry and medicine were examined in the 2019-2020 fall semester, the last semester when the courses were taught completely face-to-face, and the 2020-2021 fall semester, the first semester during which all courses were taught virtually. In addition, the views of the lecturers and students about the end-of-term course scores in ERT were obtained and evaluated together with the results of the quantitative analysis.

It has been observed that ERT, which was necessitated by the Covid-19 pandemic, brought a significant increase of 11 points in the end-of-term achievement scores based on the 100-point system. The most frequented letter grades obtained in the 2019-2020 fall semester (face-to-face) were FF (0.0; 17%) and AA (4.0; 14%) and those obtained in the 2020-2021 fall semester (ERT) were AA (4.0; 25%) and FF (0.0; 14%). This result shows that the success indictor has dramatically changed. Similar results were previously found in other studies conducted with a similar focus in Madrid, Spain (Iglesias-Pradas, et al, 2021; Gonzalez, et al, 2020), in Cologne, Germany (Hansen, et al, 2020), in Victoria, Australia (Loton, et al, 2020) and in the southwestern US (Supriya, et al., 2020). However, unlike these results, no difference was reported between the achievement scores obtained during ERT and face-to-face in a study conducted in Egypt (El Said, 2021) while the study conducted in Sweden (Tinjić, & Halilić, 2020) concluded that the difference was in favor of face-to-face education. In the studies comparing the face-to-face and online exam results of university students in the pre-pandemic period, Brallier et al. (2015), and Rane and MacKenzie, (2020) reported a difference in favor of the online exam whereas Ilgaz and Afacan-Adanır (2020) found no difference between the two modalities of education concerning the score in concern. The overall results indicated that the increase in the end-of-term achievement scores obtained in ERT was usually informed by many studies conducted in different countries. This increase may be attributed to various factors especially the novel teaching methods or measurement settings (Gonzalez et al., 2020). Without revealing all these factors, it would be far from reality to say that ERT is superior to face-to-face education only because of the increase in scores (Iglesias-Pradas, et al., 2021).

The analysis results for individual degree programs showed that the end-of-term achievement scores obtained in associate and undergraduate courses were higher in ERT while those obtained from graduate courses did not differ concerning modality. The result obtained for the graduate program courses may be due to the fact that the end-of-term achievement scores in the graduate programs were also very high (M=83.68) in the face-to-face education period. In addition, the fact that homework is frequently used as a measurement tool in graduate education during face-to-face education (Yağan & Çubukçu, 2019) and this situation continues in the ERT process can be shown as the reason for the similarity in scores.

When the end-of-term course scores were analyzed across program types (daytime education, evening education and remote education), it is seen that the scores obtained in the ERT were higher than those obtained in face-to-face education for all program types. Courses offered in remote education programs were already virtually taught in the pre-pandemic period. The situation that differs with the transition to ERT for this program is that the final exam, which constitutes of 80% of the end-of-term achievement score, was started to be conducted online rather than face-to-face. From this point of view, although the settings in which the classes were held remained the same, the change in the testing setting brought about an increase in the end-of-term achievement scores. This indicates that the setting of remote testing has an influence on the increase in scores. This increase may be attributed to the increased access to resources such as books

and study notes in remote non-proctored exams (Brallier, et al., 2015). At the same time, students' tendency to cheating, which they also describe as helping each other (Rane & MacKenzie, 2020), can be considered as another possible factor for the increase in scores. On the other hand, the effect size in remote programs (g=.29) was not found as high as the one calculated for daytime education (g=.51) and evening education (g=.59) regarding the increase in scores. Moreover, the increased scores observed in remote education programs were statistically lower than the ones obtained in face-to-face types programs. Hence, it can be interpreted that the change in the learning setting may lead to increased scores, as previously reported by Gonzalez et al. (2020). In this case, as expressed in the current and other studies previously conducted with a similar focus (Elsalem et al., 2021; Hansen et al., 2021), students may have attained higher scores by studying harder.

The qualitative findings of the study demonstrated that both students and instructors who stated there was an increase in the end-of-term achievement scores in favor of ERT significantly outnumbered those who did not. They attributed the increase in concern to the lack of test security during ERT. It has been observed that the instructors extensively held this view most probably due to the non-proctored tests or the use of similar software in the tests. In addition, the students' views on the factors that contributed to the increase in scores were different from those reported in other studies on the ERT such as studying more and studying whenever and wherever they want (Akdemir & Kılıç, 2020; Elsalem et al., 2021; Er Türküresin, 2020; Hansen et al., 2021; Şeren et al., 2020). It is seen that the reasons stated by the students regarding the increase in scores are generally positive. On the other hand, students and lecturers who agree on the view that there is an increase in the scores obtained in ERT partially differ on the stated reasons in concern. It can be concluded that the increase in scores is generally considered fair and partially unfair by the students and mostly as unfair by the instructors. This disagreement may be attributed to the fact that students and instructors have different perspectives due to their different roles (Bork & Rucks-Ahidiana, 2013). In addition, some of the instructors stated that they helped students increase their scores by asking easy questions or by emphasizing the questions likely to be asked in the tests during the virtual classes. This may be seen as a help given by the instructors in order not to make the lives of the students more difficult in the face of the worsening living conditions (Dodd et al, 2021) and education (Aristovnik et al., 2020) due to the pandemic. Another remarkable result is that students' getting away from test anxiety thanks to the remote measurement practices as they entailed an increase in their end-of-term achievement scores. This inference coincides with the opinion that the use of homework as an assessment tool in the ERT process can reduce test anxiety (Şenel & Şenel, 2021b).

Students and instructors also agree on the opinion that the scores obtained in ERT do not reflect actual learning level of the students. It is noteworthy that this view was more frequently reported by the students. Namely, they stated that the scores do not reflect their actual learning levels, since they did not answer the questions on their own. This situation can be considered as a confirmation that students use resources (Brallier, et al., 2015) and cheating behaviors (Rane & MacKenzie, 2020) in the remote testing. Students also criticize the instructors and the assessment system by conveying the opinion that high grades can be obtained without studying hard. The instructors self-criticized about this issue by stating that the scores do not reflect the truth since the questions and answers were already available on the internet. This particular finding is in line with those reported in other studies (Akdemir & Kılıç, 2020; Er Türküresin, 2020).

For the mixed method question, it is seen that the quantitative and qualitative results obtained for the units largely overlapped. The quantitative increase observed in many of its units was correctly perceived by students and instructors. Although they stated different reasons, both students and instructors were aware of the truth. It has also been observed that especially the students enrolled in undergraduate degree programs had a more consistent perception of change with the quantitative results. In other words, the quantitative and qualitative results concerning these students support each other. The clearest example of this is seen in the results obtained for remote education programs. The only thing that changed in remote education programs was that the end-of-term tests started to be held online. The statistical result that the scores

increased with this change is consistent with the participants' opinion that the scores were increased due to the lack of test security in the remote assessment. In addition, the statistical result showing that the increase in these programs was not as high as the one in other programs is compatible with the opinion of the participants that the scores were increased as the students spent more time on study.

To summarize the results, a significant increase observed in the students' end-of-term achievement scores obtained in associate and undergraduate degree programs, and throughout the university selected in the pandemic period during which the courses were offered through ERT. In return, no significant change was found in the scores obtained in graduate programs. The participant students and instructors attributed the increase in the scores during ERT to different factors. They also argued that the scores obtained in this period did not reflect the actual success of the students.

This research has some limitations due to some reasons. Initially, the end-of-term achievement scores obtained in the faculties of Medicine and Dentistry could not be not included in to the data set and data analysis. It was also restricted to the data elicited from the end-of-term achievement scores obtained in a state university in Turkey; so, its results cannot be generalized to other settings. Although there are many factors affecting course achievement in face-to-face education and ERT, these factors were ignored data collection and data analysis in this research.

In the light of the research results, the following can be offered for researchers for further directions:

- The study can be repeated for the universities that employ proctored online tests and/or proctor software in ERT and the results can be compared with the ones reported here.

- By examining the data of the 2019-2020 and 2020-2021 spring semesters, as et of data comprised of end-of-term achievement scores of the students studying at the Faculties of Medicine and Dentistry can be analyzed and the results can be compared with the ones reported here.

- A similar set of data could be analyzed by considering such variables as the course structure (theoretical vs. applied), the type of modality the classes are offered (synchronous or asynchronous) and the assessment tools utilized in emergency remote education.

- The research could be furthered to investigate to what extent student-related factors such as their characteristics, grade point averages, study habits and frequency of attending virtual classes contributed to the increase in their end-of-term achievement scores.

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Project-based online learning experiences of pre-service teachers

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Article Info	Abstract
Keywords: Project-based learning Online learning Student-centered learning Group-based learning Collaboration Research Article	Student-centered learning approach, which embodies shifting the focus of instruction from teacher to student, actively engages students in their own learning process by incorporating their learning skills and interests. With the developments in instructional technologies making online learning widespread, the student-centered learning approach has found the opportunity to transition from theory to practice. How project-based learning, which is one of the best application areas of student-centered learning, can be realized in online learning environments and the views of pre-service teachers about this experience are the research subjects of this study. Conducted as a descriptive case study, this study investigates the views and experiences of 55 Computer and Instructional Technologies Education Department students towards application of project-based learning in an online course. Data gathered through close-ended Likert type questionnaire, open-ended questionnaire and self-evaluation reports revealed that project-based learning method provided learners with gains in terms of comprehension of course content through hands-on experience, developing research skills, improving collaboration and group work skills, and creating something by making use of their imagination and creativity in a fun way.

1. Introduction

In our age, being technology literate and keeping up with the information society are at the forefront of the obligations brought by the developing and renewed science and technology to individuals. Information technology requires answers to questions such as "Where is the most reliable information and how can I access it?", "How can I integrate my previous knowledge to produce new information?", "How can I reveal the creative function of my intelligence?". In this case, new learning environments should be offered where learners can find answers to these questions and actively produce projects (Yurtluk, 2003). The necessary skills brought by the 21st century have shifted the main purpose of education system from loading or transferring information to learners into teaching them the ways and skills of accessing the most reliable information in the shortest possible way. As developing networking skills, maintaining collaborative relationships with people, and making decisions as a team are considered essential skills to succeed in the new age, students are now expected to move from passive recipients to active creators and need to learn how to learn (Collins & Halverson, 2009).

Recently, various teaching models have emerged that put the student in the center and make them more active in education. One of them is the Project Based Learning Model (PjBL), which is a student-centered model that was founded by Klipatrick (1918) in the early twentieth century. Thanks to this model, a creative

classroom environment is created. It can be ensured that students develop self-confidence, establish relationships between the real world by actively exploring real-world problems, challenges, and concepts, see interdisciplinary relationships, work in individual and collaborative learning environments autonomously and purposefully toward the completion of a project (Dado & Bodemer, 2017; Edutopia, 2014; Shearer & Quinn, 1996).

2. Literature

Constructivist teaching approach is based on the assumption that students should create the knowledge themselves. John Dewey, one of the modern founders of the constructivist learning approach, pointed out that traditional teaching methods do not coincide with the basic principles of students' development, and that learning should be structured and interpreted by the learner in order to be meaningful, relevant and beneficial to life (cited in Williams, 2017). One of the most obvious methods that can be used in accordance with Dewey's philosophy is the project approach (Glassman & Whaley, 2000). Considering that this approach aims to make not only the learning process but also the evaluation process more meaningful, PjBL, which is based on process-oriented evaluation rather than product-oriented evaluation, comes to the fore. Standardized achievement tests developed and widely used to measure learning tend to fall short of measuring the type of learning and "high-level skills" that PjBL aims to promote (Conley & Darling-Hammond, 2013). Pellegrino and Hilton (2012) emphasize that process-oriented assessment used in PjBL can facilitate the assessment of difficult-to-measure 21st century competencies such as the capacity to engage in problem solving, critical thinking, and metacognition.

The PjBL, which is one of the applications of the constructivist teaching approach, is a student-centered learning approach that focuses on real-life subjects and practices, emphasizing long-term learning activities rather than short-term practices and teacher-centered lessons in the classroom (Goldman, 2000). PjBL allows students to analyze data, solve problems, and make decisions. It improves their high-level cognitive skills, and increases their sense of responsibility towards their physical and social environment (Dori & Tal, 2000). In addition, PjBL can help students build and increase their critical thinking skills. Active participation of students in the project process enables them to shape their own ideas and reveal their perspectives (Zoller, 1991). In addition to equipping students with knowledge, PjBL is also effective in developing learners problem-solving skills, creative thinking skills, lifelong learning skills, communication skills, teamwork, adaptation to changes and self-evaluation skills (Khoiri et al., 2013). PjBL, which can include many methods and strategies, is a learning approach that aims to enable students to reach information on their own, use this information and express it by combining it with their own ideas. Educators working on PjBL model define it as a constructive, collaborative learning model that directs students to research and aims to understand the content in depth (Willard & Duffrin, 2003).

While the mission of higher education institutions is to provide students with cognitive knowledge and professional skills, as well as skills such as problem solving and teamwork (Casner-Lotto & Barrington, 2006; Vogler et al., 2018), it does not seem possible to reach these goals with a teacher-centered traditional approach (Muganga & Ssenkusu, 2019). Despite its potentials to enhance problem solving, critical thinking and collaborative skills, PjBL seem to be scarcely applied in higher education context. According to the findings of a 20-year meta-analysis of journal articles on PjBL, the model seems to be more widely applied at the K–12 level (Chen & Yang, 2019). Among relatively little research focusing on implementation of PjBL in higher education, Torres et al. (2016) found that students who chose a PjBL course on engineering design showed more persistence on to earn a degree in engineering. Analysis of 76 empirical studies focusing on PjBL application in higher education context revealed that affective outcomes including learner experience and perceptions of the benefits of PjBL were most applied (Guo et al., 2020). Most of the studies conducted in the related field have shown that participation in PjBL contributes to development of learning strategies (Stefanou, et al., 2013), improves self-efficacy, achievement (Mahasneh & Alwan, 2018) and content knowledge (Mohamadi, 2018), motivates students to learn (Shih & Tsai, 2017; Shin, 2018; Wu

et al., 2018), and provides important skills such as responsibility, cooperation, time management and problem solving (Hall, et al, 2012).

Nowadays, where online learning is gaining importance, it has been possible to use instructional technologies to facilitate collaboration skills. Most of the students have become familiar with using digital technology in their schools. With PjBL, students can use their technological skills to participate in learning activities (Musa et al., 2011). Implementation of PjBL in online higher education context has been the focus of relatively little research. Using PjBL in online learning might be effective in increasing productivity (Heo, Lim, & Kim, 2010; Shih & Tsai, 2017). Morales et al. (2013) suggest that PjBL can be effective in an online learning environment even with minimal teacher guidance. In their study, Çakiroğlu and Erdemir (2019) revealed that information technologies facilitate planning, collaboration, communication and individual learning in online project-based design activities. Considering the limited research, how PjBL, one of the best application areas of student-centered learning, can be realized in online learning environments in higher education context and the views of pre-service teachers about this experience are the research subjects of this study. In this connection, the study intended to seek answers for the following research questions:

1. What are the perceptions of the participants regarding:
    a) contribution of the PjBL implementation to group work-cooperation skills
    b) contribution of the PjBL implementation to research, resource/time management skills
    c) contribution of the PjBL implementation to acquiring learning objectives
    d) designed learning environment?

2. What are the participants' positive, negative opinions and suggestions regarding the PjBL implementation in the online course?

3. What are the participants' self-evaluations regarding the project-based online course process?

3. Methodology

3.1. Research Model/Design

Constructed as a descriptive case study, this study investigates the views and experiences of Computer and Instructional Technologies Education Department students towards application of project-based learning in online Distance Education course. As a research method, case study is used in current situations where there is no researcher control over the variables, and it aims to answer how and why questions allowing in depth examination of a phenomenon or event that the researcher cannot control (Yıldırım & Şimşek, 2011; Yin, 2009). The focus of the case study is to try to describe an event as it exists. The case study differs from other qualitative research methods with its features such as, analyzing a single unit or a bounded system, making intense descriptions and interpreting depending on the context (Hancock & Algozzine, 2006). A descriptive (also known as illustrative) case study aims to describe the situation descriptively by examining one or more examples (Yin, 1994). The factors affecting education can change depending on the context and people can affect these factors (Yıldırım, 1999). It is not possible to examine education systems outside of their real context. For this reason, the case study adopts the understanding that the factors affecting education should be examined in their real contexts. In addition, one of the basic components of the education concept is the process. In educational research, information about the process and how the research group was affected in the process is under consideration. A case study research is used when questions are about the process (Rose et al., 2015). For these reasons, descriptive case study design was employed for this study.

3.2. Data Collecting Tools

The case study does not require the use of a specific data collection method, tool, and data analysis method. Case studies are conducted by collecting data from multiple sources to make in-depth investigations. Researchers need different types of data to develop deep understanding of the situation under study (Creswell, 2011). In this study, as one of the data collecting tools, a questionnaire including 15 close-ended Likert-type statements was used. Likert-type questions were used because they are frequently referenced in fields such as social sciences and education (Edmondson, 2005) and are very easy to apply, code and measure (Spector, 1992). The questionnaire was composed by Dağ and Durdu (2012), and necessary permission from copyright holders was taken. The questionnaire included 3-point Likert type questions ranging from not true (1 point), partially true (2 points), to true (3 points), and it aimed at getting perceptions of learners about four sub-categories that are; group work-cooperation skills (four statements), research, resource/time management skills (five statements), opinions about acquiring learning objectives (three statements), and opinions about designed learning environment (three statements). Also, the participants were given an open-ended questionnaire consisting of three questions regarding their positive, negative ideas and suggestions for PjBL implementation during their online course. In addition, the participants filled in project self-evaluation forms that included six open-ended questions at the end of the project.

3.3. Sampling or Study Group

Participants of the study were 55 Computer and Instructional Technologies Education Department junior and senior students. They were selected using non-random purposeful sampling method in order to reach qualified research objects. Based on this method, participants were included according to the following criteria: (a) active Computer and Instructional Technologies Education Department students, (b) have taken online Distance Education course in 2019 fall semester, 2020 spring semester and 2020 fall semester (c) have completed all requirements of the course that embodied PjBL design.

3.4. Data Analysis

Data analysis techniques of the study differed according to the data type. Four sub-categories which included a series of three to five Likert-type items that are combined into a single composite score that represented each sub-category were analyzed with descriptive statistics that included the mean for central tendency and standard deviations for variability (Boone & Boone, 2012). For the open-ended questionnaire, content analysis was conducted based on the themes of three questions, which were positive opinions, negative opinions and suggestions regarding the implementation of PjBL for the online course. For the self-evaluation form consisting of six open-ended questions, the content analysis was done through coding and reaching more general themes.

3.5. Validity and Reliability

Validity and reliability measures of the study were taken according to the types of data collection instruments. For the close-ended Likert-type questionnaire, in order to ensure scope validity, a field expert other than the researchers checked for content. In addition, the items were evaluated by a Turkish language expert in terms of its suitability for Turkish and suggested corrections were made. The reliability of the items was calculated with Cronbach Alpha Internal Consistency following piloting, and Cronbach's Alpha value (Cronbach, 1990) was found to be 0.87 (Dağ & Durdu, 2012), which revealed that the resulting reliability coefficient was above 0.80 criterion (Bryman & Cramer, 1997). For the qualitative data, the open-ended questions in self-evaluation form and the questionnaire were constructed with assistance of a qualitative research field expert. Since the open-ended questions might come with a great diversity in answers, two independent researchers took part in the coding process and inter-coder comparisons were made during the data analysis process in order to reach consensus (Strauss & Corbin, 1998).

3.6. Research Procedures

The study was conducted during three successive semesters in years 2019-2020 at Anadolu University Computer and Instructional Technologies Department. PjBL was implemented for the online Distance Education Course, which was a must course for the program. The course was conducted fully online on Canvas Learning Management System (LMS).

At the beginning of each semester detailed information about the project, syllabus including detailed tasks to be completed on a weekly basis and evaluation principles and rubrics were shared with the students on the LMS. By the end of the semester, the students were supposed to complete an online course design by following the guidelines, audio-visual, interactive and written content shared on the course page, and two-hours synchronous classes each week in the form of video-conferencing. At the first stage of the project, the students were allowed to form groups of 3-4 by their own wish. Eight different learner profiles with different age group, professions, time limits they can allocate for the online course, technological possibilities they have and technological literacies were created by the researcher. Each learner profile required a distance online course on a different subject matter. The students were randomly assigned to each learner profile.

For 14 weeks, each aspect of online distance course design was studied synchronously and asynchronously. From the analysis of target audience, course aims and objectives, drafted course syllabus, learning and distance learning theories to instruction methods and techniques, detailed syllabus, learner-teacher roles, teaching materials, teaching media, teaching modes, interaction types and many other components of online course design were covered on LMS. The students were responsible to work in groups to complete the requirements of each week and share their tasks on the LMS. For example, for the first two weeks, each group had to make a labor division to complete their questionnaire / interview questions for the analysis of the target audience task. The example task can be seen in Table 1. After preparing their task, a group member was supposed to upload their reports and plans on the LMS.

Table 1.

Task for the first two weeks

Week 1	<u>Analysis of the target audience</u> Please consider these points while preparing your questions for interviews/questionnaires and write a target audience analysis report	• Defining learning needs • Age • Technology available • Readiness • Learner objectives • Learner background knowledge • Time constraints • learning styles	Target audience analysis report and draft course plan 15 points
Week II	<u>Analyzing the course</u> Please prepare a draft course plan based on target audience analysis report	• learning objectives • draft syllabus • course content • course materials	

First half of the course design was submitted for the mid-term evaluation. For the final evaluation the students submitted the complete course design, each component of which was explained with justifications based on the Distance Education Course content, and presented their course design in groups in video-conferencing session. During the project the teacher provided guidance and support both synchronously and asynchronously. At the end of the project the participants were given the questionnaires and self-evaluation forms.

3.7. Findings and Discussions

The questionnaire on the perceptions of the participants about the PjBL implementation revealed mostly positive results. Table 2 shows the frequency and the percentage of each statement regarding the contribution of the project to group work and collaboration skills. According to the first statement, 86% of the students stated that it contributed to the development of group working skills, which is a high ratio compared to those who said no (11%) and which is a similar finding in the literature (Dağ &Durdu, 2012; Dag & Durdu, 2017; Putri et al., 2017; Shin, 2018). Similarly, most of the participants (76%) believed the project also contributed to their collaborative working skills and they stated they mostly had good communication as a group. For the third statement, although more than half of the participants (66%) believed that the required tasks were carried out by each group member, it is seen that a significant number of students do not share the same thoughts. The fact that group members did not take equal responsibility can be considered as an expected result considering the relevant literature (Dag & Durdu, 2017; Pinter & Cisar, 2018). The participants in the study conducted by Pinter and Cisar (2018) most of the students claimed that they noticed certain member contributed more to the success of the project than others. Another study conducted by Aldabbus (2018) revealed that some students dominated the project work and did not let other members in the group to actively participate. Similarly, almost half of the participants in another study did not agree with that the process of project work was carried out equally by each member (Dağ & Durdu, 2012). In order to solve these and similar problems related to group work and collaboration, students can be closely guided in division of labor by the teacher and also they can be allowed to form groups themselves as done in this study.

Table 2.

Frequencies of responses for group work.

Statements	not true		partially true		true	
	N	(%)	N	(%)	N	(%)
1. This project work contributed to the development of my group working skills.	6	(11)	2	(3)	47	(86)
2. This project work contributed to my collaborative working skills.	6	(11)	7	(13)	42	(76)
3. In this project work, the tasks specified in the project calendar were carried out equally by each group member.	4	(7)	15	(27)	36	(66)
4. We had good communication as a group with this project work.	10	(18)	3	(6)	42	(76)

The other sub-category in the questionnaire aimed to reveal the perceptions of pre-service teachers regarding the research and time management skills. Table 3 shows the frequency and percentage of the responses for each statement in this category. Most of the statements did not receive negative response for the contribution of PjBL implementation to research and time management skills and those that received were very few (three for the fourth statement and one for the final statement). Majority of the participants believed that the project work contributed to their research and resource use skills except for the time management skills (47%). According to the answers given, the point of the project work that is believed to have contributed the most was learning how to select necessary information during the project with 85%. And it was followed by learning to organize the information (80%), and time allocated for the project (78%). For PjBL activities, it is important that learners have sufficient time and opportunities to practice effective communication, technology use, critical thinking and problem solving (Aldabbus, 2018). Considering the time allocated for the project in this study was found to be enough for most of the students, it is seen that the participants experienced challenges regarding managing the given time while carrying out the required tasks. This might be because of not having much experience on projects work, or because of problems with the division of labor. Unlike these findings, majority of students in Belwal et al.'s (2020) study asserted effective time management as the most important contribution of project work. Regarding time management, a difference between Belwal et al.'s study and this one is that the time allocated for the project was quite limited and there were tasks that needed to be completed hourly as participants mentioned.

Table 3.

Frequencies of responses for research and time management skills.

Statements	not true		partially true		true	
	N	(%)	N	(%)	N	(%)
1. This project work helped me to develop my research skills.	0	(0)	17	(31)	38	(69)
2. In this project work, I learned how to select the necessary information for the project topic.	0	(0)	8	(15)	47	(85)
3. In this project work, I learned to organize the information I learned about the subject.	0	(0)	11	(20)	44	(80)
4. The time given for this project work was sufficient.	3	(6)	9	(16)	43	(78)
5. Thanks to this project work, I gained time management skills.	1	(2)	28	(51)	26	(47)

Third section of the questionnaire focused on the perceptions of the learners about the contribution of project work to acquiring learning objectives. Table 4 shows the frequency of responses for each statement. Findings revealed that none of the statements received a negative response. Majority of the participants responded in favor of the support of the project work to acquiring objectives for the statements (84%, 87%, 80%, respectively). They believed that the project work helped them understand and comprehend the subject matter to a great extent. PjBL is believed to be an effective method for learning for reasons, such as that the whole class revises the topic studied (Salybekova, 2021), project work stimulates the student's curiosity towards the subject matter (McManus, & Costello, 2019), increases active participation and motivation, makes the lesson more understandable, meaningful and the learning more permanent (Çelik et al., 2018; Şahin et al., 2020), and it involves authentic learning tasks (Eskrootchi & Oskrochi, 2010).

Table 4.

Frequencies of responses for acquiring learning objectives.

Statements	not true		partially true		true	
	N	(%)	N	(%)	N	(%)
1. This project work allowed me to understand and comprehend the stages of distance education course design.	0	(0)	9	(16)	46	(84)
2. This project work helped me learn what to do in the analysis phase of the distance education course design.	0	(0)	7	(13)	48	(87)
3. This project work contributed to my understanding of the elements to be considered in the design phase of the distance education course.	0	(0)	11	(20)	44	(80)

The final sub-category in the questionnaire focused on learner perceptions of the learning environment. Table 5 shows the frequency of responses for each statement. Similar to the other sub-categories, majority of the participants were satisfied with the project work in terms learning process. They believed that the project contributed to their academic success as they were engaged in learning by doing and experiencing. Similarly, Chen and Yang's (2019) meta-analysis of the effects of the PjBL method on academic achievement compared to traditional methods revealed that the method had an average to higher positive effect on academic achievement. According to findings of similar studies, project-based learning contributes to higher levels of perception and learning by creating an effective classroom environment and ensures high student achievement and performance (Belwal et al., 2020; Cifci, 2015; Çelik et al., 2018; Hugerat, 2016). Participants in another study stated that to the research findings PjBL method increases active participation, makes the lesson comprehensible, efficient, instructive, motivating, and makes learning permanent (Şahin et al., 2020).

Table 5.

Frequencies of responses for learning environment.

Statements	not true		partially true		true	
	N	(%)	N	(%)	N	(%)
1. I think that the information I learned during this project work is permanent.	3	(5)	8	(15)	44	(80)
2. This project work allowed me to learn by doing and experiencing information.	3	(5)	13	(24)	39	(71)
3. I think this project work has a positive effect on my course success..	0	(0)	10	(18)	45	(83)

When descriptive statistics showing the means and standard deviations of all sub-categories are examined in order to evaluate the general perceptions of the participants towards PjBL method, it is seen that the general perception is mostly positive with the mean scores of 2.70 for research skills, 2.64 for group work skills, 2.83 for acquiring learning objectives, and 2.73 for perception regarding the designed learning environment. The findings can be seen in Table 6. In this context, it can be said that the findings show similarities with the relevant literature (Dag & Durdu, 2017; Guo et al., 2020; Putri et al., 2017; Torres et al., 2016).

Table 6.

Descriptive statistics for the mean scores of the sub-categories.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Research Skills	55	2.00	3.00	2.70	.307
Group Work	55	1.00	3.00	2.64	.611
Objectives	55	2.00	3.00	2.83	.293
Learning Environment	55	1.33	3.00	2.73	.447
Valid N (listwise)	55				

Qualitative findings based on three open-ended questions revealed participants' positive, negative opinions and suggestions for implementation of PjBL in online courses. Table 7 shows the codes, sub-themes and themes regarding each question. In general, participants reported significantly more positive opinions than negative ones. Similarly, they made very few suggestions for the implementation of PjBL in their online course. Positive opinions included gaining collaboration, group work, and time management skills, learning by experience, contribution to individual learning, providing course subject revision, effective learning, effective evaluation, formative feedback, flexibility, fun, and effective instruction. Different from this study, most PjBL studies are conducted in face-to-face learning contexts. Considering this difference, the findings of the relevant literature showed similarities with this one. Findings of Shin's (2018) study revealed that project-based learning has advantages in students' motivation to learn, attention, relevance, collaborative learning. In the same way, participants in Şahin et al.'s (2020) study found PjBL implemented course instructive, effective, motivating and fun. Regarding effective learning, one of the participants in this study stated that " *I think that since we learn by designing and making an instructional design, instead of instruction of the theoretical information in a straight way by the teacher, the information I have gained will be permanent*". The participants believe that learning by doing contributes to meaningful and effective learning. Another participant points out the effect of the project work on revision of the subject matter by stating that "*The project was a very instructive project as it required us to go through everything we talked about in the lecture for the entire semester*". One participant highlighted that "it was a lot more effective evaluation technique than the exams". As highlighted by Pellegrino and Hilton (2012), process-oriented assessment used in PjBL makes it possible to assess difficult-to-measure 21st century competencies such as the capacity to engage in problem solving, critical thinking, and metacognition, most of which might not be possible through standardized achievement tests. About the academic gains and group work skills, another participant expressed that " *I thought I really learned something while doing this project. I think*

it's the first time I put the knowledge I learned into practice. We have a full understanding of the concepts of group work and collaboration. It was quite successful. Of course, it can't be perfect work. but I think we've laid the foundations for great work". It might be concluded that, with its process-oriented nature, PjBL, the learners appreciated their gains during the process and valued their efforts. Negative opinions expressed by the participants included managing time, adjustment problems in the groups and long and tiring process, yet one participant stated that " In some stages, I had a lot of difficulty and got exhausted, but I learned very well". Tiring process can be appreciated and valued by the participants when learning achieved. Among the suggestions were receiving feedback more often and based on each group's phase. This also shows that formative feedback is valued by the learners as long as it is provided timely.

Table 7.

Participants' positive and negative opinions, and suggestions for the implementation of PjBL.

Themes	Sub-themes	Codes
Positive opinions	collaboration	positive effect of the collaborative work
		positive effect of working with group
	group work	improvement of group work skills
	flexibility	full understanding of group consciousness, cooperation
		no stress for deadlines
	formative feedback	allocation of enough time
	learning by experience	receiving feedback on time
		better comprehension with feedback
	contribution to individual learning	self-correction with constructive feedback
	revision	learning by designing and making
		transferring theory into practice
	fun	learning by oneself
		instructive project
	effective evaluation	going through the course content
	effective learning	a lot fun to work together
		more effective evaluation than exams
	time management	really learning something
	experience	putting learned information into practice
		gaining time-management skills
	effective instruction	gaining life-long experience
		learning details about the course subject
		informative course design
Negative opinions	time management	having problems with time management
		adjustment problems within group
	group work	not getting along with group members
	tiresome process	lack of communication in the group
		long and labored process
Suggestions	feedback	getting earlier feedback for groups that progress quickly
		receiving feedback weekly
	grouping	random assignment of group members

Content analysis of the self-evaluation form consisting of six open-ended questions revealed learners' perceptions about their gains, performance self-evaluation, the most challenging part of the project for them, and what parts they enjoyed most. Table 8 shows the codes, sub-themes and themes regarding each question.

Table 8.

Participants' self-evaluations

Themes	Codes	Important Statements
Gains	awareness towards course content importance of communication in the group nature of group work significance of planning collaboration with other members putting theory into practice by doing importance or research steps	- I had the opportunity to associate the course content with real life and this impressed me a lot, I liked this awareness. - I learned very well the importance of communication and how teamwork should be. - Ability to work in a planned manner with groupmates - I learned that you can do a nice group assignment with people you don't know very well. - To learn completely how to design a distance education course, which is the subject of this course. - I put all my knowledge into practice, I had the chance to apply what I learned. - I learned that it is necessary to plan the research steps in detail.
Regrets	not making a better presentation paying less attention to some steps dealing with communication problems spending less time on presentation misunderstanding some steps no regrets at all	- I like presentations that try to tell something independent of the content. I could have done that kind of scenario, my presentation could have been more colorful. - I think I spent less time than necessary on some parts of the project. - I tried to create dynamism and increase interaction within the group. Instead, I wish I had more control over the subject. - I wish I had listened more carefully while the project phases were explained. - I wish I had done some parts correctly, which we learned that we did wrong with the feedback from the teacher. -I have no regrets regarding the project, I am content with it.
Best performance	in different stages of the course design in writing the project report in presentation stage	- The first step of the distance course design, learner analysis, which is the subject of the project, went very smoothly. And I think it's successful. -I showed the best performance in writing the project report part. -My friends and I did very well in the presentation stage.
Challenges	certain parts of the course content dealing with group members presentation stage putting all things together studying online	-It was somehow hard to understand theories of distance education. -Couldn't attend the online group meetings and so missed some important parts. -Dealing with group members was really exhausting. -The project took so long so I had some trouble with putting all the things together in the end. - It was very difficult to find a time suitable for everyone for the group members. -Working on the project online was not easy.
Fun	designing and building the project opportunity to reflect individual originality unlimited use of imagination working with friends the whole process the presentation stage studying online becoming aware of one's achievement	- It was so much fun doing everything from scratch, step by step. - It was a pleasure to be able to add our own original ideas to the project, to add our imagination and creativity. - It was fun to have unlimited imagination when we were editing. - It was very enjoyable to work with my dear friends, we had a lot of fun. - I enjoyed the whole process very much. - We were all excited while preparing the presentation. There was an idea coming from every one of us. We enjoyed the presentation very much. - It was great to be able to succeed, to be able to create a distance education course design.
Evaluation of Performance	doing one's best showing great performance effective learning process need to study more systematically making revisions more often	- I believe I did my best. - I did not expect this much, but I can say that I surpassed myself. - It was an extremely productive process, I actively participated in every step and it was an effective learning for me. - I couldn't pay attention at some stages, I neglected it, I should have worked more planned and systematically. - In fact, we were expected to put the topics we covered into practice, but my performance was low because I did not make enough revisions.

Based on the statements of the participants, it can be concluded that the group project work seemed to create awareness of group work dynamics, planning, time management, course content, transfer of knowledge. Findings indicate that there are certain gains regarding the course content and project skills such as planning, group work, time management. Also, regrets are mostly about not paying much attention or neglecting responsibilities. That is, regrets were not about the project work itself. Most challenges experienced by the participants were centered around the problems with working in groups. This might be due to lack of experience in group work. It might be a good solution to make an orientation on the basic principles of working as a group before the project starts. In-group evaluation checklists that can be performed by group members at the end of each stage can also be a solution. The participants in Aldabbus' (2018) study mentioned similar challenges and findings showed that students lacked the necessary skills of collaborative work. Fleming (2000) lists six features of project-based learning as; 1. original problem, 2. student selection, 3. academic process, 4. hands-on learning beyond the school walls, 5. a unique product, 6. transparent evaluation practices using predetermined criteria. The participants of this study also mentioned most of these features in self-evaluation forms by pointing out the gains regarding the comprehension of the subject matter through active participation, putting what is learned into practice, creating original work by using individual effort and creativity. It is possible to suggest that the PjBL positively affected the academic achievement as participants made comments regarding the effectiveness of learning process and awareness of their performance. Similar to these findings, other PjBL studies show that project works improve enthusiasm, confidence, creativity, self-directed learning and collaborative learning skills (Astawa et al., 2017; Chen & Yang, 2019; Çelik et al., 2018; Mahasneh & Alwan, 2018)

4. Conclusion and Suggestions

According to the findings of this study, the implementation of PjBL method in online learning environments has certain contributions to the learning process. First of all, it allows students to work with groups, and therefore contributes to improvement of their group work and cooperation skills. Majority of the participants claimed that the project work contributed to the development of group working skills. During the learning process learners had a chance to experience what collaboration and group work was and how it should be done through first-hand experience. Some challenges regarding working in groups were about group members' taking inequal responsibility and communication problems within the group, which are among the common findings in the relevant literature (Dag & Durdu, 2017; Pinter & Cisar, 2018). Although this study let participants to form groups on their own, some responses indicated complaints about the group dynamics and sharing responsibility within the group and lack of communication. Some suggestions from participants were about random assignment of group members. An implication of this finding can be applying group work orientation at the beginning of the project. Teachers might instruct the general principles of group work, the importance of sharing equal responsibility and introduce group task completion checklists, which would allow more close monitoring on completion of tasks by all group members.

In addition, majority of the participants believed that the project work contributed to their research and resource use skills. Learners' responses indicated that most of them became aware of the managing time effectively and significance of planning each step of the project carefully, which was a finding supported by current research (e.g. Ruslan et al., 2021; Santoso et al, 2021). Some challenges regarding ineffective use of time were also on mentioned by the participants and they stated heightened awareness towards the importance of planning and managing time during the project, which is another similar finding (Aldabbus, 2018).

Furthermore, based-on the quantitative and qualitative data, it can be concluded that PjBL implementation in online learning contributes to acquisition of learning objectives by doing and experiencing. The project work in this study focused on creating a distance course design. Participants' responses indicated that they

mostly achieved the learning objectives of the course. Accordingly, learners emphasized that they could comprehend the content of the course by applying gained information into practice. Moreover, most of the participants believed that their gains would be permanent. This is one of the most common findings in PjBL literature (Chen & Yang, 2019; Çelik et al. ,2018; Santyasa et al, 2020; Syakur et al., 2020). Participants of this study expressed a lot more positive opinions compared to negative ones about the implementation of PjBL in their online Distance Education course. In the same way, they expressed few suggestions for the planning a better implementation of PjBL in their online course. Asserted positive opinions such as gaining collaboration, group work, and time management skills, learning by experience, contribution to individual learning, providing course subject revision, effective learning, effective evaluation, fun, and effective instruction were quite common int he relevant literature (Chen & Yang, 2019; Pellegrino & Hilton, 2012; Shin, 2018, Şahin et al, 2020). Negative opinions were mostly about not managing time effectively and communication problems within the groups. Difficulties in group works, inability to meet in common ideas, problems in setting up a common time, and members' not fulfilling responsibilities were among the challenges experienced by the participants in similar studies (e.g., Dag & Durdu, 2017; Pinter & Cisar, 2018; Şahin et al, 2020;). Pawson et al (2006) draws attention to this common problem in PjBL implementation by emphasizing that these problems originate from the lack of experience in joint learning and a lack of skills required for this type of learning. An implication of this finding can be setting a project orientation stage that covers sharing information, discussing the project, dividing tasks on each group member and preparing task completion checklists.

Despite the challenges, the findings in general indicate that PjBL implementation in the online course provided learners with gains in terms of comprehension of course content through hands-on experience, developing research skills, improving collaboration and group work skills, and creating something by making use of their imagination and creativity in a fun way. Whether online or face-to-face, PjBL has proven the potentials of effective teaching and learning process. This method has shown that it is effective not only in creating awareness on the significance of learning process, but also in raising awareness about the individual capabilities, achievements and the importance of planning, good communication and taking responsibility in the research process. As an effective method for gaining and measuring 21st century skills, PjBL stands out as a useful method in online teaching. It may be possible to create an effective learning process with the contribution of good planning, orientation, close process monitoring, and formative feedback given in a timely manner.

5. Limitations and Suggestions for Further Research

This study was limited by focusing on perceptions of limited number of learners taking the same online course. Future researchers might conduct mixed-research studies targeting students and teachers who are engaged in online PjBL for different courses with multiple data collection tools for both groups based upon the findings of this study. Also, this study is limited to the perceptions of learners. Investigating perceptions of teachers towards online PjBL implementation and teachers' unique methods for realizing PjBL in online teaching contexts might shed light on the relevant literature.

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Tendencies in Turkey-based academic studies on distance education during the covid-19 pandemic

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Article Info	Abstract
Keywords: Covid-19 Pandemic, Distance Education, Content Analysis Research/Review Article	This study examines the tendencies in Turkey-based scientific articles related to distance education during the Covid-19 pandemic. In this qualitative study, content analysis and categorical analysis were used. The population of the study is comprised of Turkey-based academic studies on distance education while the sample consists of 125 scientific research articles published until April 2021 and included in the Google Scholar database. Tendencies in studies on distance education were examined in terms of article information, research methods, samples, data collection tools, data analysis methods, and subjects or topics. The "publication classification form" developed by the researcher was used for data collection. As a result of the study, it is seen that qualitative research methods and case studies are frequently used while sample groups consisting of undergraduate students and interview forms are mainly preferred. It was also determined that the studies focus on research subjects that examine the opinions on distance education according to various demographic variables. In consecutive studies on this subject, diversification has been recommended in terms of subjects and methods, designs, participants from whom data is collected, and data collection tools.

1. Introduction

Having started to take effect all over the world in early 2020, the Covid-19 outbreak is one of the prominent crises throughout human history. This crisis was declared a pandemic by WHO (World Health Organization) on 11 March 2020. The Covid-19 pandemic has caused significant changes and transformations in many areas and notably in health, all over the world (Dwivedi et al., 2020). Education is another field facing changes and transformations (Upoalkpajor & Upoalkpajor, 2020). According to the data reported by the United Nations Educational, Scientific and Cultural Organization (UNESCO), schools in 188 countries have been closed to face-to-face education. This amounts to approximately 92% of the worldwide student population. As in all countries of the world, the education system in Turkey has also been affected by the pandemic (Noble, 2020; Wired and Altun, 2020). UNESCO has announced that it will support countries to take measures on distance education in order to reduce the negative effects of closed schools and to ensure the continuity of education for everyone. In this context, countries have launched existing distance education opportunities supported by different technological infrastructures in the most effective way (Mulenga & Marban, 2020). To minimize the impact of the pandemic in Turkey, emergency scenarios were switched on to enjoy the use of digital technology to the fullest extent. These

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scenarios were followed by compulsory distance education as a consequence (Bozkurt, 2020). For, in cases where appropriate place, time, and conditions are not possible, the most practical way of providing equal opportunity in education is distance education (Şen, Atasoy & Aydın, 2010; Veletsianos, 2010).

Distance education, also called distance learning, is a set of planned activities in which learning contents are presented to users through special communication methods without time and space limitations and with the use of electronic or non-electronic technologies (Rovai & Downey, 2010; Lee, 2020). Distance education is an interdisciplinary field that learns, teaches, and eliminates the limitations of learning content by using technology with a pragmatist approach (Bozkurt, 2017). Therefore, common technologies are used in learning-teaching processes and determine the stages of distance education (Anderson & Dron, 2011; Moore & Kearsley, 2011). In other words, technology is an important determinant of the classifications for distance education. Based on the chronology and generation of distance education, newspaper, letter, radio, television, video, computer, and internet technologies have played a decisive role, respectively (Anderson & Simpson, 2012; Casey, 2008). However, great developments have been observed in the sharing of information as well as in technology. Educational institutions have achieved new missions to serve large communities other than their own students (Deng, Benckendorff & Gannaway, 2019). One of the practical ways to accomplish these missions is online learning (Garrison, 2009). Online learning is a learning environment in which learners and teachers can communicate and interact synchronously or asynchronously (Moore, Dickson-Deane & Galyen, 2011). In this context, Turkey is one of the countries where formal education and online learning is concurrently provided. The "Education Information Network (EBA)" platform was established for primary and secondary education levels within the scope of the "Movement of Enhancing Opportunities and Improving Technology (FATİH)" project. This platform offers reliable and accurate e-content suitable for class levels while at the higher education level, employing the "Digital Transformation Project in Higher Education", faculty members and students come together interactively through online learning and continue their lessons and projects online as well as face to face. Also, almost all universities in Turkey are conducting a part of the educational process in an online environment via Distance Education and Application Centers (Kaçan & Gelen, 2020).

Though distance education had been previously launched in Turkey through innovative projects, it was not until 16 March 2020 that the distance education process was thoroughly adopted following the suspension of face-to-face education in all schools. Everyone with or without distance education experience suddenly landed in distance education activities. This led to the virtualization of the classes along with questions raised about potential gains or losses of students (Arkorful & Abaidoo, 2015; Panigrahi, Srivastava & Sharma, 2018). In such discussions, distance education, equal opportunity, individual learning, flexibility in measurement tools, communication, and interaction are considered as gains (Dumford & Miller, 2018; Hurt, 2008) while social learning, resistance to change, practical deficiencies, and negative attitudes are seen as losses (Debes, 2021; Kegeyan, 2016).

The discussions during such a rapid transition period are acceptable, but whether the transformation into distance education will be successful or not is closely related to academic research in this field. Studies on distance education are important in terms of the quality and applicability of education (Murphy & Rodríguez-Manzanares, 2012). When the literature is examined, it is seen that there are many studies examining distance education research in different disciplines in Turkey. (Aydın Erdem et all. 2019; Cabı & Ersoy, 2017; Gökmen et all. 2017; Kaçan & Gelen, 2020; Korucu & Kabak, 2020). On the other hand, it is striking that there are no content analysis studies during the Covıd-19 pandemic examining the research processes specific to the distance education subject in Turkey. In this context, it is reported that such content analysis studies play an important role in the dissemination of information, guiding future research, and shaping new policies, new practices and public perception specific to the subject (Çalık & Sözbilir, 2014; Suri & Clarke, 2009). Accordingly, classify scientific studies on distance education during the Covid-19 pandemic and to identify gaps, accumulations, and tendencies in studies will contribute to

the dissemination of information about distance education and revealing the needs and deficiencies in the field it will also guide researchers who are doing and will do research on distance education. Apart from this, it is thought to be important in terms of providing the opportunity to do a comparison of these studies with the studies published abroad on distance education   during the Covid-19 pandemic process. Thus, this study aims to examine Turkey-based academic studies on distance education during the Covid-19 pandemic. Besides, the sub-goal was to find an answer for the following question: What are general tendencies in studies on distance education depending on (*i*) article information, (*ii*) research methods, (*iii*) samples, (*iv*) data collection tools, (*v*) data analysis methods, and (*vi*) subject.

2. Methodology

2.1. Research Model

This study is based on the systematic analysis of Turkey-based scientific articles related to distance education and published during the Covid-19 pandemic until April 2021 in terms of various variables. The main objective of the analysis in academic studies is to reveal general tendencies, gaps, or accumulations in the relevant field. For this reason, content analysis was used in this study, which is based on a qualitative research approach in terms of the process and subject. The term content analysis has been used as a research method rather than a data analysis technique. Content analysis is a scientific method that brings together similar data within the framework of certain concepts and themes and examines them objectively and systematically (Krippendorff, 2018; Yıldırım & Şimşek, 2013).

2.2. Population and Sample

The population of the study consists of Turkey-based scientific articles related to distance education and published during the Covid-19 pandemic while the sample consists of 125 research papers published until April 2021 and included in the Google Scholar database. The criterion sampling method, which is one of the random purposeful sampling methods, was used to reach scientific articles that comply with the time interval and criteria determined within the scope of the study. The basic approach in the criterion sampling method is the study of people, events, objects, or situations that meet a predetermined set of criteria (Büyüköztürk et al., 2017). In this context, the criteria determined in the study were as follows; (i) To have articles in the field of distance education in the Google Scholar database, (ii) April 2021 as the deadline for publication of articles, and (iii) to contain at least one of the keywords of "Covid-19" or "pandemic". 150 academic studies were found to meet the specified criteria. As a result of the examination, 12 research and 13 scientific articles consisting of papers or reviews and found to be unrelated to the research and research subject were excluded from the scope of the research, and the remaining 125 scientific research articles were subjected to an examination.

2.3. Data Collecting Tools

The "publication classification form" developed by the researcher was used as a data collection tool. The publication classification form was prepared by determining the titles thought to be used in the form in line with similar studies (Çiltaş, Güler, & Sözbilir, 2012; Göktaş et al., 2012). These titles contain article information, the type of article, the subject of the article, the research method, and the level of samples, the number of samples, data collection tools, and the data analysis method.*Sampling or Study Group*

2.4. Data Analysis

The categorical analysis technique was used in the analysis of the collected data. Four steps were followed in the categorical analysis technique. In the first step, the studies were recorded in a folder on the computer according to the research title. Each of the studies was given a number from one to 150. In the second step, an Excel sheet was created to enter the data to be obtained for each title in the data collection tool. The serial numbers of the studies subjected to analysis were written in the rows in the Excel sheet, and the headings for the research problems were written in the columns. In the third step, the

articles were examined in detail according to the titles for each research problem and the tables were filled. In the fourth step, the data were arranged in a meaningful way and reported after the frequency and percentage calculations were made. The resulting findings were presented to the reader with percentages and frequencies using graphics. Furthermore, the procedures to ensure the validity and reliability of the study were: (*i*) to explain the data collection and analysis processes in detail, (*ii*) to create the encoding key named publication classification form, and (*iii*) to get help from an independent encoder. As a result of calculating the consistency between coders (Miles & Huberman, 1994), (Reliability = Consensus / (Consensus + Disagreement) x 100), the coefficient of the agreement was found to be 0.91, and this value was found to be at an acceptable level. In regards to codings analyses in which no consensus could be reached, the consensus was achieved after the encoders came together.

3. Findings

The findings of the study were analysed on the basis of research questions and are given below. The findings regarding the article information of academic studies on distance education during the Covid-19 pandemic are given in Graphic 1.
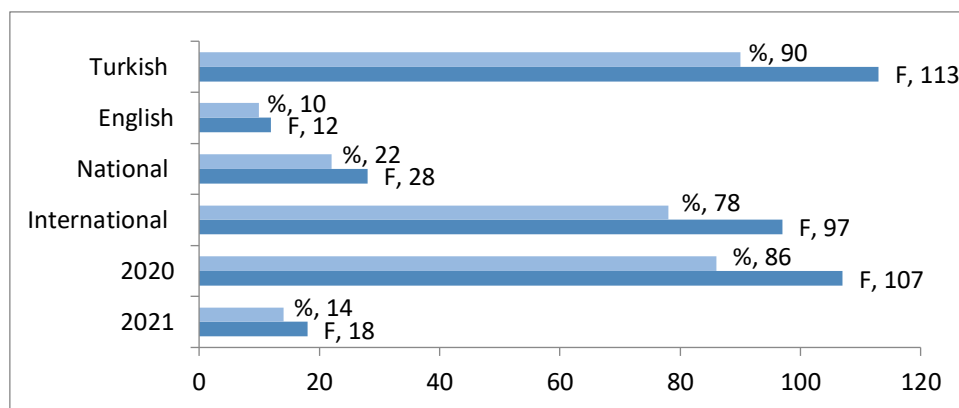
Graphic 1. Findings related to article information

As is seen in Graphic 1, the publication language of 113 articles (%90) is Turkish and 12 articles (%10) are in English. 28 articles (%22) are in national journals and 97 (%78) are in international journals. 107 articles (%86) were published in 2020 and 18 articles (%14) were published in 2021. The findings regarding the research methods used in the studies on distance education during the Covid-19 pandemic are shown in Graphic 2.
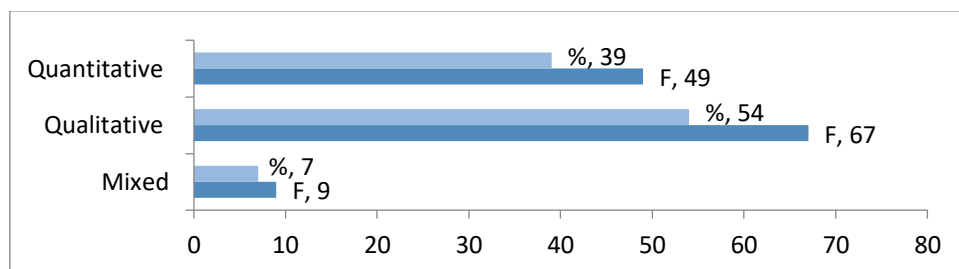
Graphic 2. The findings regarding the research methods used in the articles

As seen in Graphic 2, 49 (39%) are quantitative, 67 (54%) qualitative and 9 (7%) mixed research methods. The findings regarding the total number of samples used in distance education studies conducted during the Covid-19 pandemic are shown in Graphic 3.
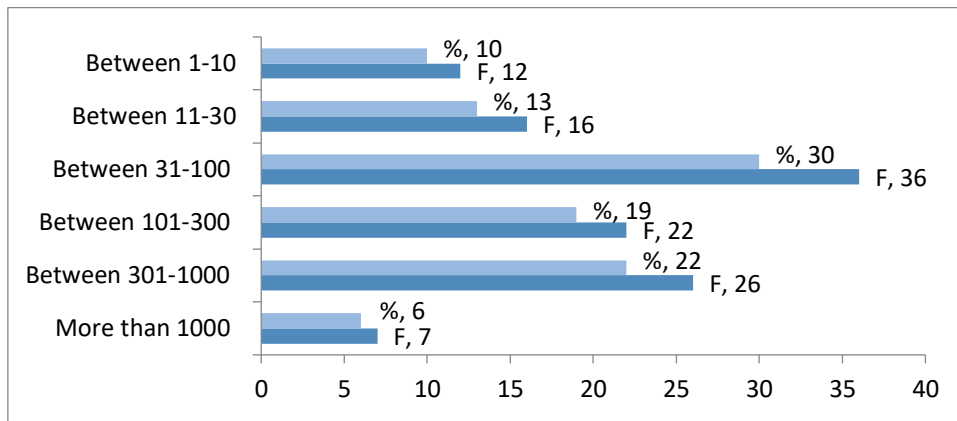
Graphic 3. The findings regarding the total number of samples used in the articles

As seen in Graphic 3, the researchers chose the maximum range of 31-100 (f: 36, 30%) as the total number of sample in the articles. This is followed by the ranges of 301-1000 (f: 26, 22%) and 101-300 (f: 22, 19%). The least preferred number of samples is the group consisting of a sample of more than 1000 (f: 7, 6%). The findings regarding the level of samples used in the studies on distance education during the Covid-19 pandemic are shown in Graphic 4.
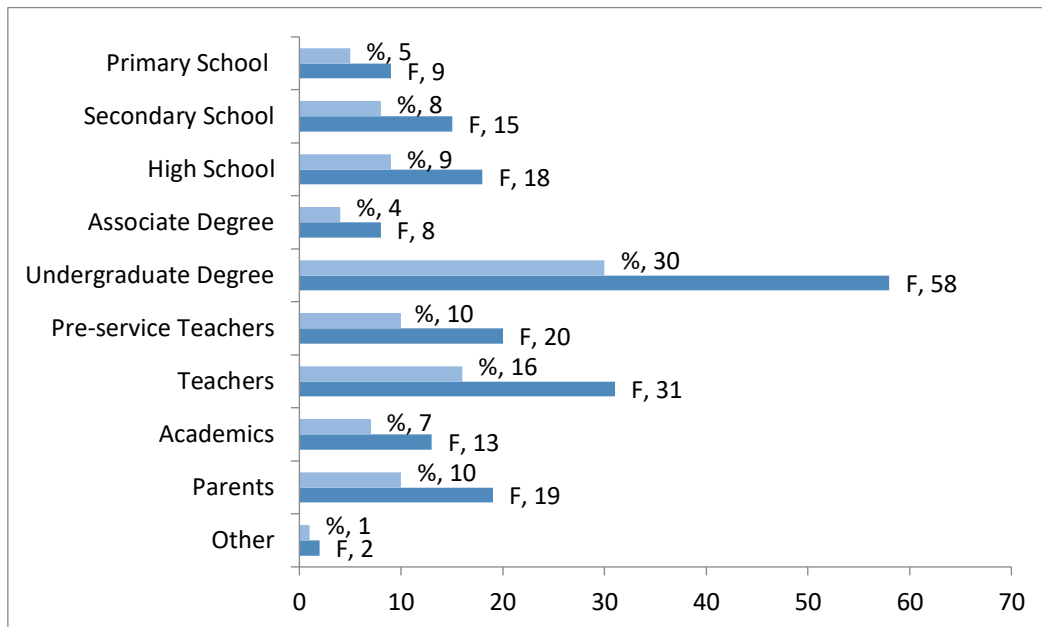
Graphic 4. Findings regarding the sample group used in the articles

As is seen in Graphic 4, during the Covid-19 pandemic process, the sample groups were mainly comprised of undergraduate students (f: 58, 30%) and teachers (f: 31, 16%) in articles on distance education, followed by pre-service teachers (f: 20, 10%), parents (f: 19, 10%), high school (f: 18, 9%) and secondary school students (f: 15, 8%). It is also observed that the researchers studied less on associate degree students (f: 8, 4%) and primary school students (f: 9, 5%). Finally, it is observed that some articles consisted of more than one sample level. The findings regarding the research pattern used in distance education studies during the Covid-19 pandemic are shown in Graphic 5.
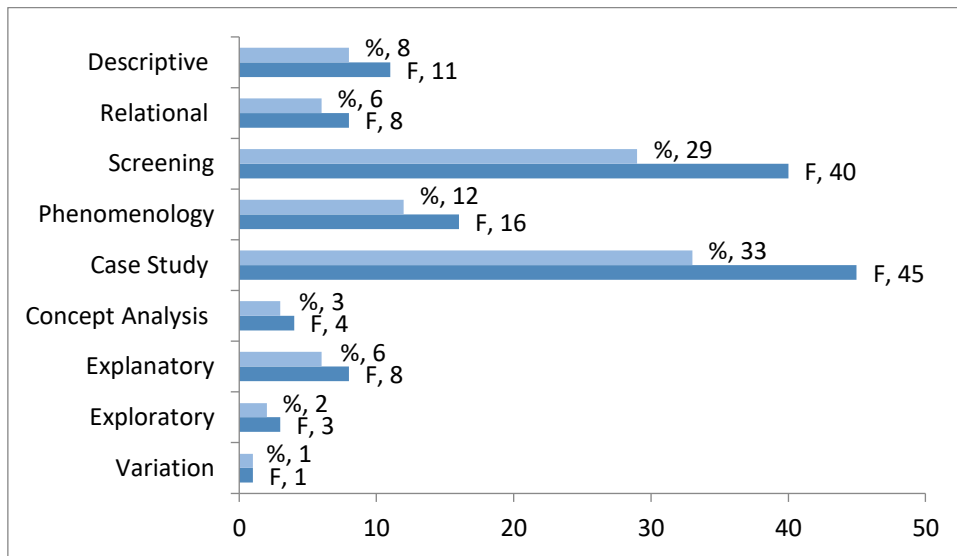
Graphic 5. Findings regarding the research patterns used in the articles

As seen in Graphic 5, researchers mostly used case study (f: 45, 33%) and screening pattern (f: 40, 29%) in research designs used in distance education studies, followed by descriptive (f: 11, 8%), explanatory (f: 8, 6%), relational (f: 8, 6%), concept analysis (f: 4, 3%), exploratory (f: 3,%). 2), and variation (f: 1, 12%). It is also found that more than one data collection tool was used in some articles. Findings regarding data collection tools used in distance education studies during the Covid-19 pandemic are shown in Graphic 6.
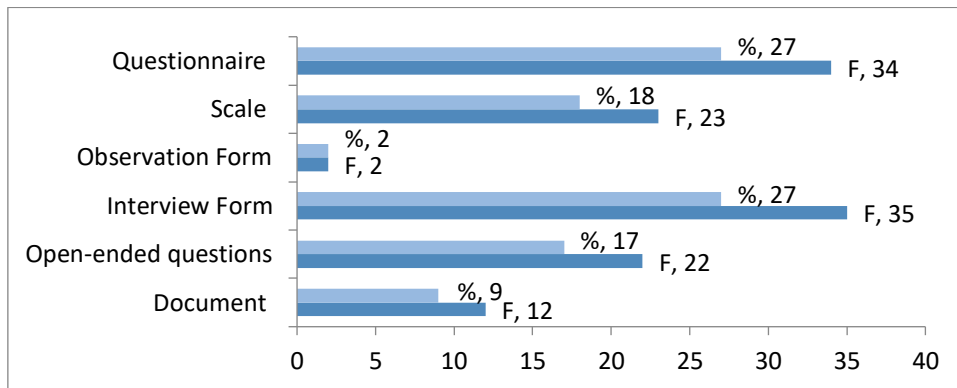
Graphic 6. Findings regarding the data collection tools used in the articles

As is seen in Graphic 6, researchers mostly used interview forms (f: 35, 27%) and questionnaires (f: 37, 27%) in data collection tools used in distance education studies, followed by the scale (f: 23, 18%), open-ended questions (f: 22, 17%), document (f: 12, 9%) and observation form (f: 2, 2%). In addition, it was found that more than one data collection tool was used in some articles. Findings regarding data analysis methods used in distance education research during the Covid-19 pandemic are shown in Graphic 7.
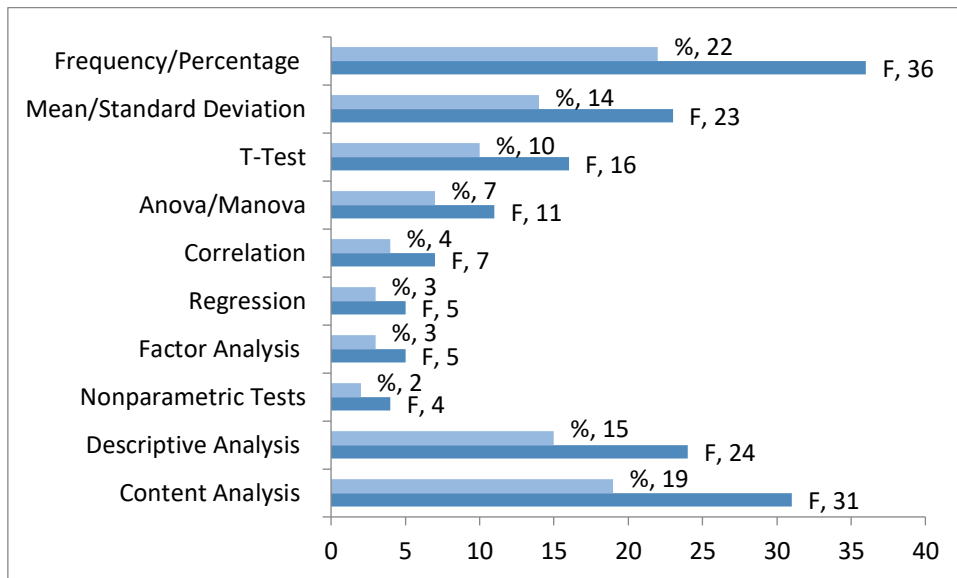
Graphic 7. Findings regarding the data analysis methods used in the articles

As is seen in Graphic 7, mainly frequency/percentage (f: 33, 20%), descriptive analysis (f: 30, 18%), mean/standard deviation (f: 28, 17%) methods are used in data analysis methods used in distance education studies, followed by content analysis (f: 26 16%), t-test (f: 16 10%), correlation (f: 7, 4%), regression (f: 5, 3%), factor analysis (f: 5,%). 3), and nonparametric tests (f: 4, 2%). The findings of the articles on distance education during the Covid-19 pandemic are shown in Graphic 8.
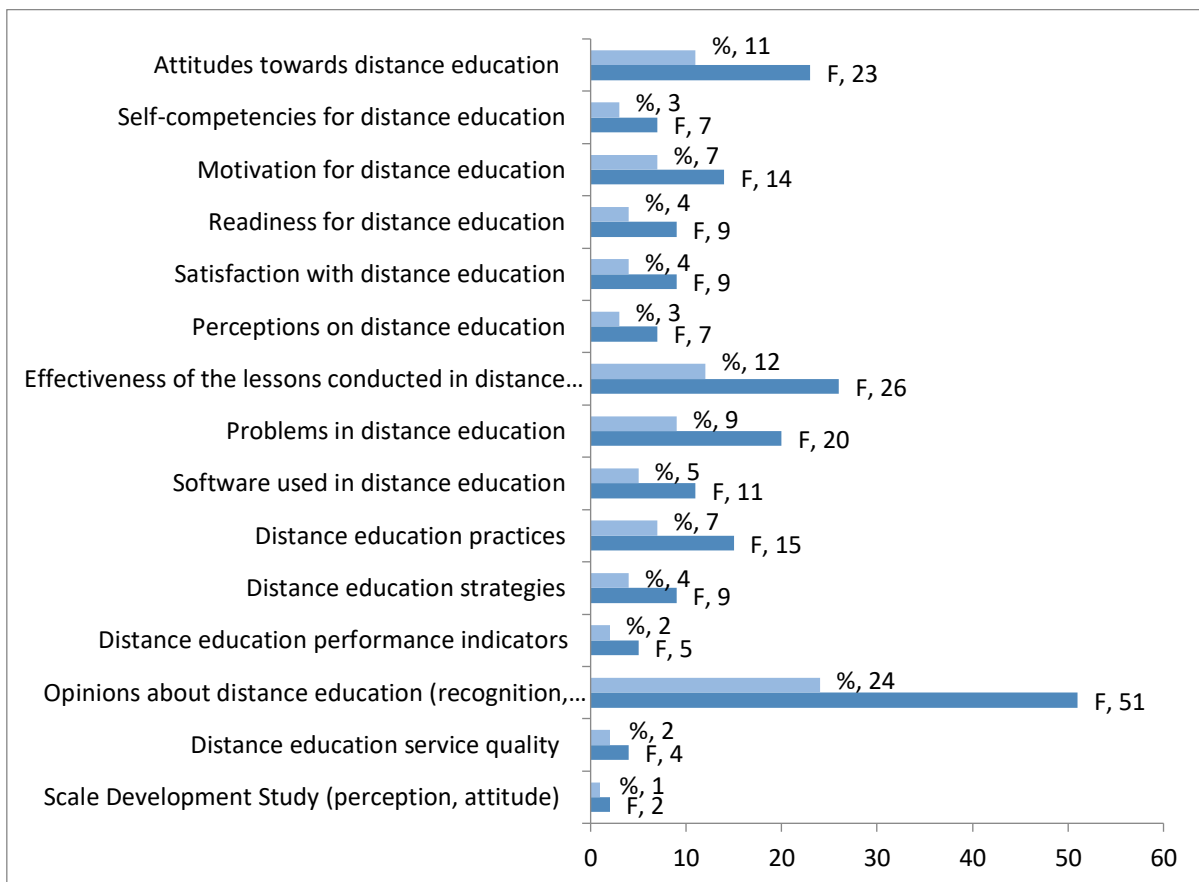
Graphic 8. Findings on the research topics of the articles

As seen in Graphic 8, the articles generally focus on "examination of opinions about distance education" (f: 51, 24%), "effectiveness of the lessons in distance education" (f:26,%12), and "attitudes towards distance education" (f: 23, 11%) while there are few studies on "scale development studies" (f: 2, 1%), "distance education service quality" (f: 4, 2%) and "distance education performance indicators (f: 5, 3%). However, it has been determined that the articles contain more than one research topic.

4. Discussion, Conclusion, and Recommendations

This study examined Turkey-based academic articles on distance education published during the pandemic. The results revealed that most of the studies (90%) were published in Turkish. The relevance of the articles, which is Turkey in this sense, may have been effective in such a result. Similar results were obtained in the study conducted by Çifçi and Ersoy (2019) on preschool education. In regards to the type of journal, it was found that the studies were mostly published in international journals (78%), which is a result of the Covid-19 pandemic being a global crisis. For, each published research result is closely related to all countries of the world. Most of the studies were published in 2020 (86%). This is thought to be related to the period of the study, which was limited to April 2021. Considering the calendar year, more studies can be published in 2021.

It was concluded that in studies related to distance education based in Turkey, qualitative research methods (54%) were mainly used and were followed by quantitative research methods (39%) and mixed research methods (7%). Content analysis studies in Turkey (Baz, 2017; Koşar, 2018; Saraç, 2017) differ from this study in terms of results. While quantitative research method results are expected to be more preferred due to reasons such as giving generalizable results and reaching a large sample (Gürbüz & Şahin, 2014), it was determined within the scope of the present study that the qualitative research method is preferred more. This is thought to be due to the lack of appropriate conditions for developing a quantitative data collection tool. However, the more use of qualitative and mixed research methods by researchers may be due to reasons such as the participant role of the researchers, holistic approach, flexibility in research designs, and inductive perspective. Therefore, researchers should be encouraged to use more quantitative and mixed research methods. In this context, Şimşek & et al. (2008) reported that students should be provided with more information on how to conduct and report mixed research. However, other conditions such as the required sample size, sample group or time may not have been provided. The results of the research regarding the level and number of sample support this situation. According to the results, the most preferred level of sample was undergraduate level (30%) and the most preferred number of sample was the range of 31-100 (30%). This overlaps with the results of studies conducted by Uygun & Sönmez (2019). However, a greater number of samples are needed to develop quantitative data collection tools (Erkuş, 2007). Restrictions and quarantine practices may have resulted in working with fewer sample groups since it is known that such occasions complicate field research.

The undergraduate level is frequently preferred in qualitative research in which perceptions or events are monitored in a realistic and holistic manner in the natural environment (Burbank, Odomb & Sandlin, 2015; Kutluca, Birgin & Gündüz, 2018). Therefore, it was concluded that working with undergraduate level sample groups based on the qualitative method is an expected situation in the pandemic process during which it is hard to meet the conditions required for using a quantitative method. However, factors such as convenience and affordability may have caused the undergraduate level (30%) more than the levels of primary school (5%), secondary school (8%), and high school (9%). Göktaş et al. (2012) reported that in educational research, researchers mostly prefer university students who are easy to reach, while Kahyaoğlu (2016) reports that pre-school, primary, and secondary school students are less preferred. Another remarkable finding in the study is that the number of studies conducted with the sample level of teachers (16%) is higher than the number of academics (7%) and pre-service teachers (10%). The literature review shows that teachers and their views on the process are expected to guide distance education studies (Alea et al., 2020; Hershkovit & Berger, 2019). In this context, it is expected

that the sample groups consisting of teachers were preferred more in the studies on distance education published during the pandemic.

The findings regarding the research design used in the studies revealed that case studies (33%) and survey models (29%) are generally used. This result of the research is in parallel with the studies conducted by Altunçekiç (2020), Kavaklı & Yakın (2019), and Varışoğlu, Şahin & Göktaş (2013). As is known, case studies examine cases in depth within their own boundaries and seek answers to questions of "how" and "why" (Baxter & Jack, 2008; Subaşı & Okumuş, 2017). In survey studies, a past or current situation is described as it is (Büyüköztürk et al., 2017; Creswell, 2017). In this context, the need for in-depth analysis of the distance education process during the pandemic may have led researchers to use such patterns. The results on data collection tools support this situation. It was determined that interview forms and questionnaires were mostly used as data collection tools. These data collection tools allow researchers to describe the distance education process as it exists and to examine it in its own environment. Findings regarding the data analysis methods used in the studies also support these results. According to the findings, percentage/frequency (36%) and content analysis (31%) techniques were used more in the studies. Content analysis is the method of analysing the collected qualitative data and reducing such data to quantitative terms (Baxter & Jack, 2008). When evaluated from this aspect, it can be implied that researchers examined in depth the distance education process under pandemic conditions.

Studies related to distance education based in Turkey mostly focus on opinions about distance education (24%), the effectiveness of courses in distance education (12%), attitudes towards distance education (11%), and the problems experienced in distance education (9%). Besides, such studies also examine the opinions of the participants about the distance education process in terms of various demographic variables. It can be inferred that the relevant studies focus on certain subjects. Also, it is considered as an expected situation to observe studies on the problems experienced in distance education and the effectiveness of the lessons to make better quality and applicable distance education activities during the pandemic.

In the light of these results, research is recommended on more articles, congress or symposium booklets in an attempt to reach more detailed results on distance education during the pandemic. One may notice that qualitative research methods are generally preferred. Thus, researchers are recommended to draw upon quantitative and mixed research methods and reach larger sample groups for generalizable results. More studies are recommended with sampling groups such as parents, instructors, and administrators, on which fewer studies are conducted. Studies can be enriched with other less frequently used research designs (such as phenomenology, explanatory, and exploratory) other than case studies and survey patterns in studies related to distance education. Data collection tools and data analysis methods and techniques used in the field of distance education can be diversified. Distance education is an interdisciplinary research area. Apart from concepts, errors, problems, solution suggestions, and attitudes, researchers can also focus on other subject areas (such as distance education strategies, distance education service quality, distance education performance indicators) to contribute to the field with different perspectives.

As a result, this research will contribute to the quality of researchers' work by offering them some suggestions in their studies on distance education in terms of method and research results. Also, revealing the general trend in the studies on distance education during the Covid-19 pandemic will guide researchers who will conduct research on this subject. In this context, this study is limited on the systematic analysis of Turkey-based scientific articles related to distance education and published during the Covid-19 pandemic until April 2021 in terms of various variables.

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The use of learning management system (LMS) moodle in the midst of covid-19 pandemic: Students' perspective

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Article Info	Abstract
Keywords: Covid-19, e-learning, Learning Management System Moodle, Acceptance Research/Review Article	This study reports on students' acceptance of Learning Management System (LMS) Moodle as e-Learning system at the University of Education, Winneba. The participants of the study were 392 undergraduate students purposively selected from the Department of Integrated Science Education. Technology Acceptance Model (TAM) instrument which has four factors; Perceived Usefulness, Perceived Ease of Use, the Behavioural Intention, and the Actual Use was the main instrument employed to collect the data. Findings from the descriptive analyses of data collected revealed a considerable high acceptance of the LMS Moodle by students. Although challenges like internet connectivity and lack of prompt feedback from lecturers were reported, students found the LMS Moodle as convenient and user-friendly. To promote effective teaching and learning in future, virtual learning should be integrated into the normal traditional classroom.

1. Introduction

The outbreak of Covid-19 in 2020 across the globe has caused lockdown of most countries borders and public institutions including schools. The lockdown was done to limit the spread of the infection across countries and also cities. Restricting human movements to help prevent the spread of the infection were lessons drawn from previous pandemic outbreaks. In 2009, the city of Oita, Japan successfully decreased the number of infected students during the peaking of the H1N1 Flu pandemic (Kawano & Kakehashi, 2015). Davis, et al. (2015) revealed that closure of schools in UK interrupted the course of infection of the Swine Flu outbreak in 2009. The closure of schools and public institutions reduced the spread and also bought time for research and production of vaccines. Closure of schools could be national, regional and local in response to infection rates. Over 107 countries implemented national school closure in relation to Covid-19, affecting 862million children and young people (UNESCO, 2020). Although closing down of schools may help curb the spread of Covid-19, the challenges and consequences it has brought is numerous. School closure does not only affect students, teachers, and families, but have far-reaching economic and societal consequences, (Lindzon, 2020).

Some economic and social challenges and consequences identified are interrupted learning of children, poor nutrition among children, confusion and stress for teachers, parents unprepared for distance and home schooling, challenges creating, maintaining and improving distance learning, gaps in childcare by working mothers, high economic costs, unintended strain on health-care systems, rise in school dropout rates,

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increased exposure to violence of children and sexual exploitation of female girls, social isolation and challenges measuring and validating learning (UNESCO, 2019). These challenges and consequences made governments all over the world to worry about the extent of the devastation of this outbreak on their economy and education. Education, the core of development, needs to be sustained to ensure future economic growth. Therefore it is imperative that teaching and learning must continue in the midst of Covid-19 and school closure.

For teaching and learning to go on, the Government of Ghana through the Ministry of Education charged all levels of educational institutions including the Universities to roll out various e-Learning programmes. The University of Education, Winneba introduced the Learning Management System (LMS) Moodle as a replacement to the traditional face-to-face classroom. Moodle is an acronym for Modular Object-Oriented Dynamic Learning Environment. The LMS is a course management system through the internet. The Moodle is free and has no licensing cost attached (Brandle, 2005; Su, 2006) and runs on the major platforms of Windows, Mac OS X, Linux and Unix (Wu, 2008). The rolling out of the LMS to all students was to ensure smooth continuation of academic work, to bring the 2019/2020 academic year to a successful end. The rolling out of the Moodle was also to help achieve the objective of the introduction of Information and Communication Technology for Accelerated Development (ICT4AD) policy. The ICT4AD policy statement sets out the road map for the development of Ghana's information society and economy and provides a basis for facilitating the socio-economic development of the country in the emerging information, knowledge and technological age to be dominated by information and knowledge based economy. Hence to transform Ghana into an information and knowledge-driven ICT literate nation. To help achieve this policy one of the policy objectives is to promote and improve educational system within which ICTs are widely deployed to facilitate the delivery of educational services at all levels of the educational system. The enactment of the ICT4AD policy in the University of Education, Winneba in particular was to promote and encourage distance education including electronic distance education and virtual learning, focusing on tertiary level education and training in all fields and disciplines to broaden access to educational and training resources and services to a larger section of the society (Republic of Ghana, 2003).

The LMS Moodle developed by the University of Education, Winneba powered by the IT service Directorate has been in used since 2018 by the Institute for Distance and e-Learning (IDeL) of University of Education, Winneba. The LMS Moodle offers students the opportunity to access lessons, assignments, comments, wikis, forums, chats, workshop and quizzes among others with ease anywhere and anytime. The system enables students to interact and communicate freely anytime with lecturers, submit assignments and take quizzes. The assignments and quizzes are graded and feedback sent to students which can be accessed online. Similarly, lecturers support students to learn by providing them with learning resources, relevant links and monitoring their progress regularly. These features on the Moodle enables participants to learn through interaction, promoting student centered, problem-solving and social constructivist approach to learning (Westermann, 2014; Saghafi et al., 2014; Gonzàles-Gómez et al., 2016).

2. Literature

The LMS Moodle is a form of e-Learning that involves the use of technological tools. This helps learners to study anytime and anywhere, hence extending the classroom to the web. The term e-Learning according to Maltz, Deblois and The EDUCAUSE Current Issues Committee (2005) is applied in different perspectives, including distributed learning, online-distance learning, as well as hybrid learning. The Organization for Economic Co-Operation and Development (OECD) (2016, 2005) also define e-Learning as the use of information and communication technologies (ICT) in diverse processes of education to support and enhance learning in institutions of higher education, and includes the usage of information and communication technology (ICT) to improve students' traditional learning experiences and these technologies will act as a catalyst if a similar change process occurs. E-learning is also defined as a method of teaching and learning that fully or partially signifies the educational model used, based on the use of

electronic media and devices as tools for enhancing availability of training, communication, and interaction, and that helps in accepting novel ways of comprehending and establishing learning (Krishnan & Hussin, 2017; Rhema, 2013). According to Wentling, et al. (2000) e-Learning depends on computers and networks to provide information and instruction to individuals globally. Similar views are shared by other researchers (Lee, et al., 2009; Liu & Wang, 2009; (Rissa, 2014; Welsh, et al. 2003). The adoption of LMS Moodle by the University of Education, Winneba to all its students to ensure effective teaching and learning in the face of covid-19 pandemic in the 2019/2020 academic year could have varying levels of effectiveness.

The adoption of e-learning may provide the institutions as well as learners the flexibility of time and place for lecture delivery and enhance easy access to a lot of information. It also promotes relations between learners and lecturers by the use of discussion forums hence eliminating the fear of facing each other as they express their opinions. Wagner, Hassanein, and Head (2008) noted that e-Learning makes available extra prospects for interactivity between students and teachers during content delivery. Additionally, e-learning can establish community spirit among the learners, create independent learners, build strong relationships among the learners and instructors, and improve problem-solving skills (Salloum et al., 2019). LMS Moodle is cost effective. There is no need for many lecture halls to accommodate large number of students and also students travelling from their residences and keeping to the protocols to attend lectures amidst the covid-19 pandemic. The LMS Moodle accommodates the study pace of each student as they can repeat lessons and activities many times as needed. Twigg (2002) described the e-learning approach as centred on the learner as well as its design as involving a system that is interactive, repetitious, self-paced, and customizable. Similar views are expressed by Khalid, (2014) and Hussein, (2015). According to Tao, Yeh, and Sun (2006), this new environment for learning that is centred on electronic networks has allowed learners in universities to receive individualized support and also to have learning schedules that is more suitable to them as well as separate from other learners. Again, it allow leaners more control and responsibility over their learning by providing opportunities to learn anytime, anywhere (Tselios et al., 2011). The LMS Moodle may ease lecturers work load as learning materials uploaded on the Moodle by a lecturer will be assessed by all students. The advantages outlined above can be summed up by Khan (2005) as the environments for e-learning are tolerant, so they are a good way of offering equal access to the information world irrespective of the locations of the users, their ages as well as their ethnic origins, and races. Similar views are expressed by Bernard et al., 2014, Chigeza & Halbert, 2014, Israel, 2015, Northey et al., 2015 and Potter, 2015 in their studies identified that the use of web-based technologies in offering opportunities for out-of-class learning independent of time, place and pace.

In spite of the listed advantages, a successful e-Learning requires self-motivation and time management to be apt to task placed on the Moodle. The use of traditional lecture method could be more effective in terms of clarifying, explaining and interpreting concepts as students and lectures interact face-to-face. More so students may not have the needed skills to express their opinions hence affecting the communicating skills adversely. Again assessing students using the LMS Moodle maybe challenging as students' actual performance could not be guaranteed should students engage in activities such as cheating which could be difficult to be controlled by the Moodle. According to Salloum et al. (2019) e-learning is less trustworthy than traditional learning in terms of peer feedback and collaborative activities assessment. LMS Moodle may probably deteriorate institutions' socialization role and also the role of instructors as the directors of the process of education. Again not all discipline can promote effective teaching and learning using the LMS Moodle. The LMS does not offer the same degree of effectiveness of ease of teaching and learning of some disciplines. For instance discipline that include practical work cannot be properly study through e-Learning. Students found themselves better equipped for solving general science problems during face-to-face classroom and laboratory activities Gonzàles-Gómez et al. (2016). In addition, Saghafi et al. (2014) argued that both the face-to-face and web-based learning environments have their respective uses but also their limitations. According to them face-to-face support hands-on skills training, while the e-learning turns out to be better suited for constructive discussion. Hence, e-learning could be more appropriate in social

science and humanities than the fields of science. There could also be difficulty in accessing the platform. This happens when there are many users logged on the platform, the servers are unable to manage information properly when there are many users on the platform. This may bring about unanticipated costs both in time and money disadvantages (Akkoyunlu & Soylu, 2006; Almosa, 2002; Collins et al., 1997; Hameed et al., 2008; Klein & Ware, 2003; Lewis, 2000; Marc, 2002; Scott et al., 1999).

The implementation of the LMS Moodle is in its early stages in the University of Education, Winneba. Usually, new system may fail due to the unacceptability of it users because they may not see any benefits from using the system or the system may be difficult to access and use. This study used Technology Acceptance Model (TAM) to measure the student's acceptance of LMS Moodle as e-Learning system in the University of Education, Winneba. The TAM developed by Al-Maroof and Al-Emran in 2018, evolved from the original TAM developed by Davis (1989). Davis (1989) defined Perceived usefulness (PU) as the degree to which a person believes that using a particular system would enhance his or her job performance and Perceived ease-of-use (PEOU) as the degree to which a person believes that using a particular system would be free from effort. It is one of the various theories of technology to appreciate the perception of students. Behavioural Intention (BI) refers to an individual's intention to perform a behaviour and is a function of Attitude and Perceived Usefulness (Davis et al., 1989). According to Davis et al. (1989), Actual Use (AU) of a particular system is defined as a behavioural response, measured by the individual's action. The relationships between the mentioned constructs are presented in figure 1.TAM describes that a person's behavioural intention to use E-learning is determined by perceived usefulness and perceived ease of use (Mahdizadeh et al., 2008). Perceived usefulness (PU) and perceived ease of use (PEOU) are considered predictors for Behavioural Intention (BI) and Actual Use (AU) and that the predictors PU and PEOU are the most influential elements of the model (Toland et al., 2014). TAM in educational technology acceptance has proved its effectiveness as compared with the other theoretical models (Al-Qaysi, et al., (2018). The TAM model has become a robust model that is appropriate for predicting the acceptance of several technologies (Al-Busaidi, 2013; Al-Emran et al., 2018). TAM have been successfully adopted to study technology acceptance and usage by many scholars (Al-Emran et al., 2016; Al-Maroof & Al-Emran, 2018; Almarabeh, 2014; Salloum, et al., 2019; Tagoe, 2012) since it provides a solid background for the effectiveness of a new technology. Gamble in 2017 used TAM to exploring EFL University students' acceptance of e-learning and Al-Maroof and Al-Emran in 2018 used TAM to explore students' acceptance of google classroom using PLS-SEM approach. The purpose of the study was to measure the student's acceptance of LMS Moodle as e-Learning system in the University of Education, Winneba. The study also sought to identify some limitations using LMS Moodle as a learning system in the University of Education, Winneba.
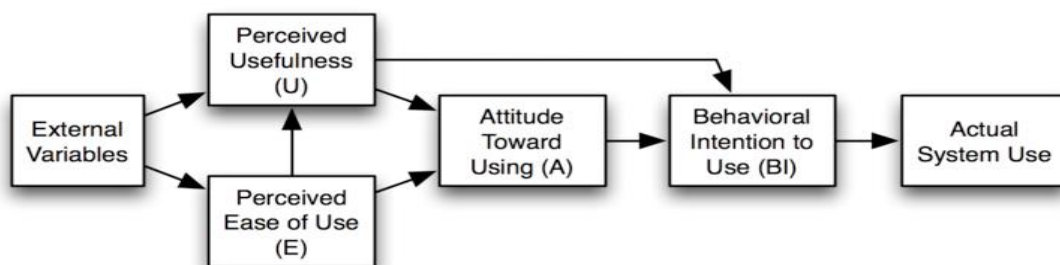
Figure 1. Original Technology Acceptance Model (TAM)

3. Methodology

3.1. Research Model/Design

This study employed a descriptive survey methodology and was carried out at the University of Education, Winneba in Ghana. Descriptive survey design seeks to explain people's perceptions and behaviour on the basis of information obtained at a point in time (Fraenkel & Wallen, 2009). However, it is limited because the results consist of self-reporting data based solely on what people say they believe or like or dislike (Thomas et al., 2005). Despite this disadvantage it elicits a good number of responses from numerous people at a time and provides a meaningful picture of events. In this case, the survey design provided the researcher an opportunity to identify the perceived.

3.2. Data Collecting Tools

The instrument for the study was an online questionnaire consisting of three sections. The main advantage of the questionnaire is that it can be administered to a large number of respondents at the same time, and can be mailed when necessary (Jack & Norman, 2003). Section A of the questionnaire gathers demographic information on students. The section B is to measure the student's acceptance of LMS Moodle as e-Learning system in the University of Education, Winneba using TAM. Technology Acceptance Model (TAM) developed by Al-Maroof & Al-Emran in 2018 to measure students' acceptance of E-learning in Oman was adapted for this study. The TAM instrument consists of 18 items distributed among 4 factors. These factors include: the Perceived Usefulness (PU) which had seven items, Perceived Ease of Use (PEOU) had six items, the Behavioural Intention (BI) had three items, and the Actual Use (AU) had two items. All the items were measured using a four-point likert-type scale ranged from Strongly Disagree = 1, Disagree = 2, Agree = 3 to Strongly Agree = 4. The section C of the questionnaire contained open ended question that elicited information on challenges faced by students using the LMS as e-Learning system.

3.3. Sampling or Study Group

The sample of the study consist of 392 undergraduate students from the Department of Integrated Science Education who enrolled on the LMS platform for the second semester of 2019/2020 academic year. The students from Department of Integrated Science Education were purposively selected because the researchers were teaching selected courses at the Department. The courses are Energy and energy transformation (level 100), Carbohydrates, proteins and lipids (level 200) and The Reproductive system (level 300).

3.4. Data Analysis

Descriptive analysis was employed for section A and B. To determine the acceptance of the LMS Moodle by students, respondents were asked to indicate the intensity of their responses to each item on a four-point Likert scale. The responses were organised into frequency counts, percentage frequency and mean score. The responses from section C was summarised and presented in frequency counts and percentage frequency.

3.5. Validity and Reliability

The face validity of the instrument was enhanced by senior science educators and professors in the faculty of Science Education in the University of Education, Winneba. They reviewed the wording and clarity of the items with respect to the factors of the TAM. They were satisfied the items addressed the factors of the TAM. The adapted TAM instruments was pilot tested and the Cronbach Alpha value for the instrument calculated was 0.8. According to Fraenkel and Wallen (2009) a reliability figure should be at 0 .7 and preferably higher and therefore, 0.8 is a good value. Therefore the instrument is highly reliable.

Table 1.

Cronbach's alpha values for the factors

Factors	Number of Items	Cronbach's alpha
Perceived Usefulness (PU)	7	.817
Perceived Ease of Use (PEOU)	6	.873
Behavioural Intention (BI)	3	.833
Actual Use (AU)	2	.735

3.6. Research Procedures

The questionnaire was uploaded on the LMS Moodle for integrated science students taking Energy and energy transformation (level 100), Carbohydrates, proteins and lipids (level 200) and The Reproductive system (level 300) as a course to respond to.

4. Findings and Discussions

The demographic information of respondents, their responses on LMS Moodle Acceptance and limitations using the LMS are presented here. Table 2 shows the demographic information of the respondents.

Table 2: Demographic Information of Respondents

Item	Variables	Frequency	Percentage
Gender	Male	305	77.8
	Female	87	22.2
Device used	Smart phones	256	65.3
	Computers	107	27.3
	Other device	29	7.4
Year of study	Level 100	183	46.7
	Level 200	127	32.4
	Level 300	82	20.9
Experience with LMS	Less than 3 months	254	64.8
	More than 3 months	128	32.6
	More than 1 year	10	2.6
Preferred mode of delivery	Face-to-face	128	32.6
	LMS	29	7.4
	Hybrid (face-to-face and LMS)	235	60.0

N= 392

A total of 392 participated in the study with most of them being male (77.8%). More than half of the students (65.3%) used their smart phones in accessing the LMS. In terms of year of study, most of them were in level 100 (46.7%) followed by level 200 (32.4%) and level 300 (20.9%). The results also show that 64.8% had less than three months experience with the LMS in their education. The results indicate that majority of the students (60.0%) preferred the hybrid (face-to-face and LMS) mode of teaching and learning, followed by face-to-face (32.6%) which is the traditional mode of teaching and learning then LMS (7.4%) respectively.

Table 3.

Frequency and Percentage Distribution of Student Responses on LMS Moodle Acceptance.

Factor	Item	Strongly agree		Agree		Disagree		Strongly Disagree		Mean
		F	%	F	%	F	%	F	%	
Perceived usefulness PU	LMS enhances my efficiency.	176	44.90	151	38.52	29	7.40	36	9.18	3.19
	LMS enhances my learning productivity.	165	42.09	132	33.67	49	12.50	46	11.73	3.06
	LMS enables me to accomplish tasks more quickly.	132	33.67	177	45.15	51	13.01	32	8.16	3.04
	LMS improves my performance.	154	39.29	176	44.9	38	9.69	24	6.12	3.17
	LMS saves my time.	14	3.57	17	4.34	274	69.9	87	22.19	1.89
	LMS doesn't have any distinctive useful features.	163	41.58	154	39.29	24	6.12	51	13.01	3.09
	LMS is not applicable to all academic courses	266	67.86	107	27.3	11	2.81	8	2.04	1.80
Perceived ease of use (PEOU)	LMS is easy to use.	194	49.49	103	26.28	42	10.71	53	13.52	3.12
	LMS enables me to access the course material.	302	77.04	58	14.80	19	4.85	13	3.32	3.66
	LMS is convenient and user-friendly.	269	68.62	47	11.99	43	10.97	33	8.42	3.41
	LMS allows me to submit my assignments	316	80.61	51	13.01	13	3.32	12	3.06	3.71
	LMS requires no training.	196	50.00	127	32.40	23	5.87	46	11.73	3.21
	LMS makes it easier to avoid future academic difficulties	152	38.78	139	35.46	58	14.80	43	10.97	3.02
Behavioural intention to use (BI)	I intend to increase my use of the LMS	156	39.80	146	37.24	33	8.42	57	14.54	3.02
	It is worth to recommend LMS for other students.	146	37.24	154	39.29	49	12.50	43	10.97	3.03
	I'm interested to use the LMS more frequently in the future.	147	35.08	175	41.77	55	13.13	42	10.02	3.02
Actual use (AU)	I use the LMS on daily basis.	168	42.86	136	34.69	47	11.99	41	10.46	3.01
	I use the LMS frequently	174	44.39	138	35.20	33	8.42	47	11.99	3.12

N= 392

The percentage responses of the students to measure their acceptance of LMS Moodle as e-Learning system is presented in Table 3.

From Table 4, most of the respondents 327 (83.42%) admit that the LMS enhances their efficiency and learning productivity 297 (75.76%). Again, students positively affirm that LMS enable them to accomplish more task quickly 309 (78.82%) and improves their performance 330 (84.199%). About 62 (16.08%) agreed that LMS save them time while 330 (84.19%) disagreed to the statement. Also, 62 (16.08%) disagreed that the LMS is not applicable to all academic courses however, 373 (95.16%) of the respondents agreed to the statement. The average mean score (2.75) indicates that the use of LMS Moodle for teaching and learning is perceived as useful.

In terms of Perceived ease of use, most students 297 (75.77%), positively affirm that the LMS is easy to use, enables them to access the course material 360 (91.84%) and very convenient and user-friendly 316 (80.61%). Again students 367 (75.77%) agreed that the LMS also allows them to submit their assignments, 323 (82.4%) requires no training and 291 (74.24%) makes it easier to avoid future academic difficulties.

With the mean score ranging between 3.02 and 3.71, indicate that students agree to the factor 'Perceived ease of use' of the LMS Moodle.

On Behavioural intention to use (BI), more students 302 (77.04%) intend to increase their use of the LMS, however 90 (22.96%) of them declined. Similarly, students 322 (77.57%) agreed to use the LMS more frequently in the future and 300 (76.53%) also recommended for other students. The average mean (3.02) suggest that students intend to adapt the use of LMS in their future learning.

On Actual Use, majority of students 304 (77.55%) agreed to using the LMS on daily basis although 88 (22.45%) disagreed to this. More so, respondents 312 (79.59%) agreed to use of the LMS frequently while 80 (20.44%) disagreed. The average mean (3.06) also suggest that students actually want to use the LMS in their learning.

The section C of the questionnaire asked the undergraduate students to identify limitations of LMS course delivery. The responses were categorized into the following themes/categories and presented in Table 4.

Table 4.

Limitations of LMS course delivery identified by respondents

Themes/categories	Yes		No	
	F	%	F	%
Challenges with connectivity	364	92.8	28	7.2
Difficulty in accessing LMS due to locality	247	63.0	145	37.0
Lack of immediate feedback from lecturers	329	83.9	63	16.1

N= 392

Below are samples of responses that participants provided as limitations encountered using the of LMS course delivery Moodle:

"I mostly use my phone to download course material, to take quizzes and to search for information from the internet since I do not have a computer of my own. But when it comes to working and submitting my assignments I visits nearby private internet café which cost me a lot of money and time".

"Because of my locality I have to travel some distance to assess the internet café and when I log on to the LMS navigating the system was easy and friendly".

"Also there is lack of immediate feedback from lecturer on our performance, it takes weeks before I get responses on our performance".

"I had connectivity problems when taking quizzes. It seems the system could not handle many users at a time".

"Because we went online we could not complete all our science practical for the semester in the laboratory".

"The use of the chat, discussion forum was not regular".

The results of study show the acceptance of LMS by the students of the Department of Integrated Science Education at University of Education, Winneba. With respect to Perceived Use (PU) most of the student admits that the LMS enhanced their efficiency, learning productivity, and improved their performance. This response by students could be that they had to do a lot of reading, and find information mostly on their own from sources such as the internet and textbooks with the guide and links provided by the lecturers as they research and read wide they are better informed on the concepts taught therefore students become active

learners and critical thinkers. However, students disagreed 330 (84.19%) that the LMS save them time. This results support other findings of Almosa, 2002; Akkoyunlu & Soylu, 2006; Collins et al. 1997; Hameed et al, 2008; Klein & Ware, 2003; Lewis, (2000); Marc, 2002; Scott et al. 1999); which reveal that this may bring about unanticipated costs both in time and money disadvantages. Again, students agreed 373 (95.16%) that the LMS is not applicable to all academic courses. This finding was as a result of the nature of their programme. The B.Sc. Integrated Science Education is a programme comprising theory and practical work. Students again identified this statement as a limitation *'Because we went online we could not complete all our science practical for the semester in the laboratory'*. Affirming Gonzàles-Gómez et al. (2016) and Saghafi et al. (2014) findings that face-to-face support hands-on skills training.

The average mean score of 2.75 indicates that the use of LMS Moodle for teaching and learning was perceived as useful. This finding is consistent with Henderson's (2005) study conducted on the role of computer and Internet access in business students' acceptance of e-learning technology. Students also responded that it is easy to access course materials, submit assignments. In fact the LMS is very convenient and easy to use. These reaction could be because majority (65.3%) of the students uses their smartphones in assessing the LMS everywhere and anytime as far as they are connected to a network. This finding agrees with the study conducted by Arthur-Nyarkoa and Kariuki (2019) at the College of Distance Education, University of Cape Coast. Hence, there is the likelihood that students who have a higher level of access to digital devices such as computer, smartphones, tablets and the Internet would respond positively to e-Learning delivery and the opposite is equally probable Arthur-Nyarkoa,& Kariuki (2019). The results also showed that most of the students (64.8%) had less than three month experience with the LMS but they indicated they required no training this may be student taking Information and Communication Technologies (ICT) as general and mandatory course as part of their 4-year degree programme. It can be concluded that students have acquire basic skills in ICT. By using ICT the teacher's role is being transformed from a traditional profession to an intermediate supporter towards the facilitation of the students to conquer knowledge (Kalogiannakis 2010). Therefore, e-Learning has the potential to transform people, knowledge, skills and performance.

Out of the 392 students who participated in the study, 60.0% of them preferred the hybrid (face-to-face and LMS) mode of teaching and learning, to face-to-face (32.6%) and LMS (7.4%). This finding comes as no surprise as the integrated science programme has both practical and theoretical aspect. This finding support Singh (2003) who argues that while fully-online involves a single mode of delivery, blended learning combines multiple delivery media that are designed to complement each other and promote learning and application-learned behaviours. Again, mixed mode, web-supplemented and web-dependent hold more promise than fully online (Buzzette-More, 2008; Tagoe, 2013). Consequently, students will be able to undertake their practical lessons in the laboratory and theory lessons online.

On Behavioural intention to use (BI), most students 302 (77.04%) intend to increase their use of the LMS, however 90 (22.96%) of the students declined. Similarly, 322 (77.57%) students agreed to use the LMS more frequently in the future and also 300 (76.53%) recommend for other students. The average mean (3.02) suggest that students intend to adapt the use of LMS in their future learning. Because the respondents are undergraduate students hence may consider using online for their postgraduate programme in the near future without necessarily vacating their job post. With these intention students will ensure to stay abreast of current technology to promote teaching and learning. On the whole students' behavioural intention to use the LMS Moodle was high and similar to the findings of Henderson (2005).

On Actual Use, majority of students 304 (77.55%) agreed to use the LMS on daily basis and 312 (79.59%) respondents agreed to use of the LMS frequently. The average mean (3.02) also suggested that students actually want to use the LMS in their learning. The positive response on the use of LMS can be attributed to easy internet access with their phones and computers at home and private internet cafés. This is similar to the findings of Arthur-Nyarkoa & Kariuki (2019) in their study reporting 78.4% have access to

smartphones, 65.2% have access to computers and 93.0% of their respondents have access to internet connectivity. According to Lee, et al., 2009, Liu & Wang, 2009, Rissa, 2014; Welsh, et al. 2003 and Wentling et al. 2000, the e-learning depends on computers and networks, but it is likely it will progress into systems comprising of a variety of channels such as wireless and satellite, and technologies such as cellular phones.

5. Conclusion and Suggestions

This study focused on measuring students' acceptance of LMS Moodle as e-Learning system in the University of Education, Winneba using Technology Acceptance Model (TAM). The students' responded positively in all the four factors of the TAM with an average mean score of 3.2, which is considered relatively high. This show that students were pleased with the Learning Management System (LMS) Moodle to ensure effective teaching and learning however, student preferred the hybrid mode of teaching and learning where students will be able to undertake their practical lessons in the laboratory and theory lessons online wherever they find themselves. It is therefore timely to integrate the LMS Moodle into the teaching and learning of all courses at the University of Education, Winneba.

Based on the research findings the following suggestions were made to improve upon the acceptance of LMS Moodle as e-Learning system of teaching and learning by students at the University of Education, Winneba:

1. Special arrangements should be made with telecommunication providers to improve the speed, strength and bandwidth of the internet connectivity for students to access the LMS Moodle everywhere across Ghana.

2. Much efforts should be made by lecturers to give immediate feedback to students on their performance.

6. Acknowledgements

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Online course satisfaction in a holistic flipped classroom approach

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Article Info	Abstract
Keywords: Online course satisfaction Flipped classroom Pre-service teachers Covid-19 Research Article	The present study aimed to investigate the satisfaction of pre-service teachers with the completely online course instructed with the flipped classroom model. The study was conducted with the explanatory sequential mixed design. The participants included 117 pre-service teachers. Data were collected during the 2020-2021 academic year fall semester with the Online Course Satisfaction Scale and face-to-face interviews. The study findings demonstrated that the pre-service teachers were satisfied with the online course. The satisfaction level of female participants was higher, and the differences were not significant based on the student department. On the other hand, the participants stated that there were systemic and instructor-oriented problems. Furthermore, it was determined that ease of use was an important factor in predicting satisfaction. Ease of use varied based on PC ownership, but not based on tablet ownership. Satisfaction did not differ based on both PC and tablet ownership. It was found that the flipped classroom model exhibited interactional challenges. However, the model had advantages due to its structure that allowed flexibility. It could be suggested that the findings of the present study would contribute to future studies that would address flipped classroom method and satisfaction with online courses.

1. Introduction

History is full of important events that changed the world. The Covid-19 pandemic that started in 2019 is one of these historic events. The epidemic that started in the last months of 2019 in China was recognized as a pandemic by the World Health Organization (WHO, 2021). In the pandemic, more than 150 million Coronavirus cases were identified and over 3 million people died globally (Worldometer, 2021). According to the Republic of Turkey Ministry of Health (2021), 6.458.630 cases and 57.559 deaths were recorded in Turkey. In almost all countries, to prevent the proliferation of the pandemic, education was mostly conducted online. It was observed that this was more prominent in higher education institutions. Similar practices were adopted in Turkey, and the Council of Higher Education decided on 03.26.2020 that 2020 spring semester would be instructed completely with distance education (YÖK, 2020). Following this decision, except the applied and science courses, distance education was adopted in most programs. The Council of Higher Education suggested that education could be conducted with distance education. After this suggestion, Pamukkale University announced that the education would continue mainly with distance education in all academic departments (Pamukkale University, 2020a). It was announced that only certain courses in practice-oriented disciplines could be conducted face-to-face. Approximately one month after this announcement, it was announced that the interactive distance education model was adopted for this process (Pamukkale University, 2020b). It was stated that the process was student-centered, the course

materials would be available before the live courses, and the activities such as reinforcement, interpretation and evaluation should be conducted with the course material in the courses. It was emphasized that the students should also examine the uploaded material before the class and participate in the interactive classes, except for legitimate excuses. On the other hand, it was announced by the Distance Education and Research Center that the Flipped Classroom learning and instruction approach should be employed in this process (Uzaktan Eğitim Uygulama ve Araştırma Merkezi, 2020). Although the general announcements and the method titles employed by the center were different, it was observed that the content was actually the same. Thus, the application aimed the students to examine the content uploaded to the system by the lecturer before the live online class, and discuss the topic in the live class and reinforce it with associated activities. It was also suggested to conduct more detailed investigations after the class.

2. Literature

2.1. Flipped Classroom

Flipped classroom is one of the significant distance education approaches. The model has been defined by several scholars. For example, Bergmann and Sams (2012) described it as conducting traditional classroom activities at home and doing homework assignments in the classroom. The most accepted definition was proposed by Bishop and Verleger (2013). According to them, in the method, instruction is computer-assisted and conducted outside of the classroom, and group activities are conducted in the classroom to support learning. According to the Flipped Learning Network (FLN) (2014), there are 4 main elements in the flipped classroom technique. These include flexible environment, learning culture, intentional content and professional educator. On the other hand, Chen et al. (2014) reported that these pillars would be insufficient in higher education. According to them, progressive activities, engaging learning experiences and diversified platforms should be added to the 4 elements. Among these factors, allowing flexible environments differentiated the flipped classroom approach from other models (Filiz & Kurt, 2015). The flipped classroom focuses on the student rather than the teacher and encourages the students to experiment. Flipped classroom is also an effective learning model that leads to active and meaningful learning during both in-class and out-of-class learning activities (Forsey et al., 2013). It was determined that the model improves learner motivation and performance more when compared to conventional instruction (Lai & Hwang, 2016; Smit et al., 2014). One of the advantages of the flipped classroom is the availability of instant feedback in simultaneous sessions conducted after the students are ready (Hattie, 2009). It should be noted that the method has certain disadvantages as well as the above-mentioned advantages. For example, it was reported that learning outcomes would remain low without proper counseling and support (McLaughlin et al., 2013; Sun et al., 2017). Material content is another important factor in the flipped classroom method. Shimada et al. (2017) reported that extremely long material would not motivate the students to prepare for the class. Students prefer summarized material rather than supplementary material. Thus, there are several factors that can affect the success of the flipped classroom method. These factors include personal computer ownership, tablet ownership and ease of use. Thus, these variables are addressed in the following paragraphs.

2.2. Personal Computer (PC) Ownership

Bandura (1997) analyzed the impact of PC ownership and self-efficacy on learner behavior in his social cognitive theory. Computer self-efficacy could affect an individual's learning behavior (Mann et al. 1999). In the literature, certain studies demonstrated that PC ownership increased computer self-efficacy (Selwyn, 1998; Teo et al., 2002). Furthermore, it was reported that PC owners adopted more positive attitudes towards technology use in education (Akgün & Topal, 2015; Cavas et al., 2009; Gökal et al., 2019; Harvey & Wilson, 1985; Rahimi, 2011; Roussos, 2007). Owners of PC feel more confident and comfortable (Kahveci et al., 2011). On the other hand, other studies argued that PC ownership does not affect the attendance in online courses (Kharma, 2019). It was also determined that perceptions about distance education did not differ based on computer ownership (Gündüz & İşman, 2018). Considering the place of

PC ownership in technology use, its importance in online learning and its situation in distance education, it is thought that it will be useful to examine this variable in terms of flipped classroom approach.

2.3. Tablet Ownership

Today, mobile devices are more popular than conventional computers. One of these mobile devices is the tablet computers. These devices have various interactive features (Churchill et al., 2012). They significantly contribute to student engagement due to the above-mentioned features (Amelink et al., 2012). Previous studies demonstrated that these devices were better suited to e-learning when compared to computers (Pratama & Scarlatos, 2020). Tablet computers allow more active participation in activities (Manuguerra & Petocz, 2011) and further collaboration as well (Lauricella & Kay, 2010). On the other hand, mobile devices also have several limitations. For example, distraction during a class is among the most common disadvantages (Fried, 2008; Lauricella & Kay, 2010; Wurst et al., 2008). In addition to this, the users may experience concentration problems and lower working memory capacity (Hadlington, 2015). Considering the contributions of having a tablet to active participation and student engagement, and its advantages in e-learning environments, it was thought that it would be useful to evaluate this variable within the scope of the study.

2.4. Ease of Use

Perceived ease of use is the primary factor in acceptance of technology (Venkatesh & Davis, 2000). Perceived ease of use was defined as the belief that the individual could use technology with less effort, while perceived usefulness was described as the belief that the individual's performance would improve when a technology is employed (Davis, 1989). Furthermore, there are several barriers to technology use in education. One of these is the resources (Sánchez-Prieto et al., 2019). The individual's comfort in the employment of a device is expected to improve with the individual's resources. Considering the ease of use's key role in technology adoption and emphasis on the impact of these conditions in the context of the use of information technologies (Lai et al., 2012; Ngai et al., 2007), it would be useful to include the ease of use as a variable in the research.

2.5. Online Course Satisfaction

One of the most important variables in online learning environments is learner satisfaction (Yukselturk & Yildirim, 2008). Online course satisfaction is among the most significant factors in the determination of quality of distance education by higher education institutions (McGorry, 2003). The factors considered in this determination include interaction (Croxton, 2014; Lister, 2014; Roper, 2007), communication with peers (Kurucay & Inan, 2017; Liaw & Huang, 2013), supplementary learning activities (Chen, 2014; Lister, 2014; Tibi, 2015), timely and descriptive feedback (Britto & Rush, 2013; Wallace, 2003) and explicit description of the tasks and the grading system (Ralston-Berg et. al., 2015). Furthermore, technical issues (Bolliger & Martindale, 2004), teacher traits (Fedynich et al., 2015; Martin-Rodriguez et al., 2015), course design and content (Jaggars & Xu, 2016; Lister, 2014; Ralston- Berg et al., 2015) are among the effective variables. The factors were considered imperative for an effective online course (Kauffman, 2015; Kurucay & Inan, 2017; Martin-Rodriguez et al., 2015).

2.6. Aim of the Study

It could be argued that the model adopted by the higher education institution in the present study was based on the model reported by Chen et al. (2005). In this model, the pre-classroom material was shared asynchronously, while activities and discussions were conducted in simultaneous classes. Exams were conducted face to face. The only difference between Chen et al.'s (2005) model and the implemented technique was the fact that the exams were conducted online due to the pandemic. Since the implemented model was also a flipped classroom application, online course satisfaction was quite important. Ease of use, PC ownership, and tablet ownership were also essential variables. In the literature, there are several studies on the advantages of the flipped classroom method, including online satisfaction (Chen et al., 2014; Forsey

et al., 2013; Lai & Hwang, 2016; Smit et al., 2014). However, variables associated with learners were never analyzed in a completely online flipped classroom environment. Thus, the present study aimed to determine online course satisfaction levels of learners in a flipped classroom environment. In addition, reason of the satisfaction level and other variables that may affect this variable were examined.

1. What is the online learning satisfaction level of the participants?

      1.1. What is the reason behind the online learning satisfaction level of the participants?

2. Is there a difference between online learning satisfaction levels based on gender?

3. Is there a difference between online learning satisfaction levels based on department?

4. Does ease of use predict satisfaction?

5. Do ease of use and online learning satisfaction differ based on PC ownership?

6. Do ease of use and online learning satisfaction differ based on tablet ownership?

7. What are the views of the learners about the decision to adopt distance education?

8. What are the views of the learners on the flipped classroom model?

3. Methodology

3.1. Research Model

The present study was conducted with the explanatory sequential design, a mixed research method. The mixed design entails collection and analysis of both quantitative and qualitative (Onwuegbuzie & Leech, 2006). In explanatory sequential design, initially, the quantitative and qualitative data are collected in sequence and the latter is employed to support quantitative data (Creswell, 2003). First, the quantitative data were collected with the Online Course Satisfaction Scale in the present study, and the transcripts of face-to-face interviews conducted with both pre-service teachers and faculty members were analyzed.

3.2. Data Collecting Tools

The study data were collected with a scale and face to face interviews.

The Online Course Satisfaction Scale (OCSS), developed by Bayrak et al. (2020), was employed in the study to gather data regarding online course satisfaction. The 5-point Likert type scale includes 10 items in a single factor. All scale items are positive. It was reported that OCSS was suitable for general population, although it was developed with college students. The Cronbach Alpha internal consistency coefficient was calculated as .90 or above in both study 1 and study 2. In the present study, the Cronbach Alpha was determined as .91. Above-mentioned data demonstrated that the internal consistency of the scale was high (Nunnally & Bernstein, 1994).

The interview form developed by the author was used to collect data for the open-ended questions. The form was reviewed by 3 Computer and Instructional Technologies Education specialists. Then, the questions were reviewed by a linguist and an assessment and evaluation specialist. The interview form was revised based on the reviews and finalized to include the following questions:

-     What do you think about the decision to adopt distance education?
-     What do you think about online learning satisfaction?
-     What is the reason behind the online learning satisfaction level of the participants?
-     What do you think about the flipped classroom approach?

Demographic questions about the participant age, gender, department and ease of use were included in the scale. Participants were asked to score the ease of use variable between 1 and 10 points.

3.3. Study Group

The study group included 117 pre-service teachers attending the Faculty of Education at a state university in the 2020-2021 academic year fall semester. Participant age varied between 18 and 22. Besides, most pre-service teachers were female (77.8%).

The criterion sampling method was used to select the study group The assignment is conducted based on certain preexisting criteria or criteria determined by the authors in this method (Yıldırım & Şimşek, 2011). Thus, the sampling criteria included attendance at Pamukkale University Faculty of Education, enrollment in a course during the 2020-2021 academic year fall semester and attendance in the registered course throughout the semester. Furthermore, only volunteering participants were included in the study due to ethical concerns. Also, to avoid ethical problems, the pre-service teachers were coded with the letter "S" and the faculty members were coded with the letter "T" and their names were kept confidential. Interviews were conducted with 6 pre-service teachers and 4 faculty members as well. Most of these pre-service teachers are female (66.6%) and their age ranges from 18 to 21. All faculty members are male and their ages varied between 32 and 42.

3.4. Data Analysis and Interpretation

Before the data analysis, missing data were examined. No problem was determined. Normal distribution of the data was tested to determine the type of analysis that would be conducted in the next stage. The sample size is expected to be at least 15 in each compared group (Pallant, 2001). It was determined that the necessary conditions were met.

Table 1.

Statistics regarding the variables

Variable	N	Min	Max	$\overline{X}$	SD	Skewness	Kurtosis
Satisfaction	117	15.00	50.00	37.99	7.75	-.811	.602
Ease of use	117	1.00	10.00	7.19	2.31	-.844	-.029
PC ownership	117	0.00	1.00	.77	0.42	-1.295	-.330
Tablet ownership	117	0.00	1.00	.13	0.34	1.953	1.930

The skewness and kurtosis for both the participants and other variables were between -2 and +2 as given in Table 1. It was found that the distribution of the data was normal (George, 2011). Kolmogorov-Smirnov test was used for groups with 30 or more participants to determine normal distribution (Akbulut, 2010). It was determined that there was normal distribution. Furthermore, according to Çokluk et al. (2010), histograms and quantile graphs should also be employed to determine normal distribution. The analyses demonstrated that all variables exhibited normal distribution as well. Thus, independent samples t-test, a parametric test, was employed. On the other hand, non-parametric tests were used for the data associated with the third research problem. This was due to the fact that the group did not exhibit a normal distribution based on the department. The research problems and the analyses conducted to resolve these problems are presented in Table 2.

Table 2.

Research problems and associated analyses

Research problem	Employed analysis
1. What is the online learning satisfaction level of the participants?	Descriptive statistics
1.1. What is the reason behind the online learning satisfaction level of the participants?	Qualitative analyses
2. Is there a difference between online learning satisfaction levels based on gender?	Independent samples t-test
3. Is there a difference between online learning satisfaction levels based on department?	Kruskal-Wallis and Mann-Whitney U

4. Does ease of use predict satisfaction?	Simple linear regression
5. Do ease of use and online learning satisfaction differ based on PC ownership?	Independent samples t-test
6. Do ease of use and online learning satisfaction differ based on tablet ownership?	Independent samples t-test
7. What are the views of the learners about the decision to adopt distance education?	Qualitative analyses
8. What are the views of the learners on the flipped classroom model?	Qualitative analyses

The quantitative analyses indicated in Table 2 were conducted with a statistical software. The significance level was accepted as .05 in statistical analyses. The qualitative study data were analyzed with a spreadsheet software. In the spreadsheet, the themes and codes determined in the content analysis conducted on the responses were written on each line. Furthermore, the transferability of the study findings was improved by including direct participant quotes.

3.5. Validity and Reliability

Data were diversified to improve the internal validity of the study. This method allows the researcher to check, compare and verify different types of data (Patton, 1990). Thus, both the OCSS data and face-to-face interview data collected from the pre-service teachers and faculty members were used. In addition, the participant rights about participation in the study were briefly mentioned. Also, direct participant quotes from face-to-face interviews are presented to improve the study reliability. The Cronbach Alpha coefficient was reported after the development of the scale and the internal consistency coefficients calculated in data analysis were presented as well. In addition, open-ended questions were analyzed by another expert with a PhD in Computer Education and Instructional Technology. Cohen's Kappa statistic was examined to calculate the reliability between these coders. This value was found as $\kappa = .91$ which can be stated that the concordance between coders is high (Landis & Koch, 1977).

4. Findings

The findings obtained with the analyses conducted based on the research problems are presented under eight main topics. First, descriptive statistics findings for satisfaction based on gender and department are presented. Then, the findings associated with the predictive power of the ease of use for satisfaction are presented. This is followed by the findings on the effect of the ease of use, PC and tablet ownership on satisfaction. Finally, the findings are concluded with the views on distance education decision and the flipped classroom approach.

4.1. Satisfaction of the Participants with Online Learning

Descriptive statistics were used to investigate pre-service teachers' satisfaction with online learning. Furthermore, their responses to the interview questions were employed to investigate the reasons behind their satisfaction. The findings obtained with the descriptive statistics conducted on satisfaction with the online learning environment, considering that the total possible score in the scale was 50, it was observed that the mean score was quite high ($M = 37.91$; $SD = 7.46$). On the other hand, it was determined that there were students who stated that they were not satisfied with the online environment. It was considered beneficial to include the answers to the interview questions to investigate the reasons for satisfaction. In the analysis, it was found that the negative views were about the system. All participants shared negative answers about the system. Student S2 stated the following: "I think the biggest problem with the system was being kicked out of the course all the time. I do not even remember how many times my connection dropped. Even if I was not, I always experienced audiovisual problems. In fact, one of the teachers thought that I stayed online while I was busy with other tasks. How can I understand someone I hear intermittently and how such a class would be efficient?" S6, on the other hand, stated the following: "We were victimized during the exam. It was obvious that the system would collapse because the attendance was quite high." Also, the faculty member T4 stated that "The system was inexistent. I do not think the system was successful, but in such a short time, a high number of individuals could reach the system. If the efforts did not cease during summer term, a better system could have been achieved." According to the instructor,

although there were problems in the system, the process was successful overall. Also, the same instructor stated the following: "The transformation was slow. The pandemic hit as a rapid wave. We were not mentally ready for distance education." The instructor also stated that certain measures were adopted in the process, but it would take time for the system to be efficient. The next common criticism was about the instructors. It was determined that there was a disagreement between the participants on this issue. Seven participants mentioned strengths of the instructors, while 6 emphasized the problems. The most prominent criticism about the instructors was the lack of emphasis on the classes. S4 addressed the issue in detail and stated the following: "… there were teachers whose faces I never saw during the semester, and I will not recognize them if we meet on the street because their cameras were always off. This gave me the impression that I was not in the classroom… I mean, it was like watching an informative video rather than a class, the impact was more or less the same. And some teachers were very indifferent, when there was a problem with the course, they were inaccessible..." On the other hand, the faculty member T2 stated the following: "I do not think that online education had many advantages because the instructors aimed to complete the class without any complaints instead of spending an effort for the students to acquire the required knowledge and skills." Seven participants stated that certain instructors did their best. For example, S2 stated the following: "Yes, the teachers were generally very good. In fact, for me, a few of them managed the process best way possible." Criticizing the instructors, T2 stated the following: "There were also instructors who continued the process to serve the purpose," indicating that there were also instructors with advantages in the process.

4.2. Participant Satisfaction with Online Learning Based on Gender

On the second research question, the results of the independent-samples t-test, which was conducted to determine the differences between the participant scores in online course satisfaction based on gender, are presented in Table 3.

Table 3.

Online satisfaction scores based on gender

Group	n	$\overline{X}$	SD	df	t	p	Eta Squared
Female	91	39.02	7.152	115	3.141	.002	.097
Male	26	34.00	7.327				

The findings presented in Table 3 demonstrated that the female participants had higher scores than males in terms of online course satisfaction ($t_{(115)} = 3.141$; $p<.05$; $\eta^2=.097$). It was suggested that this could be due to the fact that female pre-service teachers prioritized the process and the components of the process more than the male pre-service teachers.

4.3. Participant Satisfaction with Online Learning Based on Department

Kruskal-Wallis test was employed to determine the differences between the online course satisfaction scores of the pre-service teachers. The results of the Kruskal-Wallis test, where the scores of the participants were analyzed based on their department are given in Table 4.

Table 4.

Online satisfaction scores based on department

	n	Mean Rank	df	χ^2	p	Difference
1	8	56.63				
2	17	67.53				
3	49	57.03	4	19.92	.001	3-4, 4-5
4	11	96.32				
5	32	45.25				

1: Elementary Science Education; 2: Mathematics Education; 3: English Language Teaching;
4: Early Childhood Education; 5: Psychological Counseling and Guidance

The analysis results presented in Table 4 demonstrated a significant difference between the online course satisfaction scores of the students based on the student department ($x^2_{(4)=}$19.2; p<0.05). Mann-Whitney U test was conducted to determine the group or groups that led to this difference. The test results revealed that there were significant differences only between English Language Teaching and Early Childhood Education (*U*=93; p<.005) and Psychological Counseling and Guidance and Early Childhood Education (*U*=30; p <.001) departments. The difference was in favor of the Early Childhood Education in the both groups. As seen in the participant responses to the questions on their satisfaction levels, the lack of consensus about satisfaction with the instructors was consistent with this finding.

4.4. Predictive Power of Ease of Use on Satisfaction Level

Within the context of the fourth research question, simple linear regression analysis was conducted to determine whether the ease of use score was a significant predictor of the online course satisfaction score. The model achieved with this analysis is presented in Table 5.

Table 5.

The Summary of the simple linear regression model

				Overall Model Test			
Model	**R**	**R^2**	**Adjusted R^2**	**F**	*df1*	*df2*	**Sig.**
1	.573	.273	.267	43221	1	115	.000

The analysis results demonstrated that ease of use was a significant predictor of students' satisfaction with online learning (R^2= .273; F$_{(1.115)}$ = 43.221; p<.001). The simple linear regression equation obtained with the data could be written as follows: The Online Course Satisfaction Score = 25.439 + 1.730 x Ease of Use Score. Thus, it could be suggested that students who did not experience problems in online classes were more satisfied with the online learning environment. It was considered that this due to adequate opportunities that the learners experienced.

4.5. Ease of Use and Online Learning Satisfaction Based on PC and Tablet Ownership

The independent-samples t-tests were conducted to determine the differences between the participant scores in online course satisfaction based on PC and tablet PC. The results are presented in Table 6.

Table 6.

Independent-samples t-test results

	PC Ownership	**n**	$\overline{X}$	**SD**	*df*	**t**	**p**
Ease of use	Nonowner	27	6.26	2.521	115	-2.452	.016
	Owner	90	7.48	2.184			
Satisfaction	Nonowner	27	40.15	7.315	115	1.660	.100
	Owner	90	37.34	7.803			
	Tablet Ownership	**n**	$\overline{X}$	**SD**	*df*	**t**	**p**
Ease of use	Nonowner	102	7.17	2.256	115	-.480	.632
	Owner	15	7.47	2.295			
Satisfaction	Nonowner	102	38.14	7.258	115	.874	.384
	Owner	15	36.33	8.837			

As seen in Table 6, pc owners had higher scores than nonowners in terms of ease of use. (t$_{(115)}$ = -2.452; p<.05). On the other hand, no significant difference was determined bases on PC ownership. This may be due to the fact that individuals have found different PCs to access the environment over time. There was also no significant difference between the ease of use and satisfaction scores based on the tablet ownership

variable. Similar to the findings on PC ownership, the ease of use scores of tablet owners were higher when compared to those who did not own a tablet ($\overline{x}_{\text{owner}} > \overline{x}_{\text{nonowner}}$). Also, the satisfaction scores of those who did not own a tablet were higher ($\overline{x}_{\text{nonowner}} > \overline{x}_{\text{owner}}$). It could be suggested that the fact that the course design was not suitable for tablet devices which are more interaction oriented affected these findings. Thus, 6 participants stated that there were problems due to the instruction staff. S4 stated the following: "… there were teachers whose faces I never saw during the semester and I would not recognize them if I see them on the street, because their cameras were always off. This gave me the impression that I was not in the classroom… I mean, it was like watching an informative video rather than a class, the impact was more or less the same." S1 stated the following: "This was my first year. I do not know my classmates or the instructors in my class."

4.6. Participant Views on Distance Education Decision

Participants were asked about their views on the distance education decision in the interviews. All participants stated that they considered the distance education decision by the institution right and normal. Furthermore, a student and two instructors stated that the decision was late. For example, T4 stated the following: "The decision should have been made earlier. Similar conditions were experienced during the spring term. People have a right to know what will happen to them." The instructor emphasized that they should have been more prepared based on prior experiences.

4.7. Participant Views on the Flipped Classroom Approach

Unlike the distance education decision, there was no consensus on the flipped classroom application. Six participants emphasized the disadvantages of the approach. Three participants stated that there was not adequate interaction in the system. For example, S1 stated the following: "This year was my first year. I did not know my classmates or the instructors in my class." Also, 2 students emphasized that not everyone had access to the required facilities to access the system. Five participants stated that the approach had certain advantages. On the issue, S4 stated the following: "First, I think that students had the opportunity to watch the classes without any time constraints and as many times as they wanted without any restrictions, which was an advantage of the system," emphasizing the prominent advantages of the system as reported in the literature. Instructor T4 stated the following: "I think this model should be applied even outside of the distance education. Maybe it was not named as such, but somehow that was inevitable. The pandemic only accelerated the process. But it will take time," underlining that it was a step towards the future.

5. Discussion

The present study aimed to determine online course satisfaction in a flipped classroom environment. For this purpose, satisfaction levels of 117 pre-service teachers were investigated. It was considered that the study findings would contribute to understanding satisfaction, which is one of the most important factors in flipped classroom environment. Furthermore, it was suggested that comprehension of the model, which was compulsory and conducted completely with distance education during the pandemic, could contribute to future designs.

The study findings demonstrated that learners were generally satisfied with the system. This finding was in line with the literature (Bayrak et al., 2020; Chen et al., 2014). However, the interviews revealed certain systemic troubles. Although students were generally satisfied with the system, the problems mentioned by the students reflected the dynamic structure of satisfaction that could be affected by various variables (Kauffman, 2015; Kurucay & Inan, 2017; Martin-Rodriguez et al., 2015). The problems were mostly associated with the system and the instructors. This finding was consistent with previous studies in the literature (Bolliger & Martindale, 2004; Fedynich et al., 2015; Martin-Rodriguez et al., 2015; İlic, 2020).

The study findings revealed that female students were more satisfied with the model when compared to males. This finding was consistent with the literature where it was concluded that females prioritized the

the process and were therefore more satisfied (Gonzalez-Gomez et al., 2012). On the other hand, the finding was also in contrast with studies where it was reported that males were more interested in e-learning systems, leading to higher performances among males (Xu & Wang, 2006) and the studies that did not report a gender-based difference (Bayrak et al., 2020; Harvey et al., 2017). Also, the study findings revealed there were no general differences between satisfaction levels based on the department. Previous studies reported that system components were among the important factors that determined satisfaction (Bolliger & Martindale, 2004). Thus, this could explain the small differences between the departments. The determined differences between the departments could have been caused by non-systemic elements such as interaction and instructor traits that significantly affect online learning satisfaction. This finding was also in line with the literature (Croxton, 2014; Fedynich et al., 2015; Lister, 2014; Martin-Rodriguez et al., 2015; Roper, 2007).

It was determined that ease of use was a significant predictor of online satisfaction. It was concluded that both systemic and personal facilities should be sufficient for this comfort. It is known that the ownership of resources affects technology use in education (Sánchez-Prieto et al., 2019). The study findings were consistent with the fact that both ownership and ease of use were among the leading factors for technology acceptance (Venkatesh & Davis, 2000). On the other hand, comfort varied based on PC ownership. This finding was consistent with the literature (Akgün & Topal, 2015; Cavas et al., 2009; Gökal et al., 2019; Harvey & Wilson, 1985; Rahimi, 2011; Roussos, 2007). It was concluded that satisfaction did not differ based on PC ownership. This finding was in line with previous study results that individual perceptions about distance education did not differ based on PC ownership (Gündüz & İşman, 2018; Kharma, 2019). It was also found that both ease of use and satisfaction level did not change based on tablet ownership. Resources have an impact on ease of use (Sánchez-Prieto et al., 2019). Tablet computers are important due to their interactive nature (Amelink et al., 2012; Churchill et al., 2012). Thus, the finding that ease of use did not differ based on tablet ownership was surprising. However, the interview findings demonstrated that the course was instructed with a design that did not allow interaction, and the above-mentioned finding could be expected. On the other hand, tablet ownership did not lead to a difference in satisfaction. It was reported in the literature that interaction, communication with peers, and supplementary learning activities were important factors behind satisfaction (Chen, 2014; Croxton, 2014; Kurucay & Inan, 2017; Liaw & Huang, 2013; Lister, 2014; Roper, 2007; Tibi, 2015). The present study finding that was not consistent with the literature could be due to the course design that was not adequate for interaction and communication.

In the study, it was concluded that the distance education decision was correct. This finding was parallel with the view that education should be second to health during a pandemic (Bozkurt & Sharma, 2020). However, the participants argued that the decision was late. This finding was consistent with serious planning and programming requirements for distance education systems (Bozkurt & Sharma, 2020; Haag et al., 2004; Moore & Kearsly, 1996; Palloff & Pratt, 2007).

The pros and cons of the flipped classroom model were determined based on the study findings. Thus, it was concluded that the most significant problem was lack of interaction. This finding was in contrast with the fact that the flipped classroom approach is focused on interaction (Chen et al., 2014; Forsey et al., 2013). However, without proper orientation and support, these advantages could turn into disadvantages (McLaughlin et al., 2013; Sun et al., 2017). On the other hand, it was found that the model had a future since it provides a flexible environment for the students. This finding was consistent with the advantages of the flipped classroom model reported in the literature (Filiz & Kurt, 2015; Flipped Learning Network, 2014).

6. Conclusion and Suggestions

In conclusion, it was determined that learners' satisfaction with online learning was high. On the other hand, it was concluded that there were problems associated with the system and instruction staff. The online learning satisfaction varied based on gender, it did not differ based on the department. It was determined

that ease of use was a significant predictor of satisfaction and PC ownership significantly changed the ease of use. However, it was concluded that computer ownership did not have an impact on satisfaction, and similarly, tablet ownership did not affect ease of use or satisfaction. It was found that the adopted distance education system had also disadvantages due to the lack of interactive facilities. However, it was concluded that flexibility was one of the main advantages of the flipped classroom approach. It could be suggested that the present study findings on learner satisfaction were valuable for the analysis of the flipped classroom model, which was conducted completely online in the present case. However, further studies are required on the topic:

- Future studies could be conducted on different institutions to compare the findings reported in the present study.

- In the present study, the satisfaction variable was scrutinized. Future studies on student achievements could be beneficial.

- Future studies could be conducted on readiness for online learning and satisfaction.

- Future quantitative studies could be designed to investigate both flipped classroom model and satisfaction in depth.

Some practical suggestions were given based on the results as well:

- In such settings, the students' online course satisfaction levels should be taken into account both before the lesson and at the end of the semester. In this context, actions to improve the system should be employed.

- Flexibility of the system is one of the advantages of the online flipped classroom room settings. Thus, this issue should be considered in these systems.

- The lack of interactive facilities is the foremost disadvantage of the current system. Settings that will enable interaction should be created and interaction should be encouraged.

- Ease of use is a significant predictor of satisfaction. Therefore, attention should be paid to the factors that can positively affect the ease of use in the system.

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Online language learning in times of crisis: Hindrance or opportunity?

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Article Info	Abstract
Keywords: Emergency remote teaching Distance education Pandemic period language learning Student perspectives Research Article	The COVID-19 pandemic has brought many changes to the way teachers teach and students learn. Although there is a surplus of research on online education, the transition period to online education is also worth investigating. This study set out to explore language learners' perceptions of how they were impacted by emergency remote teaching (ERT). All the participants were students attending an English medium university in Turkey. The mode of teaching, changes in teacher-student and student-student interaction, online tools and materials used in the courses were investigated by a comprehensive self-developed online survey and the data were triangulated later by semi-structured interviews conducted with the volunteering participants. Most found the transition to ERT demanding, particularly the loss of face-to-face interaction; however, some students benefited from being able to better regulate their own learning process thanks to the recorded lectures and online materials. Students also appreciated receiving regular feedback from instructors about their progress.

1. Emergency Remote Teaching

This study explores how students attending English language courses in the spring semester of 2020 switched to an online mode of instruction. The study considers students' needs both physically, technologically, and psychologically, during the adaptation period to the sudden transition to online education. To be able to explore this specific situation through this study, recent literature published on the similar situation would provide a wider scope of perspective.

A thorough review of the literature suggests that while most students would prefer face-to-face instruction, others found the online mode beneficial in terms of it being self-paced, self-regulated, and requiring self-motivated learning (Delaney et al., 2010; Diebel & Gow, 2009; Garrison, 2009; Kim et al., 2005; Song, et al., 2004; Tichavsky et al., 2015) . There is a surplus of evidence to support that online education can prove to be as beneficial as face-to-face education in the literature (Driscoll et al., 2012; Young, 2006).

When studying the ERT that the COVID-19 pandemic enforced, the literature on online education at large should be explored. Online education literature would help understand what major shifts in educational practices and attitudes the change in the medium of instruction brings about to the concept of education at a larger scale. As can be observed in any country or culture, the online mode of instruction was much different from that of what both students and instructors had been used to, yet it should be acknowledged that it is not an innovation that was introduced with the pandemic period. Online education has already started playing a major role especially in higher education. One of the studies that focused on the role of online educational tools and their effect in taking students out of their comfort zone was conducted by Bond, Feyver and Pitt (2004). They found out that the online mode of instruction definitely took students out of their comfort zone which resulted in completely giving up on asking for support by voicing their

needs. They state that the method of providing access to online materials plays a significant role in this particular finding. Online education has been the focus of many studies that concentrated on the effectiveness in teaching, and the attitudes of students and instructors. Yet, most studies conclude that the negative attitude is challenged by instructional technologies training and effective teaching is not impossible through online education, hence online education requires meticulous planning (Hodges et al., 2020; Ko & Rossen, 2010; Means et al., 2014; Pu, 2020).

With information technologies (IT) support, once it is ensured that the students do not reject the online education system altogether, they can be encouraged to integrate the online course materials, and hence build confidence. While they emphasize that when presenting materials, the expectations of students are important, in ERT that the pandemic brought about, the higher education institutions did not have the time to explore student expectations of media to present course materials, which created another challenge on top of the panic experienced by both instructors and students caused by the sudden, unexpected and unprecedented case. In fact, Gacs, Senta and Spasova (2020) dwell on similar differences between crisis period online education and planned online education with specific reference to language teaching. They state that emergency online education can provide ample data which can be enlightening when preparing for planned online education. The quality of expectations might not be as high as planned online education, when evaluation, digitalisation of course content, accessibility of educational materials and the objectives of programs are considered. Yet, still, emergency remote teaching periods are still quite useful in shedding light to planned online instruction (Gacs, Senta & Spasova, 2020).

Online English Language Teaching (ELT) due to the pandemic has been a new experience for all higher education institutions throughout the world. Most challenges posed are similar even in different educational contexts of remote cultures and countries (Pu, 2020; Hartshorn & McMurry, 2020). Neither the students nor the instructors were fully prepared to switch to online education. Teaching is a profession well-known with the requirement of preparedness. That the teachers were not ready for the transition created a stress factor for the students on top of the impossibility of meeting their peers and meeting their teachers face-to-face when the pandemic started (Hartshorn & McMurry, 2020).

It is not unforeseen that the pandemic and compulsory home confinement that came with the pandemic led to anxiety mostly in higher education institutions. Baloran (2020) conducted a cross-sectional study examining the emotional reactions of the students when faced with online education due to the pandemic. Students at higher education institutions are reported to have benefited significantly from non-medical preventions taken and promoted by the government. Yet, according to Baloran's research, there was an apparent unwillingness towards moving to online or blended education. The findings of the study conducted by Hartshorn and McMurry (2020) agree with Baloran's study in that, due to the health-related stressors, education lost its priority in students' lives. In addition, they state that in their research the students reported to have experienced more anxiety compared to their instructors.

The stress the pandemic brought about is undeniable and has been the focus of a surplus of recent studies conducted on students. For instance, Wang et al. (2020) claimed that compared to non-student participants, students suffered to a greater extent during the pandemic and schoolwork comprised %47.46 percent of all the challenges that contributed to their pandemic period stress factors. In Wang and his colleagues' study, the participants underscored increased schoolwork because of the technological expectations which required quick adaptation skills.

With the onset of the pandemic, Hartshorn and McMurry (2020) found out that speaking was the skill in which less language development was observed. Wang et al. (2020) also stated that the participant students in their research reported to have developed speaking skills much less during online education because the opportunities to develop speaking skills were rather limited. Wang et al. (2020) add that some of the participants did not differentiate between skills but agreed on stating that learning a language online was not efficient independent of how proficient students are in technology integration. The limited opportunities to develop speaking skills during online education are also referred to in Aksal's 2011 study. Yet, online education should not be continued at the expense of meaningful and consistent communication both among students and between the students and instructors (Garrison, Anderson & Archer, 2000). While speaking with the interface of the videoconferencing program can not be compared to face-to-face interaction, such communication can also lend itself to misunderstandings (Tichavsky et al. 2015). The misunderstandings will not be that frequent as the videoconferencing programs advance and provide more options of conveying messages, such as the chat box, raising hand icon, and other emoticons. To increase student motivation, interaction plays a major role in especially language classes (Baker, 2010; Paechter & Maier, 2010).   The need for interaction is also emphasised by Akbana et al. (2020). They state that instructors and institutions should be open to discover new channels of communication to design more interactive online classes. While new technological investments can give way to more interaction, Akbana et al. (2020) also emphasize the importance of digital training for instructors as well. Digital training bears importance not only to have student-teacher interaction, but also to track student performance, to provide effective feedback, to create an online presence, and to help build self efficacy in students (Sumardı & Nugrahanı, 2021). Aksoy (2020) in his study where he compares Turkey to other parts of the world in online education emphasizes the importance of student-student interaction as well as teacher-student interaction.

2. **Methodology**

2.1. *Research Design*

The research aimed at finding the answers to the following questions:

- What were the challenges for the School of Foreign Language students during the emergency remote teaching period?
- What were the instructional preferences of the students of School of Foreign Languages during the emergency remote teaching period?
- What were the expectations of School of Foreign Languages students from their instructors during the emergency remote teaching period?

The study was conducted with a mixed method design which followed a sequential explanatory framework according to Creswell's (2013) types of mixed method research in which the quantitative data was collected through a self-developed survey and it was followed with individual interviews with volunteering participants. The researchers developed a survey with mostly Likert type questions. The survey questions were discussed with six other researchers and the wording of some questions was refined. The expert paneling helped the researchers avoid the use of unclear expressions and formulate more specific statements. One such example of a revised question is: instead of "I miss my classmates", "I miss the interaction with my classmates" was preferred. The clarification information in the parentheses of question 10 and 17 were added. Question 10 was revised as follows: I had the technical knowledge to cope with the

necessities of emergency remote teaching (e.g. using the microphone and camera of my phone or computer/ hardware-related tasks). Question 17 was revised as follows: I often feel frustrated because of problems with technology while learning online (e.g. being cut off on Zoom; not being able to reach materials/ tasks, etc.).

The survey was later piloted on 20 students and revised and edited according to the feedback received. The researchers administered the survey in two classes, one being from the Department of Basic English (DBE) and the other from the Modern Languages Department (MLD). Later the researchers collected oral feedback as to which questions were not clear to the participants and what else the participants would like to be asked. The feedback provided was used to make minor vocabulary changes in the wording of some statements and helped guide the researchers with the formulation of the interview questions. This online survey prepared on Google forms was administered immediately after the end of the emergency remote education semester, the spring semester of 2019-2020 academic year, to around 8000 students attending the School of Modern Languages. It was important that the experience students had was still fresh in their minds so that they could recall particular emotional reactions or certain practices of online teaching. The online survey started with an informed consent notice that let the participants know that participation in the survey was voluntary and that the data provided by the students was going to be used for research reasons only and it was not going to be shared with third parties for other reasons. The survey data was anonymous. However, if the participants chose to share their phone numbers for the interviews, they could do so without writing down their names. In the online survey, one of the questions asked if the participants would volunteer to be interviewed. 90 participants volunteered and shared their phone numbers. The researchers conducted individual interviews with them. The interviews were then recorded and transcribed. Later the transcriptions were uploaded and analyzed on MAXQDA qualitative data analysis program (VERBI Software, 2019) by coding the content. The researchers came up with codes when going over the interviews. When they had doubts or disagreements as to which code the content fell under, they resorted to an external researcher familiar with the focus of the study and the research setting.

2.2. *Participants*

The sampling was done according to the convenience sampling method, which is also known as 'availability sampling'. It is a non-probability sampling method with which data is collected from participants who are available (Creswell & Creswell, 2013). There was not a purposeful choice of participants according to their age, gender, or educational background. All the participants were enrolled in a course offered by the School Foreign Languages. 819 participants responded to the online questionnaire. 65.3% of the participants were students at the freshman English department, the Modern Languages Department, and 34.6% of the participants were students at the preparatory school, the Department of Basic English. Among the students at the DBE, there were no students whose level of English is below pre-intermediate, still the survey questions were also presented to the students in Turkish as well to make sure that both foreign and Turkish students fully understand the questions, and do not misunderstand some questions because of their reading comprehension proficiency in the target language they were studying. Among the MLD student participants who took the survey, 77.1% were students of the freshman academic English courses. 21.7% were students of the academic presentation skills course, the other participants were students of the business English course and students of other languages such as French, Chinese, Italian, Spanish and German. 86.6% of the participants were between the ages 18-21.

2.3. *Data Collection*

The data were collected through a self developed survey whose Likert type questions can be seen in Table 1. The demographic questions provided data on the participants as reported in the 'Participants' part. The survey was prepared by three researchers working at the same institution in three different departments, all of which offer English language courses. The researchers referred to their own experience and interaction with the students as well as the administrative experience of the university with online teaching through consulting the academicians with administrative roles. The semi-structured interview questions were shaped according to the results of the survey. The Ethics Committee approval for both the survey and interview questions was issued (235 ODTU 2020) by the university's Ethics Committee. The interviewers made notes during the interviews which were all held on the phone or on video conferencing tools depending on the preference of the participant. Below are the semi-structured interview questions that helped gather more in-depth data:

- What did/didn't you like about the emergency remote teaching period?
- What didn't work effectively during emergency remote teaching?
- What did you find to be effective/ functional/ useful/ practical about the emergency remote teaching period?
- What do you think would have worked better?

The interviewers were research assistants fluent in both the native tongue of the participants and in English, who were trained interviewing for academic research. The Turkish interviews were translated by the researchers who are both experienced English language teachers. They asked which language the participants preferred to be interviewed in and proceeded accordingly. The interviewers were very sensitive with the way they approached the interviewees. They tried to sound friendly and sincere and started the conversation with small talk first, but when doing so they avoided comments that would guide the interviewee to provide socially accepted answers. The researchers, who are instructors, avoided being engaged with the participants, who are students, not to yield biased data because of unequal school context power relations. The interviewers were sensitive not to use judgmental or sexist language, not to collect socially expected data.

2.4. *Data Analysis*

The data collected by the survey was analyzed through descriptive statistics. The interview notes were analyzed through thematic analysis with MAXQDA 2018. The interviews provided "rich and detailed data" (Braun and Clarke, 2006, p. 5). During data analysis, first the issue was identified, next it was coded, and the codes were merged to generate themes as Peel (2020) suggested for thematic analysis stages. Braun and Clarke (2021, p. 343) suggest that the researchers are active in creating the themes, hence themes do not "emerge" from codes, but researchers have themes "in their heads". Thus, they suggest that researchers generate initial themes from codes, which was the method of analysis of data in this study. During the interpretation stage of the thematically coded data, the findings were contextualized.

3. **Results**

3.1. *Quantitative Research Results*

According to the survey results, most of the participants had the necessary technological means, such as computers (93.3%), earphones (91.4%) and smartphones (97.6%) when the ERT started. However, only 0.4% of the students had cameras.

83.6% of the participants were familiar with the university Moodle system, and 98.3% of them actively used WhatsApp; however, the videoconferencing tools such as Microsoft Teams, Blackboard, Collaborate, Google Meet, Cisco Webex, BigBlueButton, Skype or Discord were unknown to most participants. Among these, Skype was the most known with 82.4% and Zoom was the next with 36% of the participants, but the other video conferencing tools were familiar to less than 5% of the participants.

Considering the online learning tools, 35.4% of the participants were familiar with the open coursewares of universities available online, 79.9% were familiar with TED Talks, 47% with Udemy, 58% with Khan Academy and 20% with Coursera.

The below table shows the mean scores and standard deviation of the Likert type questions in the questionnaire.

Table 1.

Likert type questions about the transition to ERT.

Likert-type Items	M	SD
9. I had a smooth transition from in-class learning to emergency remote education.	3.1	1.4
10. I had the technical knowledge to cope with the necessities of emergency remote teaching (e.g. using the microphone and camera of my phone or computer/ hardware-related tasks).	2.7	1.6
11. I was well prepared for emergency remote learning in terms of my experience with online learning tools.	3	1.3
12. My university provided me with technical equipment when I needed them.	3.1	
13. I feel more comfortable with emergency remote learning now than when I first started doing it.	2.8	1.4
14. Emergency remote teaching has become an extra chore on top of my daily life.	2.9	1.4
15. I needed frequent technical support while using online education tools.	3.1	1.5
16. I have access to technical support while using online education tools.	2.9	1.2
17. I often feel frustrated because of problems with technology while learning online (e.g. being cut off on Zoom; not being able to reach materials/ tasks, etc.).	2.9	1.4
18. I missed face-to-face education.	2.6	1.8
19. I prefer online learning to face-to-face learning.	3.3	1.7
20. Online learning is more advantageous than face-to face-learning.	3.3	1.6
21. The workload of online courses has been overwhelming.	2.9	1.4
22. Online learning is more stressful than face to face learning.	2.8	1.5
24. I feel demotivated in online classes.	2.7	1.5
25. Online learning cannot replace face to face education.	2.7	1.7

26. Teachers and students communicate better in class than they do online.	2.8	1.7
27. I miss the interaction with my classmates in the actual classroom atmosphere.	2.7	1.7
28. It is easier to learn in face-to-face settings.	2.7	1.7

According to the descriptive analysis of statistical data, 44.4% of the students perceived the transition to the ERT period to be smooth while 36.4% of them did not consider it to be smooth. The remaining 19.2% was neutral about this item. More than half of the participants (51,7%) stated being equipped with the technical knowledge required to cope with the necessities of the ERT. Regarding the online learning tools, there was a variation in the responses. 37.7% of the students thought they were well-prepared for these online learning tools; on the other hand, almost a similar number of students (38.7%) stated not being prepared for the same tools. 23.7% was neutral. This may be due to not being familiar with the tools to be used.

48,1% of the students expressed that they felt more comfortable with online learning by the end of the ERT period. 35.3% of the students still disagreed with this idea while 16.6% was undecided. For quite a number of students (44,8%), online education became an extra chore on top of their daily lives. For 36.5% of the participants, however, this was not the case.

When asked about whether frequent technical support was needed during the ERT, 37.9% of the participants agreed while a higher percentage of students (47.7) responded that they did not need frequent assistance. When they needed technical support, 34.9% of the students had access to it while 29.5% did not. When faced with a technical problem, 43% of the students expressed feeling frustrated but 37.7% was not affected that much.

The results also show that by the end of the ERT period, around half of the participants stated missing face-to-face education while some did not agree. Similarly, slightly more than half of the students (51.6%) prefer face-to-face education to online education while 37.6% expressed their preference for online education. Some 10.9% of the students were still undecided. There is consistency in the results when participants were asked about whether online learning is more advantageous compared to face-to-face education. While 51% of the participants marked their preference for disagreement, 33.9% showed their preference for agreement and 15.1% for neutral.

Considering the workload of online courses, 41.1% of the students regarded it to be overwhelming while a similar number of participants (36.1%) stated the opposite. 22.8% was undecided.

49.4% of the students perceived online learning to be more stressful than face-to-face learning. On the other hand, 35.5% did not think so and 15.3% were undecided about the same item.

Almost half of the participants (49.9%) marked feeling demotivated in online classes while 33% stated the opposite. The percentage of students who felt neutral about feeling demotivated was 17.1. Below is a table representing the results for this question.

53.7% of the participants think that online education cannot replace face-to-face education while 35.6% disagree with the idea. 10.7% of the students were still undecided about this item. Similar results were obtained about communication in online classes. While 53.5% of the participants think that teachers and students communicate better in online classes, 39.4% disagree with this statement. 7.1% of the participants were neutral regarding the same item. Consistently, 55.1% of the participants expressed missing the

interaction with classmates in the face to face classroom atmosphere. Regarding the same item, 36.2% disagreed and 8.8% was neutral.

Finally, about half of the students (51.9%) considered learning in face-to-face environments to be easier while 35.4% did not think so. The percentage of the participants who were neutral about this item was 12.6.

As can be understood from the statistical data, students are mostly undecided about the effectiveness of the ERT period. One of the main reasons suggested for this result in the interviews was the different practices of teachers in the courses. While some instructors dealt with the challenges of the ERT well and improved their digital skills by investing time and effort in developing their knowledge of educational technology tools, some tried to survive by just sharing slides, forming class WhatsApp groups, or sending out documents and emails. This led to an imbalance in the materials shared with the students, and unfair ways of teaching and learning. Due to this imbalance, while some students were exposed to an ERT instruction which was handled more professionally, the others complained about the difficulty their instructors had, hence were not as satisfied as others when it comes to the sudden switch in the mode of instruction. This is why it is difficult to say whether students favor face-to-face or online education or not. The survey results gain much more meaning when interpreted in the light of the interview data as the participants made more detailed comments about causations in the ERT period.

3.2. *Qualitative Research Results*

To answer the first research question about what the participants liked about the emergency remote teaching period, many students reported being happy about being at home enjoying the freedom provided by the welcoming atmosphere. They stated that being together with their loved ones especially during the pandemic made them feel safe. Some of the participants responded to the interview questions as follows: "I am happy at home. We did not know about this illness. Being at home together with my loved ones made me happy." Another participant said: "I was quite comfortable at home. My mom, dad and my brother, we were all at home. I felt safe and comfortable." However, the same environment was sometimes distracting as well, since there were siblings or even parents in the same or the next room trying to log into online sessions or meetings. one of the participants stated: "Although everybody was in one room at home and the environment was noisy, I felt free to eat what I wanted to eat or sit wherever I wanted to. It was home anyway!" Another student expressed himself as follows: "The university was less noisy. At home, family members talked a lot, the doorbell rang, people next door had kids shouting. Sometimes it was quite distracting." Apart from the home environment, it was also mentioned by the students that they benefited a lot from being able to follow revisable materials such as pre-recorded videos at their own pace, whenever they wanted. Another student also made similar comments representative of the many others: "I don't like the pandemic, but I like being at home. In class, you must take notes very carefully, sometimes, we miss things but at home, when we miss points, we could watch the videos again. Some friends even recorded the live sessions with their phones. We shared a lot of sessions together."

However, for some students with relatively poor time management and metacognitive skills, it was difficult to concentrate and prepare for exams during the ERT. One such student put it very simply: "Unfortunately, we did not know what to study and how to study. We were sometimes lost." Another negative comment on the sudden and imposed shift in study habits is: "I do not like studying on my own. When we were at school, we came together with friends and roommates and studied together. Now we can't do this, so I got lower grades. I am not happy this way."

When it comes to what the participants did not like about the ERT, the biggest concern of students during ERT was technology related problems. Lack of technical equipment, internet connection problems and sometimes power outages were the main sources of frustration. However, there were few students who were more tolerant of such technical obstacles. One of the participants complained as: "First, I did not have a good computer. I suffered a lot. Then I arranged something and this time the internet was bad, lots of bandwidth problems. The exams were exhausting. I know these are normal but still sometimes, it is really difficult to tolerate them."

A common theme that emerged in the analysis of the qualitative data was ERT's being timesaving. As the participants did not have to commute everyday to and from the university, they saved a great deal of time. One participant expressed the time management during the ERT as an asset: "I got up very late, just five minutes before the lesson. I sometimes followed the lesson in my bed with my laptop. This was great! When I had a long break, I even slept!" Another participant also agreed with saving time during the ERT:"My home is quite far away from the university so every morning, I spent two hours on the road to reach the school and two hours to go back in the evening but in the pandemic, we did not need to so I saved a lot of time."

Another positive comment made by the students was that they appreciated their teachers' effort to reach out to them trying to arrange online meetings to address their individual needs and weaknesses. The students expressed feeling happy or comfortable when their teachers were more tolerant of deadlines especially when they experienced some technical obstacles. One of the participants said: "Some of our teachers were helpful. They tried to help us and arranged extra meetings. We sometimes asked for deadline extensions. Some accepted this. This was a different time and we were quite tired. Everybody was giving a lot of homework and tasks. Teachers' help made us comfortable." This other participant is also representative of many similar appreciative comments made by students: "I could not attend a session this term because of the internet connection. I wrote an email to my instructor and she gave me explanations and extra materials. She even extended my deadline. This showed me that she cared for me."

The participants were also happy about receiving higher grades. For many, ERT led to an increase in their grades. However, for some others, the grade inflation was frustrating leading to "undeserved grades". Some of the participants said that the ERT period increased their overall GPAs. Some other participants were critical because they did not think that the grading was done fairly through online evaluation methods. A. said: "It is not fair! Some people had very high grades. They increased the curve points and we received lower grades and lower letters in the course." Another complaint is as follows: "Very unsuccessful students got good, even very high grades. Their course grades are underserved. This is unfair."

Similar to the results gained from the statistical analysis of survey results, the interview data also show that the students were not happy about the lack of interaction during ERT, which is the first theme. They even said, "Discussions were one way- just from [the] teacher or lecturer". This non-interactive environment was one reason for demotivation in online classes. Interaction continues outside class in face-to-face education. Therefore, almost all students mentioned missing the campus. Feeling psychologically detached and lonely made them more pessimistic about the current situation. To cite one participant directly: "In class, we talked a lot but in online lessons, we did not. We listened to the instructor." Another comment is: "The teachers talked a lot. In the middle of the lesson, I was sleepy. I lost my motivation in some courses." On interaction with peers S. stated that it was not just the lessons that lacked interaction, but it was the fact

that she was alone at home and she needed the motivating campus atmosphere a lot during the ERT. One other direct quotation from a similar complaint is as follows: "I never had such a bad time before. I was at home alone. My dad is a doctor, and my mum is a nurse. They were at the hospital and I was alone at home. Such a pessimistic time! No people to talk to. I missed my campus."

Regarding teaching and learning in the online world, students asked for variety in online sessions. They expected their instructors to be using online tools more in their classes. Interestingly, some students, though in minority, mentioned that it was hard to remember the passwords of the different programs or platforms preferred by the teachers. The participants of the study also mentioned repeatedly in the interviews that when they felt the need for further reference materials in their courses, they resorted to other online sources. T stated: "We really had 1 or 2 teachers who were skillful in the online world. Some only used slides and shared their screens to show their notes. This does not help. We needed extra support." A similar comment by another student is: "Teachers had to learn to teach in the online world. It is different. We did not have any communication in some courses while the online sessions have breakout rooms, chat options, etc. Some instructors did not know how to use the digital tools." Some students complained about the difficulty to communicate with their instructors, for example one of them said: "Our class teacher was old, and she even did not use the email regularly and effectively. We could not reach her so easily. We asked other friends, and instructors for help. We also used our friends' class notes for the exams. Anyway, she retired at the end of this period."

The second theme that emerged from the qualitative data is testing implications of ERT. The study results have important implications regarding exams and the assessment system as well. One main concern of students was the teachers' different attitudes towards exams. Cheating was a big issue raised in the interviews. Some teachers' indifference to the issue of cheating and others' being strict during proctoring led to some unjust practices. The distrustful attitudes of their instructors were usually a source of frustration for students. Participant F. said: "In online exams, I believe there is always cheating but some instructors are very careful, and we can't cheat but some instructors leave us free. There were always some classes with very high grades in the midterms as their teacher did not warn the students much."

In the faculties, lecturers preferred to use various assessment platforms. Many freshman students stated that "many innocent students got falsely flagged as cheaters/'plagiarizers' by the [assessment] system", which was a "punishment for honest students". Besides, just to prevent cheating, the instructors chose to make the exam questions more challenging and even cut down on the time allocated for completing the exam. In addition, it was also stated by the students that grading was harsh, which was demotivating as well. U. stated that: "The exams were difficult, really difficult. We had more questions and less time to answer them. This is insane. It is not testing but punishment for honest students."

The third theme that emerged is feedback implications of ERT. In the interviews, students emphasized that they value feedback and they expect to receive more of it. However, some stated not receiving much feedback or "none" in some cases during the ERT period. Students stated that they did not feel ready for being assessed when they were not given feedback on their progress. In the interviews, some students also expressed their resentment for not being able to reach their instructors when they needed them desperately. They used the words "uncaring" or "unresponsive" to describe their perceptions of their instructors in such cases. On receiving feedback one of the students claimed the following: "I sent my class instructor many emails. She did not respond to them, very unresponsive! I did not know what to do. She did not care for us.

This is disrespectful." A similar representative dire quotation is from another participant: "I did not know how my writing was. I needed feedback but I did not receive any. It was before the exam day and I received my paper back with some small notes, which did not help me at all. I think I would have better grades if I received good feedback."

Students also reported that they expect to see consistency regarding scheduling the synchronous classes among the instructors of the School of Foreign Languages. They stated that even though there was a fixed timetable, the flexibility of the online world enabled some instructors to constantly change the time of their classes. Announcing this change just before the actual class time was even more frustrating for those students who had to share their computers with their siblings or parents.

4. Discussion

This study investigated the ERT period in which higher education worldwide had to switch modes and become online suddenly without the preparation of students or instructors ahead of time. The present study researched the needs and challenges of the students of the School of Foreign Languages at a prestigious and highly populated state university in Turkey where the total number of students is about 8000 including the ones who take preparatory year and the ones in their departments taking academic English and elective courses from the School of Foreign Languages.

With the pandemic, the sudden shift to online education distressed not only instructors but also students. Being panicked, instructors might not have anticipated the anxiety their students experienced; however, both the literature and the findings of the present research reveal that tolerance understanding is most expected at such times when all stakeholders of education are feeling less sure about what tomorrow would present that would change the planned instructional tools and interactions. Flexibility to adapt is a requirement that is needed more than ever for students in the transition periods. On a positive note, these skills of flexibility may have been the most beneficial gain for the students who experienced the ERT period due to the COVID-19 pandemic. Seckin et al. (2020) conducted a quantitative study on the perception of the ERT period online education and face-to-face education in a tertiary level educational institution, too. One of the constructs in their data collection scale was about the psychosocial context of the university students. They compared online education and face-to-face education and found out that students have a negative attitude and resistance towards online education as well.

It is apparent that online education integration is indispensable to the future of education and the pandemic has taught the world that unprecedented emergency situations are a reality in which higher education can still survive in. What is indispensable for any institution is good planning before going online. Not only teachers but also students should have all the necessary information related to the course including the course schedule, materials, the online platform(s) to be used and assessment. A recent study that compares the ERT with online teaching compares them and states that the main difference is in planning. Hence, in online teaching, the already prepared course material with the right infrastructure might lend itself to education as effectively as in face-to-face (Al-Azawi, 2021). Agility is a skill that stands out in this planning process for the ERT (Rahmadi, 2021). In the present study, one of the concerns raised by the participants was related to the good planning of the courses in general. Some participants pointed out the need for more guidance about assessment which is the cornerstone in the teaching and learning process. Not being clear about how they would be assessed was a great stressor for many students. With good planning, everything including the assessment procedures should be made clear from the beginning of crisis times so that students would know what and how to study.

Another recurring response that came up in the interviews was that no matter if it is ERT or regular online courses, it is evident that students ask for their online sessions to be recorded so that they can access them for further reference. Most students stated that it is practical that the online synchronous sessions are accessible on an online educational platform for further reference if need be.

Apparently, online education has its own challenges as well. One of these challenges stands out in assessment. It is ineffective to do assessment in the same format as in face-to-face settings. Administering tests online has many drawbacks and is, therefore, frustrating both for students and instructors. Therefore, any educational institution planning to go online should be prepared for alternative assessment tools to replace face-to-face exams. In addition to alternative assessment tools, it is also important to learn about and invest in the best proctoring procedures when online exams are inevitable such as the summative assessments or language proficiency exams.

The data in this study reveals that interaction is the key to success in any language program. Therefore, it is vital that both instructors and institutions look for ways of increasing interaction in the classes. The need for channels for communication among the instructors, students and peers, is also reported to be a common finding of the document analysis of ERT papers Akbana et al. (2020) report. While for institutions, it can require investment in some new technology and equipment, for instructors, this may mean learning about new digital platforms and investing in learning about new educational technologies and improving digital skills. All the students in the current study mentioned lack of interaction as one of the biggest reasons for their motivation in the lessons. The study by Seçkin et al. (2020) also yielded similar results and highlighted the importance of interaction in online education. The participants in their study emphasized the lack of interaction and immediate feedback as common factors for their demotivation in online classes. The students stated being negatively influenced by the lack of socialization with their peers in the online world as well. Therefore, teachers should look for ways of increasing interaction in online classes.

Aksoy's (2020) study which gives an overview of the ERT period from different parts of the world and Turkey also concludes that the importance of peer interaction in online education is undeniable and should not be overlooked. Interaction also encompasses teacher-student interaction. The study conducted during the ERT period in Indonesia on pre-service language teachers also concluded with a similar result emphasizing the importance of feedback in online education (Sumardı & Nugrahanı, 2021). This may also require teachers to create an online presence. Students expect their teachers to be active in and out of their virtual classes following their work, checking emails regularly and giving timely and constructive feedback. It is also important that teachers be aware of the importance of providing feedback and search for alternative ways of giving online feedback as feedback bears significance not only for improving one's language skills but also for increasing students' self-efficacy. The form of feedback may differ, but students value the time they spend with their instructors, so from the data collected in the interviews, it was concluded that the participants would favor online one-to-one sessions or online office hours where teachers and students will be engaged in sincere communication.

5. **Conclusion**

In the present study, it was concluded that particularly at higher level institutions, for online English language instruction to be effective, the continuous professional development units should consider helping the faculty update their knowledge and skills that would ease the online, distant or hybrid education so that course materials are accessible online and exercises are available on online platforms. The same suggestion is made in the analysis of Akbana et al.'s document analysis of ERT publications (Akbana et al., 2020).

Bozkurt (2020) also emphasizes the importance professional development bears in supporting the teachers to meet teaching and student needs during times of major medium of instruction change, such as the COVID-19 pandemic.

The transition period bears importance in that it will shed light as to what needs to be taken into consideration in online education, and what the needs and expectations of the students are in online education. The study focused specifically on psychological and technical support students received and on the actual practices of teaching and learning during the ERT. It was found out that students needed to be well-equipped technologically whereas not all of them were, they expected feedback on their performance, and they needed a standard and fair assessment system. The students also asked for material to be provided in multiple modes, and that the material is available online so that they refer to it at their own pace in their own time. In addition to the course material provided by the institution, outside resources gained importance in the ERT period as well.

It is very probable that online education is to stay. As stated by Harasim (2000, p. 59), "Online learning is no longer peripheral or supplementary; it has become an integral part of mainstream society". The ERT period was a learning opportunity for many stakeholders in the education system. Some conclusions have been drawn and lessons are taken at the end of the first round of online teaching. First of all, any institution who is planning to go online should plan in advance. The technical infrastructure should require good planning both for teachers and students. If need be, technical assistance or guidance should be provided for both parties. Institutions should enrich their repertoire of online materials. Students should be provided with not only documents but also videos that they can revisit whenever they need to.

It is also important to set the standards for the exams and announce them prior to test administration. Both teachers and students should be clear about the rules and regulations beforehand. This is not only true for high-stake exams such as the language proficiency exam but also for any in-class quizzes or midterms. It is an undeniable fact that online test administration is challenging due to the challenges about technology related obstacles and the difficulties of proctoring. Therefore, some predetermined midterms, finals or quizzes might be replaced by alternative performance-based tools of assessment, such as projects or take-home assignments, such as e-portfolios. The institutions are also to search for and invest in effective online proctoring programs and set standard proctoring rules and regulations for fair administration of online exams.

As witnessed during ERT, teachers should be equipped with some digital literacy skills to be able to cope with the challenges of online teaching. Therefore, institutions should integrate continuous professional development sessions or activities for teacher empowerment. Similar to exams, teacher feedback is one way of showing students' progress in their language development. Therefore, a component of these teacher empowerment sessions should be on providing more effective and constructive feedback. Additionally, especially during times of crisis, such as the COVID 19 pandemic, students need to be supported more. As face-to-face office hours are not possible, online sessions should be held by the instructors to be able to help the students with their stress and weaknesses.

Now that the future of education has changed with the triggering factors the pandemic enforced on face-to-face education, the institutions when planning to go online are expected to have technology integration in their curriculum, and when setting the circumstances of planned online integration, the needs, preferences, expectations, perceptions, and preparedness of students are to be taken into consideration. These would differ based on the particularities of each educational setting. While this study is limited with only one

institution under inspection, the findings of this research have relevance for other educational institutions as the current institution is one of the well-established universities with a long history in English-medium instruction. The pedagogical insights gained from this study can shed light to other School of Foreign Languages at English medium higher education institutions especially when preparing their strategic plans on building effective learning environments. As it is clear from the literature in the field, technology is here to stay and in the future of education, it is not going to be technology, per se, which may replace teachers, but teachers who can use technology efficiently will replace those who do not.

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Bibliographic review. Existence of virtual museums for educational purposes is applied to the professional environment.

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Article Info	Abstract
Keywords: Virtual museums, Bibliographic Review, Professional, educational innovation, digital learning. Review Article	Virtual museums are the answer a digital society, a new cultural, social, and economic system and a tool for educational innovation and digital learning. This article aims to collate all relevant evidence in virtual cultural museums with a teaching approach and detect what is published using the following question "What is published about virtual museums for educational purposes?". Its objective is to verify what can be found in the academic field about virtual museums for didactic purposes applied to the professional environment. The research analyzes two hundred and twenty-three articles, of which seventeen were selected for their didactic and professional environment characteristics. The bibliographic review presents indicators that determine a virtual museum is an effective tool both in the field of reinforcing learning, as well as in the theoretical and practical development of activities that encourage creation by students.

1. Introduction

This article arises from verifying what publications are being made in virtual museums, specifically in digital learning linked to professional skills and competencies. The method selected to verify this context is the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA).

The objective of the bibliographic review is to collate all relevant evidence in the field of cultural virtual museums with a teaching approach and detect what is published in this regard using the following question "What is published about the virtual museum for educational purposes?". From there it is pursued:

- Identify what can be found in the academic field on the theme of virtual museums.

- Verifying which of the above are framed in the teaching field for didactic purposes applied to the professional environment.

The information generated in the systematic review is fundamental for the scientific interests of the research group Design, Society, Education and Art (DiSEA), on the theme "virtual museum", in which two research actions are located.

The first one is the "ESIT virtual museum", a didactic tool of the Design area of the Higher School of Engineering and Technology (ESIT) from the Universidad Internacional de La Rioja (UNIR – International University of La Rioja). This museum was created for educational purposes that encourages the STEAM methodology and interdisciplinary learning in business, scientific and social fields. We live in a society framed in the era of image and interactivity and this project encourages the dissemination of the best didactic results of the ESIT Design Area. At the same time, it is an innovation in the disseminating of the

results obtained in classes and a recent initiative with a 100% online university like UINR (International University of La Rioja).

The second said museum will be one of the dissemination interfaces for the results obtained in the research carried out as an own project financed by UNIR entitled "The visibility of creative women in Spain in the XXI century". This project is being developed by the research group DiSEA - Design, Society, Education and Art - whose principal researcher is PhD Laura de Miguel, co-author of this article.

The bibliographic review carried out in this article is justified by these two mentioned reasons, both in digital teaching and learning and in the context of research.

UNIR is an online university that promotes research (in educational innovation and new technologies) with expert researchers in various methods and multidisciplinary research groups. Currently, UNIR has developed an advanced course to prepare articles on systematic review in research in Social Sciences, with the support of various experts in this method.

The article is divided into four parts. The first presents a brief literature review. The second part deals with the research method and its periods, arguing the bibliography search method and what have been the research parameters to answer the question "What is published about virtual museums for educational purposes?". The third presents the selection of articles and their analysis. It is verified that there are two profiles of virtual museums with didactic purposes, those that have physical headquarters but also have their virtual unit and are resources for reinforcing learning and virtual museums without physical headquarters. These museums are developed by students and teachers as a way of applying knowledge in practice and learning by doing.

The fourth part assumes the results obtained from the research that detects that virtual museums are an effective tool, both in reinforcing learning and in the theoretical and practical development of activities that encourage creation by the students themselves.

2. Bibliographic Review

In the framework of virtual museums thematic, an element to consider is the current society and the way communication is established. Technology has enabled the interaction between the physical and the virtual, favouring other types of relationships and has enabled greater access to information (Quiroga Sichacá, 2018), in short, a change in the way of communicating (Da Costa Santos & Lima, 2014).

Virtual museums answer a digital society, a new cultural, social, and economic system, a technological and social environment of interaction, practices, and thoughts. Said technological environment with the cultural context is called Cyberculture (Lévy, 1997).

Cyberculture opens a reality of constant change and growth for museums. Besides globalization, openness, and multiculturalism, it enables continuous innovation in the use of technologies, content languages and adapting users' needs (Fernández de Castillo Santisteban, 2017).

According to the definition of the Consejo Nacional de Museos:

"A museum is a non-profit, permanent institution at the service of society and its development, open to the public, which acquires, preserves, investigates, communicates and exhibits the tangible and intangible heritage of humanity and its environment for purposes of education, study and recreation." Consejo Nacional de Museos (s.f)

A virtual museum broadens the service to society since borders are diluted since it can be accessed from anywhere on the planet and at any time since it is always open. In this sense, technology has made the ideology of André Malraux (1947) come true when he idealized a museum space without walls (Da Costa Santos & Lima, 2014).

According to Werner Scheweibenz (1998), virtual museums are constituted by a collection of digital objects made up of a variety of media, logically organized, in which the visitor communicates and interacts according to their interests and needs.

According to Ioannis Paliokas and Gerassimos Kekkeris (2008), virtual museums adopt different formats on the Internet:

- Digital art collections made up of digital images accompanied by the description of the work.
- Museums of virtual Reality (3D), virtual architectural spaces in which the visitor is an avatar, thus having the feeling of presence and interaction with the content between the avatar and the objects in three dimensions.
- Museums of social interaction, in which they develop collaborative capacities between the three-dimensional world and with other visitors who interact with voice and text in real-time.
- Virtual museum Portals are entry points for virtual collections that are active on the Internet.
- Artist blogs, personal portfolios through blogs.

The closeness to society turns these spaces into a more powerful tool for teaching and for communicating the results to society, more universal, which produces a great impact on the cultural and artistic industry (Fernández de Castillo Santisteban, 2017).

3. Method bibliographic review

The systematic review is a method that works with relevant evidence, which meets previously established criteria, to answer a specific research question (Moher, et al, 2015). In this article the question is "What is published about virtual museums for educational purposes?" The PRISMA method (Moher et al, 2015) has been used as a guide to carry out the review. The method is divided into 17 steps structured into four sections: Administrative, Introduction, Methods and Data (Moher et al, 2015).

The search strategy was organized with the following parameters: SCOPUS search engine, the period from the 15th of October 2020 to the 3rd of November 2020, in articles published in journals and congresses from 2000 to 2020, in English, Spanish and Portuguese and in the field of Art, Technology and Humanities.

In the search bibliometric process, the descriptors 'online museum', 'web museum', 'physical museum', and 'virtual museum' have been selected. Given the diversity of definitions found in the articles on the theme of museums in virtual spaces, it was verified that virtual museum is the most used terminology, However, the results were not very significant. From the searches carried out with the words virtual museum, professional, learning, four were selected, which were the ones that generated significant information for the study.

Virtual museums present different terms such as "Cybermuseum", "online museum", "web museum", "digital museum", "net museum", words that are always in evolution (Da Costa Santos & Lima, 2014; Schweibenz, 1998).

Both authors have collaborated to determine the protocols of the systematic review, being the author Franceschi the one who has been responsible for the combination of the keywords when selecting the articles related to the research area. It is desired to clarify that the systematic review carried out is not registered in PROSPERO (International Prospective Register of Systematic Reviews) since it is not from the health area.

In the first search on November 3, 2020, two articles were selected out of ten. The search engine SCOPUS was chosen with the equation (TITLE-ABS-KEY ("virtual museum") AND TITLE-ABS-KEY ("professional") AND TITLE-ABS-KEY ("learning")):

- Katz, J.E., Halpern, D. Can Virtual Museums Motivate Students? Toward a Constructivist Learning Approach. *J Sci Educ Technol* 24, 776–788 (2015). https://doi.org/10.1007/s10956-015-9563-7

- Shaffer, D.W., Nash, P. & Ruis, A.R. (2015) Technology and the new professionalization of teaching. *Teachers College Record*, 117 (12), 1-30. https://www.tcrecord.org/content.asp?contentid=18149

In the second selection on November 22, 2020. ten articles were selected out of one hundred seventy. The search engine SCOPUS was chosen with the equation (TITLE-ABS-KEY ("virtual museum") AND TITLE-ABS-KEY ("learning") AND NOT TITLE_ABS_KEY ("formal")):

- Bolognesi, C. & Aiello, D. (2020). *Learning though Serious Game: A digital design museum for education. Proceedings of The International Archives of the Photogrammetry Remote Sens. Spatial Inf. Sci., XLIII-B5-2020, 83–90.* https://doi.org/10.5194/isprs-archives-XLIII-B5-2020-83-2020, 2020.
- Daniela, L. (2020). Virtual museums as learning agents. *Sustainability*, 12(7), 2698. http://dx.doi.org/10.3390/su12072698
- Del Valle, M., Broiero, X.A., Gacia-Romano, L. (2020). Museos virtuales iberoamericanos en español como contextos de enseñanza y aprendizaje de las ciencias naturales. *Revista Eureka 17(1),* 1301 https://doi.org/10.25267/Rev_Eureka_ensen_divulg_cienc.2020.v17.i1.1301

- Eichler, M.L & Del Pinto, J.C. (2011). *Development of a virtual museum of science in southern Brazil. In M.B. Nunes, & P. Isaías (Eds). IADIS International Conference e-Learning 2011*, 1, 260-264. ISBN: 978-972-8939-38-0

- Ismaee, D.A & Al-Abdullatif, A.M. (2016). The Impact of an Interactive Virtual Museum on Students' Attitudes Toward Cultural Heritage Education in the Region of Al Hassa, Saudi Arabia. International Journal Emerging Technologies in Learning 11 (4), 32-39. eISSN: 1863-0383

- İşlek, D. & Danju, I. (2019). The Effect of Museum Education Practices Carried out on Virtual Teaching Environments on Prospective Teachers' Views. *Revista de Cercetare Si Interventie* 67, 114-135. https://doi.org/10.33788/rcis.67.8
- Paliokas, I., Sylaiou, S. (2016) *The use of serious games in museum visits and exhibitions: A systematic mapping study 2016. 8th International Conference on Games and Virtual Worlds for Serious Applications, (VS-Games)2016*, 1-8. https://doi.org/10.1109/vs-games.2016.7590371

- Santagati C., Galizia M., Basso A., La Russa F.M. (2019). Reshaping the Identity of University Museums: The Museo della Rappresentazione in Catania as Digital Innovation Hub for the Engagement of New Generations and the Development of the Territory. In: Luigini A. (eds) *Proceedings of the 1st International and Interdisciplinary Conference on Digital Environments for Education, Arts and Heritage. EARTH 2018. Advances in Intelligent Systems and Computing,* vol 919. Springer, Cham. https://doi.org/10.1007/978-3-030-12240-9_75

- Sylaiou, S., Mania, K., Paliokas, I., Pujol-Tost, L., Killintzis, V., & Liarokapis, F. (2017). Exploring the educational impact of diverse technologies in online virtual museums. *International Journal of Arts and Technology,* 10(1), 58-84. https://doi.org/10.1504/ijart.2017.083907

- Zaina, L. A., Eline, F. D. A., Góis, G. J. D. C., & Leles, A. D. (2016) Intensifying the development of web-based Virtual Museum for e-Learning Domain. Isaías, P. (ed). *Proceedings of the IADIS International Conference e-Learning 2016,* 1, 3-10. ISBN 978-989-8533-57-9

In the third selection on November 29, 2020. two articles were selected out of thirty-one. The search engine SCOPUS was chosen with the equation (TITLE-ABS-KEY ("virtual museum") AND TITLE-ABS-KEY (learning) AND NOT TITLE-ABS-KEY ("formal")) AND (EXCLUDE (SUBJAREA, "SOCI") OR EXCLUDE (SUBJAREA, "ENGI") OR EXCLUDE (SUBJAREA, "MATH") OR EXCLUDE

(SUBJAREA, "DECI") OR EXCLUDE (SUBJAREA, "BUSI") OR EXCLUDE (SUBJAREA, "BUSI") , "PSYC") OR EXCLUDE (SUBJAREA, "MEDI") OR EXCLUDE (SUBJAREA, "MATE")) AND (EXCLUDE (LANGUAGE, "French") OR EXCLUDE (LANGUAGE, "Italian")) AND (EXCLUDE (DOCTYPE, "cr") OR EXCLUDE (DOCTYPE, "bk")):

- Hill, V., Mystakidis, S. (2012). *Maya Island virtual museum: A virtual learning environment, museum, and library exhibit. 18th International Conference on Virtual Systems and Multimedia, 2012*, 565-568. https://doi.org/10.1109/vsmm.2012.6365978

- Paliokas, I., Sylaiou, S. (2016) *The use of serious games in museum visits and exhibitions: A systematic mapping study 2016. 8th International Conference on Games and Virtual Worlds for Serious Applications, (VS-Games)2016*, 1-8. https://doi.org/10.1109/vs-games.2016.7590371

In the fourth selection on November 20, 2020. two articles were selected out of twelve. The search engine SCOPUS was chosen with the equation (TITLE-ABS-KEY ("virtual museum") AND TITLE-ABS-KEY ("art") AND NOT TITLE-ABS-KEY ("heritage museum ") AND NOT TITLE-ABS-KEY (" heritage center ") AND NOT TITLE-ABS-KEY (physical) AND NOT TITLE-ABS-KEY (real) AND NOT TITLE-ABS-KEY (" virtual reality ")) AND (LIMIT-TO (DOCTYPE, "ar")) AND (LIMIT-TO (SUBJAREA, "ARTS:

- Bertacchini, F., Bilotta, E., Gabriele, L., Pantano, P., & Tavernise, A. (2013). Toward the use of Chua's circuit in education, art, and interdisciplinary research: Some implementation and opportunities. *Leonardo, 46(5)*, 456-463. https://doi.org/10.1162/LEON_a_00641

- Kampouropoulou,M., Fokiali, P., Efstathiou, I. & Stefos, E. (2103). The Virtual Museum in Educational   Practice.   *Review   of   European   Studies*   5,   4.   120-129. http://dx.doi.org/10.5539/res.v5n4p120

4.   Articles selection and analysis.

4.1 Articles selection

Before addressing how the selection of the articles has been carried out, it is important to contextualize the museum's typologies, for a better understanding since the three types appear in the selection made. Ron Ascott (1996), a British artist and theorist in cybernetics and telematics, has created a classification that is divided into three types of web museums.

- The websites of physical museums are the first type.

- Works with their digital origin are the second type. Works in pixels destined for fabrics on computers, that is, works created by software in which the exhibition space is virtual environments in two-dimensional spaces.

- Digital works, generated by image creation software and allowing interaction with the environment that converges in the same environment, offering a repository of creativity and collaboration, an operations platform, and a seedbed of ideas are the third type.

In the third type, the computer enables the viewer to manipulate and transform the message through the interfaces and can be participate in the work (Loureiro, 2003). In the review we will see the three typologies, but it is important to note that DiSEA projects work with the second and third types.

The four selected searches add up to a total of 223 articles. Seventeen of them were selected. The way of doing it has been the critical reading of the summaries of the two hundred and twenty-three articles, with a data extraction process respecting the following criteria:

- Research that uses the museum to reinforce the learning of the syllabus.

- Research that talks about the impact of museums in the theoretical/practical didactic context of learning the themes of the academic guide, where the museum enters as an exercise in classroom teaching. The student creates the entire museum from the work to the virtual space. The museum is the exhibition space for her work and that of others and towards society, so this criterion is what the practice together with the professional context addresses.

4.2 Articles analysis

Research that relates virtual museums with a learning reinforcement tool has a constructivist learning approach in which the use of technologies in learning provides students with some autonomy. Most of the investigations addressed here are virtual museums that have a physical location.

The virtual museum has a unique characteristic and that is that the student can access the information whenever he wants. In this way, it's a continuous learning beyond the space and time of the classroom. (İşlek & Danju, 2019; Katz & Halpern, 2015; Paliokas & Kekkeris, 2008; Shaffer & Nash, 2015; Sylaiou et al., 2017;).

Virtual Museums are like digital texts, they are digital tools to serve as a starting point for discussion, debate, and reflection, since they reinforce the content learned in class (Shaffer & Nash 2015).

Virtual museums are a tool of applied knowledge (Del Valle et al., 2020), providing three types: conceptual, procedural, and attitudinal.

The elements of virtual museums encourage interaction and communication since the digital and interactive 3D content of museums can strengthen the motivation of students/visitors, unleashing aesthetic sensitivities, developing creativity, and providing new approaches that involve visitors in unique interactive experiences personalized for them (Sylaiou et al., 2017). The 3D in virtual museums promote constructivist pedagogy and "learning by doing".

They stimulate creativity, influence the interaction and learning experience of users, encouraging participation in the learning process, increasing understanding of the content. Virtual museums with their physical spaces increase the intention of users to visit the physical museum in the future. (Katz & Halpern, 2015).

It is verified that these museums use various technological resources such as games and simulations. They also emphasize using social networks for new possibilities of interaction (teachers, students, and museum educators), to express doubts or comments on the topics developed in class. Social networks increase collaboration within and outside the group and with specialized museum personnel (Del Valle et al., 2020).

The gamification of the experience in virtual museums presents a new way of working with cultural education. It may show some resistance in teaching since it is necessary for teachers to learn new technologies for this to take place. The teacher must assist in well-defined game mechanics since navigation through the 3D camera alone may not offer the expected learning results when immersed in a virtual museum (Sylaiou et al., 2017).

Virtual museums provide a permanent and active learning environment. The activities effectively create a cooperative learning environment, as they improved cognitive and sensory skills, favouring the development of research skills, critical thinking, and creativity. They also increase the ability to make observations through visual perceptions (İşlek & Danju, 2019).

The research of Eichler & Del Pinto (2011) relates the development of a virtual museum with 2D digital works in 3D space. With interface design tools they create virtual exhibitions in museums for educational purposes. It is a platform created for students and teachers of formal, non-formal and informal education and for the general audience. The main objective of their proposal is the virtual museum to be a tool to stimulate creativity, innovation, experimentation, discussion and interdisciplinary nature. Thus, they

propose that technologies and digital works can build critical and reflective knowledge learning environments.

In her article Daniela (2020) comments that virtual museums are a learning tool in which entertainment encourages the figure of the active visitor, fosters the explorer profile, and enhances the narrative with the varied use of technological solutions. In the research, she analyzes thirty-six museum applications and concludes that there is a significant development path. She understands that technology is a learning enhancer and defends the virtual museum is a great potential as learning agent since it works on digital materiality, helping in the visualization and in expressing abstract concepts. She highlights that it is a tool of autonomy the student or the visitor should learn alone. She also exposes that learning in the museum is enhanced by mobile applications that make it possible to interact with artefacts, with the narrator or explore art objects in detail. It is then possible to activate digital learning and individual reflection. The study considers virtual museums as agents of learning and interconnection between the virtual and the physical world.

According to Ismaeel & Al-Abdullatif (2017), in educational institutions virtual museums play an important role in educational experiences as an element to reinforce learning. They argue that it is a crosscutting tool for integration between more traditional. And it's possible other practices innovative that promote the use of technologies, digital and multimedia design, and the Internet. They also find that they promote improved communication, collaboration, digital literacy, and student creativity. They comment that it is a tool that encourages constructivist learning in which you can experiment, test, and reach your own conclusions.

The investigations that speak of the impact of museums in the theoretical/practical didactic context of learning and professional are not experiences like the previous ones where students learn the content in class and the museum reinforces learning. Still, the museum encourages creation and publication of the results, this is applying the theory practising high school or university experiences.

In practice carried out in laboratories by Bertacchini et al., (2013), high school students between sixteen and eighteen years old produced art forms such as 2D and 3D images, sound compositions and music, also 3D environments. Therefore, the mode of communication of the works carried out aligns with the virtual museum of type three mentioned before. The researchers with this activity found that it is an effective method of teaching complex concepts in realistic environment in which students engage and motivate powerfully.

The practice carried out by Kampouropoulou et al., (2013) with secondary school students is a hybrid process, a learning process in which the students had to generate the material such as photos, interviews, and process them to publish in the virtual museum. This research detected a change in attitude about the content studied and integrating technologies providing holistic learning (Kampouropoulou et al., 2013). In addition, the students had an active role, in which interaction, initiative and creativity, and participation were encouraged. During the educational process, some students worked with the role of themselves and others as co-creators.

In the outreach programme of the University of Washington, the practice carried out by Hill & Mystakidis (2012) instructs students to create 3D content. They address both practical and theoretical knowledge about virtual environments and 3D instructional design. They created a virtual world of Second Life in which users had the option of playing a memory game to learn about the Mayan culture, mixing learning and fun. The article highlights the transversality of areas such as library services and faculties for the development of the project.

The article by Paliokas & Kekkeris (2008) analyzes a developed tool that allows students to publish their work, creating and maintaining the exhibitions. One of the points they observed is that technologies can be a beginning for disseminating student work in virtual museums. This tool aims to reduce the time and effort generally needed by programmers to create and render 3D environments. The experiment was carried out

with elementary and middle school students. Most of the students responded positively using the virtual museum, which is why it is verified that the language of virtual reality and video games is a stimulus in the learning process.

The practice carried out by Santagati et al., (2019) encourages the participatory process of students and the use of technological tools in University Museums towards the awareness of society. The students chose a sample of works from the courses of Building Engineering and Architecture. They made a digital exhibition, developing 3D textured mesh models (obtained through digital photogrammetry or acquisition of laser scanning) using re-topology algorithms for 3D sculpture and virtual reality. The research observes that it is important to promote the visualization of information as an element that can be a pedagogical and cognitive resource, in addition to highlighting the importance of social networks as a communication and loyalty tool.

5. Results

The bibliographic review presents indicators that determine that the virtual museum is an effective tool. It's effective both in the field of reinforcing digital learning and in the theoretical and practical development of activities that encourage creation by students.

Virtual museums have a constructivist pedagogical approach (Katz & Halpern, 2015; Ismaeel & Al-Abdullatif, 2017) being a tool for autonomous, permanent, and active (Daniela, 2020; İşlek & Danju, 2019; Paliokas & Kekkeris, 2008; Shaffer & Nash, 2015; Sylaiou et al., 2017).

The virtual museums (3D) encourage interaction and communication and strengthen motivation. They promote the development of visual and aesthetic perceptions, improving cognitive and sensory skills and the development of creativity. In this three-dimensional context, gamification and simulation in virtual museums, present an educational innovation. A new way of working in education (Ismaeel & Al-Abdullatif, 2017; Santagati et al., 2019).

Virtual museums (3D) promote a cooperative learning environment. They're supporting the acquisition of research skills, critical thinking, observation, and the improvement of the compression of content and interactive digital learning experiences (Ismaeel & Al-Abdullatif, 2017; Katz & Halpern, 2015; Kampouropoulou et al., 2013; Sylaiou et al., 2017).

The virtual museum is an effective method for teaching complex concepts in realistic environment and allows to development of transversal projects. Students are involved and motivated with the development of the activity; they adopt an active role in the projects. They promote interaction, initiative, creativity, and participation. They work with the part of students and as co-creators during the educational process (Bertacchini et al., 2013; Eicher & Del Pinto, 2011; Hill & Mystakidis, 2012; Ismaeel & Al-Abdullatif, 2017;).

The tendency to combine virtual museum platforms with social networks is detected as a tool that increases collaboration within and outside the group and with specialized personnel, favouring new interaction of possibilities with teachers, students, and educators of museums (Del Valle et al., 2020).

There are also combinations of virtual museums with mobile applications that, when exploring art objects, favour a technology that enhances learning through the different ways of interacting with artefacts, with the narrator. They represent elements that activate digital learning and individual reflection connecting the virtual and physical world (Daniela, 2020).

In the bibliographic review, the three types of web museums classification mentioned by Ron Ascott (1996) have been detected. Thus, it is verified that the third type is more powerful than the others in cognitive and sensory stimulation and impact the student positively by promoting interaction, communication and strengthening motivation to learn.

It is also detected that for there to be more theoretical/practical actions, most from type three, it is necessary for teachers to learn new technologies to promote these initiatives (Sylaiou et al., 2017).

6. Conclusion

The bibliographic review on the virtual museum theme proposes a powerful didactic tool in the context of digital learning, with vast possibilities in teaching given its potential of transversality, the use of a variety of technologies and the continuous development of virtual reality technologies.

It is observed that digital learning in virtual reality environments fosters cooperative knowledge, research skills, critical thinking, observation, and improved content compression.

Virtual museums (3D) are a tool to strengthen motivation, enhance the development of visual and aesthetic perceptions. They improve cognitive and sensory skills, and the development of creativity. In this context, it is necessary to highlight elements such as gamification, games, and simulation in virtual museums.

The virtual museum is an effective method for teaching complex concepts a realistic environment allowing the development of transversal projects and the learning reinforcement and development of professional skills. It is an autonomous, permanent, and active learning tool.

It also highlights the trend of combining virtual museum platforms with social networks to increase collaboration and communication, which raises the need for technological updating and training of teachers.

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A review of research on the use of social media in language teaching and learning

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Article Info	Abstract
Keywords: *CALL* Social media Language learning Language teaching Review Article	The various possibilities that social media offers to language learners and teachers have long been recognized by researchers within the field of language instruction, and many studies have been carried out in an attempt to address and unpack its potential contributions. This paper aims to review such research on the use of mainstream social media in language teaching and learning published in *Computer Assisted Language Learning*, a top tier (i.e., Q1) journal indexed in major citation index systems (e.g., Arts & Humanities Citation Index, the Social Sciences Citation Index and Scopus), between the years 2016-2020 inclusive. For the purposes of the study, a total of 23 articles that meet the selection criteria is reviewed and presented in five sections. The first section deals with the majority of the articles, which are found to be on the use of social networking in language teaching and learning. In the following sections, studies on the use of videoconferencing, wikis, blogging and forums are discussed. Collectively, the studies reviewed in this paper outline a critical role for the use of social media in language instruction and the study aims to provide valuable insights for researchers, teachers and learners.

1. Introduction

Being popularized as a term to refer to the second generation of the World Wide Web, Web 2.0 tools opened new doors to their users by making it possible to produce and share content through social media (İstifçi, 2014b). Since then, social media has become a global phenomenon playing an important role in many people's lives. Today, with a 49% social penetration rate, social media platforms are used by almost half of the world's population (Statista, 2021). As in many other aspects of life, they have caused changes in the educational landscape, and language instruction has been no exception. These platforms have revolutionized language learning, so much so that social networking sites and applications, such as Busuu or Livemocha, that are solely aimed at language learning have been designed. They obviously have a lot to offer to anyone who would like to learn and practice a new language, yet even mainstream social media, in the forms of social networking sites (hereafter SNSs), videoconferencing platforms, wikis, blogs and forums, are also being used for such purposes by growing numbers of language teachers and learners. Social media provides learners and teachers with so many opportunities that how they could be most effectively exploited has been a major area of interest within the field of language teaching and learning.

Being one of the most popular social media platforms, Facebook has attracted the attention of many researchers. In their studies Eren (2012), Yang (2013), İstifçi (2014a, 2014b) and Wu (2016) all find positive attitudes towards Facebook as a language teaching and learning tool. Several studies have also reported on its positive contributions to teaching and learning languages. These include opportunities for

better student-teacher interactions (Aydın, 2014), for creating a sense of belonging to a learning community (Blattner & Fiori, 2009; Lin et al., 2016), for intercultural communication and socio-pragmatic awareness (Blattner & Fiori, 2009, 2011; H. I. Chen, 2017), for collaborative learning activities (Lantz-Andersson et al., 2013), for improving writing ability (Alberth, 2019; Barrot, 2016, 2021a; Shih, 2011; Yunus & Salehi, 2012), and for learner autonomy (Akbari et al., 2015). In a similar vein, research on Twitter suggests a potential to encourage participation, engagement, reflective thinking and collaborative learning (Gao et al., 2012). Twitter is also found to have positive effects on teaching pronunciation (Mompean & Fouz-González, 2016) and maintaining motivation and learning routines (Fewell, 2014; Sekiguchi, 2012). Although much of the research to date has tended to focus on Facebook and Twitter, other social media platforms such as Instagram, Pinterest, Snapchat and WhatsApp are becoming extremely difficult to be ignored by the researchers considering the numbers of their young users and the features they offer (Manca, 2020). Winet (2016) explores instant messaging and highlights WeChat, Facebook Messenger and WhatsApp as excellent tools in improving students' enthusiasm, and thus writing ability. Qi and Wang (2018) underline that teachers have positive experiences of creating social and work relationships using WeChat, which they described as an ideal tool for professional development. Furthermore, Andujar and Cruz-Martinez (2017) reveal the contributions of WhatsApp to oral proficiency. Videoconferencing tools such as Skype are also considered powerful resources for language learning (Taillefer & Munoz-Luna, 2014) that have the potential to improve linguistic and intercultural competence (Tian & Wang, 2010). Blogs are found to be "motivating, enjoyable and encouraging" learning tools in İstifçi's (2011) study. In addition, YouTube is another Web 2.0 tool that has been shown to facilitate language learning (Brook, 2011), provide opportunities for self-regulated learning (Wang & Chen, 2020) and improve listening abilities (Silviyanti, 2014). Finally, Chao and Lo's (2011) and Ducate et al.'s (2011) projects reveal positive perceptions of wikis as language learning tools.

Based upon the above-mentioned concerns, this review article is a further attempt to analyze the last five years (2016-2020 inclusive) of published research in *Computer Assisted Language Learning* (hereafter CALL) on the use of mainstream social media platforms in language instruction in order to shed more light on the academic possibilities they offer to facilitate language teaching and enhance learning outcomes since research providing insight into the use of social media in language teaching and learning plays a critical role in the much-needed integration of technology and language instruction. By giving a brief account of such research, this meta-narrative review aims to contribute to the wider implementation of this integration in various language teaching and learning settings.

2. Methodology

2.1. Selection Criteria for the Journal

For the purposes of the present review, CALL, a highly respectable top tier journal ranking in the first quartile (i.e., Q1) in the language and linguistics subject category (Scopus, 2021) was chosen. CALL was found to rank first in terms of *h-index* along with *Language Learning and Technology* and was identified as "the most significant publication venue in terms of productivity" in Barrot's (2021b) comprehensive review of literature on social media in language learning, which is based on his survey of over 1,600 journals indexed by Scopus. Therefore, considering its high number of publications on the subject and the citations they get, it is safe to say that CALL proves to be an ideal venue for the present review of literature which aims to provide insights into the current body of research investigating the use of social media tools in language learning and teaching.

2.2. Selection Criteria for the Articles

The last five volumes of CALL (i.e. volumes 29, 30, 31, 32, 33) spanning over a period of 2016-2020 were scanned for articles investigating the use of social media by language learners and teachers as a tool for second or foreign language instruction. The total number of articles in these five volumes was 230, but after

the initial search was completed by reading the titles and the abstracts of the articles, 41 of these articles were identified to be related to social media. Next, these articles were read and the articles focusing on some other issues of language use on social media, the articles on the use of social media and applications designed only for language learning and review articles were excluded. By employing a content analysis, the common themes, most preferred methodologies, common implications were detected for each category.

3. Findings

This review presents 23 articles that meet the selection criteria in five sections. It begins with the studies that investigate the use of social networking sites and then goes on to the studies on videoconferencing, wikis, blogging and forums. In each section, the studies are discussed in relation to their research purposes, context, designs and results. Furthermore, the findings that emerge from analyses of their above-mentioned features are reported with regard to their similarities and differences. The table below provides an overview and shows the main characteristics of the research that will be reviewed in the following five sections.

Table 1.

Articles published in CALL in the 2016-2020 period

Year	Volume	Issue	Authors	Country	Social Media Focus	Research Focus
2016	29	4	P. Chen	Taiwan	blogging	metalinguistic awareness, affective performance in writing
		4	Pham & Usaha	Vietnam	blogging	peer response in writing
		5	Hsu	Taiwan	voice blogging	speaking skills
		5	Zou &Wang & Xing	China	Wikispaces	error correction in writing
		6	Terhune	Japan	Skype	computer mediated communication
		8	Dizon	Japan	Facebook	writing skills
2017	30	1-2	Rassaei	Iran	Skype	face-to-face recasts with computer-meditated recasts
		3-4	Sun et al.	China	Papa	speaking skills
		3-4	Xu & Peng	China	WeChat	feedback on oral production
		6	Özdemir	Turkey	Facebook	intercultural communicative effectiveness
		7	Fouz-González	Spain	Twitter	pronunciation
2018	31	1-2	Jin	China	WeChat	language development affordances
		7	Zou & Li & Li	China	WeChat	perceptions of WeChat as a learning tool
		8	Peeters	Belgium	Facebook	online peer interaction
2019	32	5-6	Paul &Friginal	China	Facebook Twitter	written production
		5-6	Su et al.	China	wikis	literature circles, online self-regulation
		8	Hsu	Taiwan	Wikispaces	collaborative writing
		8	Ko	South Korea	NaverCafè	vocabulary feedback
2020	33	3	Börekçi & Aydın	Turkey	Facebook	teacher-student interaction
		3	Ma	Hong Kong	Google Sites	online peer feedback on wiki writing
		4	C. W. Chen	Taiwan	social media	language awareness, digital literacies
		5-6	Lenkaitis	the USA	Zoom	language learning, learner autonomy
		7	Viáfara González	Colombia the USA	Skype	telecollaboration, pre-service teachers' perceptions

3.1. Studies Investigating Social Networking

Social networking has long been a question of great interest in a wide range of fields, including language instruction. Indeed, eleven out of 23 articles reviewed in the present paper belong to the social networking category and are related to the various opportunities SNSs provide for language teachers and learners. C. W. Chen (2020) investigated whether facilitating language awareness and digital literacies could be one such opportunity via a five-stage process involving the use of SNSs. In the *observation* stage, 27 Taiwanese EFL students were asked to read the anonymized YouTube comments they were provided with by the researcher and took part in discussions in the *guided exploration and analysis* stage. Compiling a portfolio of online comments and their annotated commentary, the students engaged in a critical analysis of language forms and functions in the *collection* stage. In the *creation and participation* stage, they posted their own comments and reported the responses they generated in their portfolios. Finally, the *reflection* stage was related to the whole experience, and according to the students' entries, they gained valuable insights about online comments, which could be fertile grounds for language and intercultural learning.

The above-mentioned study, which draws attention to the potential benefits of making learners read and analyze online comments, is the only study that explores a general feature shared by various SNSs. The remaining studies, on the other hand, tend to focus on the use of particular SNSs in language teaching and learning, and they are presented in the following sections based on these SNSs.

Facebook

Investigating Facebook within the context of language teaching and learning has received considerable attention. In a quasi-experimental study, Dizon (2016) aimed to explore the efficacy of Facebook in improving the participants' writing fluency, lexical richness and grammatical accuracy in a 12-week EFL writing class. 24 in-class focused free writings were assigned both to the experimental group, who needed to post them on Facebook and comment on at least two of others, and to the control group, who needed to complete the assignments using paper and pencil. Although no significant differences were found in terms of lexical richness and grammatical accuracy, improved writing fluency was observed in the experimental group. Therefore, the study suggested that Facebook could indeed promote second language (hereafter L2) writing. Another study on Facebook-integrated writing courses was conducted by Peeters (2018), who carried out a two-year project to investigate Facebook's potential for an additional peer interaction space. The participants of the case study, more than 200 first year EFL majors at a Belgian University, joined a Facebook group which they used to discuss academic writing activities. The analysis of their interactions on Facebook revealed that they carried out a great number of communicative functions that could be categorized under four developmental processes: cognition, metacognition, organization and socio-affect. Peeters (2018) concluded, as these developmental processes and related communicative functions could enhance learning outcomes, Web 2.0 tools such as Facebook could be of assistance in language instruction.

Another possibility Facebook could provide for EFL learners was examined by Özdemir (2017) in the context of a Turkish university. Özdemir (2017) explored the potential of Facebook for developing Intercultural Communicative Effectiveness (ICE), a subcomponent of Intercultural Communicative Competence, in a mixed-method study employing multiple data collection tools. Following a pre-test of intercultural effectiveness scale, the participants were given a five-week instruction on intercultural communication, and after each class, some participants were asked to participate in discussions led by the researcher on a Facebook group with 69.000 members while the others participated in-class discussions. The post-test revealed significantly higher scores for the participants of the Facebook group, who, in their semi-structured interviews and essays, also expressed positive attitudes and experiences about the process. Therefore, Facebook was suggested as a viable platform for intercultural communication, especially in countries like Turkey, where opportunities for such interactions were scarce. The only study that investigated teachers' perceptions of the use of Facebook in language instruction also came from Turkey. In their descriptive study, Börekçi and Aydın (2020) examined English teachers' perceptions and practices

of student-teacher interactions on Facebook with respect to certain variables. Female teachers, high school teachers and teachers with a BA and those who spent more than one hour on Facebook were found to be more comfortable with active interactions, whereas certain variables such as age, teaching experience, and the number of friends/student friends were found to be insignificant. However, the survey data also revealed that teachers mostly preferred passive behaviours, such as viewing the students' profiles or reading through their posts, which do not require any direct contact with them on Facebook. Whatever the reasons might be behind these passive behaviours, the researchers suggested that teachers should increase their interactions with their students on Facebook, as improved teacher-student relationships could enhance language learning.

In conclusion, although they employ different research designs and investigate different aspects of integrating Facebook into various language learning and teaching contexts, taken together, these studies all highlight Facebook's potential positive contributions to EFL instruction as an additional tool.

Facebook and Twitter

Facebook was also the research focus of the only study that compared two SNSs. Paul and Friginal (2019) explored the effects of Facebook on L2 learners' writing ability in comparison to those of Twitter in a pseudo-experimental setting. The researchers drew attention to the different nature of communication on these two SNSs, categorizing Facebook as a symmetric SNS which required mutual agreement on the friendship, and Twitter as an asymmetric SNS which did not require an invitation or approval to be able to follow a user. After completing a pre-questionnaire, English-speaking learners of Chinese were assigned to a Facebook or a Twitter group and asked to regularly post in Chinese as part of their coursework. Data were gathered from the coded screenshots of the posts and the pre- and post-questionnaires separately for a short term (10 days) and a long term (50 days) project. In both projects, the participants were found to display different online behaviours, which could be related to distinct characteristics of the two SNSs. Overall, the analysis of the data led the researchers to conclude that symmetric SNSs such as Facebook might provide a more effective platform for peer-to-peer interaction and feedback.

Twitter

The only other study on Twitter reported more positive findings regarding its use in language instruction. Fouz-González (2017) designed a quantitative study with a control and experimental group to investigate the opportunities Twitter could provide for teaching pronunciation. All of the participants, 121 Spanish learners of English, got a daily tweet of a vocabulary item (whose pronunciation was problematic for Spanish speakers) with short explicit explanations for 22 days, but only those in the experimental group received an additional link to a video or an audio file on its pronunciation and use in authentic contexts. Pre-, post- and delayed post-tests revealed that the participants' pronunciation of the commonly mispronounced words significantly improved, and the improvements were retained over time. Although not very strong, there was also a positive correlation between high engagement scores and high improvement scores. Most of the participants were already active users of many SNSs including Twitter, as the pre-study questionnaires showed, and according to the results of the post-questionnaires, the participants believed Twitter held great potential for language learning, too. The study is significant in terms of its focus on a less-studied SNS (Twitter), group of participants (Spanish learners of English) and language skill (pronunciation).

WeChat

WeChat is another popular SNS, especially in Chinese-speaking communities. Trying to identify various affordances of WeChat for language learning, Jin (2018) gave an account of two students on a study-abroad program in China who had been taking Chinese classes in their home country. The researcher adopted qualitative data collection methods: a weekly survey the participants filled out on their language learning experience, screenshots of the participants' public and private texts on WeChat and two semi-structured

interviews. A casual space with easy access to native speakers of Chinese, authentic meaning-focused communication with native speakers of Chinese, linguistic resources and multiliteracies and space for new identity creation were the affordances identified. Although each participant made use of each affordance on a different level depending on their personalities and proficiency levels, both reported positive attitudes towards and experiences with the use of WeChat as a language learning tool. Another study that explored the use of WeChat in the context of teaching Chinese as a second language was by Xu and Peng (2017). Their exploratory study specifically investigated the characteristics of mobile-assisted feedback on oral skills of 13 learners of Chinese studying at a Chinese university and their perceptions related to this practice. During a 12-week semester, the participants were assigned nine voice recordings on topics such as food or dream jobs after they were covered in class and asked to send them to the class group on WeChat. The participants received oral and written feedback on their 2-to-3-minute recordings again on WeChat. The pre- and post-study questionnaires completed by the participants and their interviews revealed a positive perception of WeChat as a tool for facilitating oral skills. Already using WeChat in their daily lives, the majority of the participants agreed on the effectiveness of WeChat as a feedback platform in language teaching and learning.

In a similar vein, Zou, Li and Li (2018) aimed to explore learners' perceptions of WeChat as a language learning tool in addition to that of a curriculum app they designed for their four English for Academic Purposes (EAP) classes at a Chinese university. 84 participants of the mixed-method study who enrolled in these classes used the curriculum app and two groups on WeChat, one class group which enabled student-student and teacher-student interaction and another with French college students who were also learning English. They actively used both WeChat platforms to chat, ask and answer questions and give feedback to each other as well as getting feedback from their teacher, which they found to be useful, easy, comfortable and fun. The participants reported positive perceptions related to the integration of WeChat into their classes in their questionnaires and interviews. As it provided additional space for communicating with teachers, local and international peers, SNSs such as WeChat were strongly recommended by the researchers for supplementing students' learning.

To sum up, the studies reviewed here share certain common features. They all investigate the perceptions of their participants, who are either learners of Chinese or Chinese-speaking learners of English, and overall, they provide evidence that WeChat is recognized as a useful platform for language teaching and learning.

Papa

Although not as popular as WeChat, Papa is another Chinese-based SNS that enables its users to record, upload and share audio. Focusing on the use of this less known SNS, Papa, with a less studied group of learners, Sun et al. (2017) explored the effect of SNSs on the oral skills of Chinese elementary school students learning English in a quasi-experimental study. While some randomly chosen members of the control group presented their oral assignments in class, all the members of the experimental group submitted their assignment on Papa. The analysis of the pre-test and post-test showed similar gains in terms of accuracy and pronunciation; however, significantly better progress at fluency was evident in the experimental group. Focus-group interviews revealed that 90% of the participants enjoyed using the SNS and the four affordances that stood out were the fostering of an encouraging environment, reduction of anxiety, situated learning and ease of use. Considering the importance of these affordances for young EFL learners who lacked opportunities for practicing their speaking skills anywhere in the world, the study provided important insights by touching upon an area about which relatively little is known, the use of SNSs when teaching young learners.

3.2. Studies Investigating Videoconferencing

Computer-mediated communication in the form of videoconferencing enables communication to happen between participants who are not in the same space and time and obviously holds great potential for

language instruction. The studies reviewed in this part aimed to explore the possible contributions of videoconferencing in the various research settings. In his experimental study, Rassaei (2017) compared the effects of face-to-face recasts with computer-mediated recasts during videoconferencing via Skype on Iranian EFL learners' language development. Two experimental groups received one type of above-mentioned corrective feedback while the control group did not receive any feedback on their article usage during the three treatment sessions which involved storytelling activities. The findings from the pre- and post-tests revealed both types of recasts to be equally effective and supported their use since the participants in both experimental groups outperformed those in the control group. Therefore, the study provided important evidence in favour of computer-mediated recasts during videoconferencing, which could indeed be the only option during online education. Terhune's (2016) mixed-method study, on the other hand, showed that learners might not be very pleased to replace face-to-face learning with computer-mediated learning. The study portrayed the integration of computer-mediated communication through Skype provided by a language school in the Philippines into a university-level EFL class in Japan which aimed to prepare the students for academic study overseas. Twenty students taking the class made reservations and accessed the qualified teachers of the language school for either free conversation classes on mutually agreed topics or text-based conversation classes on visual prompts. As revealed by the end of class survey, more students would have preferred if the practice had not been a required part of their class at all or had been optional. In addition, although most students were pleased about the use of Skype for conversation, they were not sure about whether they wanted to continue learning English through Skype and showed a bigger preference for traditional classroom learning. Terhune (2016) also quantitatively analysed students' use of the service and linked the students' diminishing participation over time to certain issues related to motivation and autonomy. The study provided important pedagogical implications by concluding that a task-based approach with more concrete tasks and specific goals could be used to overcome such problems in the use of videoconferencing in language learning. Skype was also used as a telecollaboration tool in Viáfara González's (2020) qualitative study which investigated the effects of telecollaboration between pre-service English teachers from Colombia and Spanish heritage language students from the USA on the Colombian future teachers' self-perceptions as (non)native speakers. During the eight weeks of telecollaboration, the participants took part in information exchange and comparison and analysis tasks on topics like language learning experiences, bilingualism and Spanglish through chats on social media and weekly audio/video calls on Skype in both English and Spanish. Data from these chats and calls, pre- and post-questionnaires and interviews with Colombian participants, and their reflection logs were thematically analysed. The participants were found to rethink and change their negative self-perceptions as non-native speakers thanks to the cooperative and intercultural relationships they built with their telecollaboration partners.

Another videoconferencing platform, Zoom, was studied by Lenkaitis (2020), who investigated the effect of videoconferencing via Zoom on L2 learning and learner autonomy employing a mixed-method research design. The participants were 25 students learning Spanish at the same university in the USA, who were assigned into 10 Zoom groups that met weekly during the six-week treatment period. They were asked to use Spanish to discuss the assigned topics with their peers on Zoom and complete a survey after the session. Data from the transcribed zoom sessions, weekly reflection surveys and pre-/post surveys revealed Zoom to be an effective tool to practise L2 skills by providing additional space. Without the help or feedback from the teacher, the participants created an autonomous learning environment. The study demonstrated that the integration of videoconferencing activities with tools like Zoom could also help students who are studying at the same university.

In short, as demonstrated by the studies above, videoconferencing tools like Skype or Zoom can be utilized in language teaching and learning for various purposes. Although not likely to be preferred to classroom teaching by everybody, it is certain that the integration of videoconferencing into language instruction opens new, and sometimes otherwise impossible, doors to language teachers and learners.

3.3. Studies Investigating Wikis

Wikis have attracted the attention of researchers, teachers and learners who would like to find new ways to enhance L2 development thanks to their ease of use and support for collaborative learning. The majority of the research on wikis has been carried out in relation to its use in collaborative writing. In a mixed-method study, Hsu (2019) explored the nature of collaborative dialogue during wiki-mediated collaborative writing and its effect on the development of L2 learning in the context of a writing class at a Taiwanese university. Twelve groups of 2-3 EFL learners were formed and asked to write the two drafts of a four-paragraph expository essay on their wiki page. Wikispaces, a useful tool with Edit, Comment, Discussion and History functions, enabled the learners to work on their collaborative project and the researcher to collect data on their activities. Among the 341 collaborative dialogues that were identified, the majority were language-related episodes followed by content- and organization-related ones, indicating a bigger preference for language accuracy (local concern) than content and organization (global concerns). Although there were unresolved, incorrectly resolved or neglected episodes, correctly resolved episodes were found to be more in all three types of episodes. The study provided insights into the nature of learner-learner interactions on wikis and highlighted its benefits, especially in terms of scaffolding. In another mixed-method study on collaborative writing, Zou, Wang and Xing (2016) focused on error correction in a language exchange program between students learning English at a Chinese university and students learning Chinese at a university in the UK. The students in both groups used the wiki platform on Wikispaces to upload their 3 pieces of writing in the target language and later to correct the mistakes and make comments on the writings in their own language. The data were collected from the Chinese students' corrections and comments, interviews and pre- and post-test results of the students in the above-mentioned treatment group and the control group. The students reported that they were highly motivated and believed that they benefitted from the practice and improved their writing, which explained why they were found to be active on the collaborative tasks on the platform and performed better than the control group in the post-test.

Google Sites was another wiki platform that was studied in relation to collaborative writing using a mixed-method approach. Ma (2020) examined wiki-based collaborative writing in terms of types of inter-group online peer feedback, the teacher's evaluation of their effect on the quality of the written product and students' perceptions related to their usefulness. The participants were 37 English majors taking an EAP course, Introduction to Linguistics, at a university in Hong Kong, for which they needed to write an academic book chapter similar to the ones they studied in class. After the students collaboratively wrote the first draft, all the other students individually provided feedback on what they learned from the chapter and how it could be improved. More than 1000 entries on Google Sites by the students and the teacher were found to fall into two broad categories of praise or suggestions for improvement. The students provided more praise for their peers than suggestions, probably due to the open to public nature of wikis, and they were mostly on content, not on the use of language, probably because it was an EAP setting. The suggestions were found to predict the final score by the teacher well, and according to the online survey, the student found the feedback on the wikis useful and provided positive comments on how they improved their wiki writing. In general, the three studies reviewed above offered positive evidence regarding the integration of wikis into writing classes by outlining their role when providing feedback and correction during peer interaction.

The only study which focused on collaborative learning opportunities that wikis could provide for reading classes was by Su et al. (2019), who designed a mixed-method study to investigate the relationship between online self-regulation and attitudes towards the use of wiki-based literature circles. 285 Chinese EFL learners participated in the study which required them to complete five literature circle tasks, each carrying out the roles of discussion leader, summarizer, word master, passage person, and connector in groups of five. The participants were found to be highly engaged, and the data from the questionnaires and the interviews showed that they had positive attitudes towards the practice in terms of perceived usefulness, self-efficacy, affection and behaviour. The findings also indicated a positive correlation between some of

the students' online self-regulated learning strategies and their attitudes (i.e., goal setting and perceived usefulness /self-efficacy). The researchers suggested that wiki-based literature circles could be integrated into reading classes to facilitate L2 learning through the use of self-regulation and collaborative learning strategies.

In conclusion, although wikis mostly seem to have been investigated in relation to writing instruction, they can also be used in other practices of self-regulated collaborative learning such as those regarding reading instruction, as suggested by the final study reviewed in this section.

3.4. Studies Investigating Blogging

Blogging has been another social media medium that researchers have investigated in relation to language teaching and learning, focusing on its potential contributions to the writing and speaking skills of learners. P. Chen (2016) examined learners' metalinguistic awareness and affective performance in two different writing classes at a Taiwanese university: A conventional English writing class as the control group and a blog-integrated one as the experimental group. Although students in both groups had the same instructor and were subjected to the same classroom procedures, the students in the experimental group used their blogs to post assignments, peer-review other assignments and get feedback. Due to the open environment blogs provide, the students in the experimental group had an additional opportunity to see the archives for their peers' marked papers and all peer reviews, which, according to the researcher, could be the reason why they made significantly more progress in metalinguistic awareness. However, this could also be the reason why they reported lower self-efficacy beliefs than the students in the control group. Finally, it was found that the participants did not differ significantly in their metalinguistic strategies, writing motivation and anxiety. Therefore, increased metalinguistic awareness was the only benefit identified by the study. Another study with a research focus on blogging and EFL writing was by Pham and Usaha (2016) who explored how blog-based peer-response could enable students to improve their writing revisions. The 32 students taking a 15-week academic writing class at a Vietnamese university posted their writings on four different topics on their blogs through the semester and got feedback on their first and second drafts from their peers, the third draft from the instructor, and produced the final draft. For the fourth topic, the participants were given e-peer response training, and the student drafts, peer comments and revisions made after that in addition to the in-depth interviews with the participants regarding these provided the quantitative and qualitative data for the mixed-method study. The most frequent revisions happened at the 'word' level, and at times did not happen as they were found incorrect or unnecessary by the writers. Indeed, more revisions were made because of the writers' independent choices than the peer feedback. Therefore, although the findings of the study did not provide evidence on the effectiveness of blog-based peer response, they could be of use to anyone who would like to incorporate it into their writing classes.

Finally, in her exploratory study, Hsu (2016) investigated the use of voice blogging as a tool for improving EFL learners' speaking complexity, accuracy and fluency. The participants were 30 students of a conversation class at a Taiwanese university, who had no other speaking practice opportunities other than that two-hour class and the class blog created for it. The participants were required to post their recordings on the weekly topic and also provide written feedback to at least one of their peers for 15 weeks. The data used in the study came from the voice blog entries of the first two and the last two weeks and coded in line with the measures of complexity, accuracy and fluency adopted and developed for the study. Although not in accuracy or fluency, the findings suggested improvements in speaking complexity. Therefore, the researcher concluded that integrating voice blogging into speaking classes held some pedagogical potential.

To sum up, the studies reviewed in this part show that there still is a need for more research to be conducted on the use of blogging in language teaching and learning. Without further studies, the educational affordances of blogging can only be partially exploited.

3.5. Studies Investigating Forums

The only study which explored social media forums was by Ko (2019), who integrated NaverCafe into the vocabulary teaching part of an EFL reading class at a South Korean university. During the classes, the instructor provided instant feedback on the grammatical accuracy and the contextual appropriacy of the vocabulary items in the sentences the students produced and posted on the forum using their smartphones. At the end of the semester, the students completed open- and closed-ended surveys which aimed to collect data on the benefits and constraints of the use of smartphones and social media in the classroom and their perceptions regarding timeliness, quality and student engagement when getting vocabulary feedback through smartphones and social media. Inducing comfort and active learning, increasing interest and satisfaction, enhancing cooperation and sharing, and improving word use were the benefits identified. Although some constraints such as low battery problems, feeling ashamed of the mistakes or logging into other applications were reported, they were not shared by the majority of the participants. They were in general satisfied with the timeliness, quality and student engagement. Therefore, it can be concluded that social media forums can also play important roles in various aspects of language teaching and learning. However, it is clear that they remain understudied and more research is needed on forums as social media platforms that can be used in language instruction.

4. Conclusion

It is now known that with 3.81billion active users, the global social media penetration rate has reached 49% of the world's population (Statista, 2020). Considering the fact that it is becoming more and more common for people to use their L2 to interact with new people in addition to their friends, teachers, employers or colleagues on social media, knowing how to communicate effectively on these platforms has obviously become crucial in today's world. Furthermore, given the considerable amount of input and interaction required to learn a new language and the limited time spent in language classrooms, it is essential to take advantage of the opportunities that social media offers for practice without being constrained by time, space and distance. In this respect, recent research into the use of various social media platforms in language teaching and learning plays a critical role in guiding and shaping future practices. Therefore, by presenting a review of such research in one of the most prestigious publication venues in the field, CALL, in the 2016-2020 period, the present study aims to prove useful in expanding our understanding of how social media can be integrated into language instruction. Although the scope of this study is relatively limited, the insights gained from this study may be of assistance to the researchers who would like to carry out further research to unlock social media's potential to facilitate language instruction as well as the language professionals who would like to fully exploit that potential.

In all of the studies reviewed by the present study, social media is recognised as a tool that can be utilized for various gains on the part of language learners. It is also possible to observe some broad research trends that these studies seemed to follow. In general, the studies reviewed are found to follow mixed-method research designs, use university students as participants and report positive findings regarding the use of social media in language teaching and learning. The studies are mostly conducted in Far Eastern countries (particularly China), and Taiwanese and Chinese speakers of English appear more frequently than speakers from other nationalities. EFL is the overwhelmingly dominant research context overall, however, there are also a few studies on Chinese and Spanish as an L2. Furthermore, the reviewed research tends to explore the effect of social media integration on the writing or writing-related skills of learners more frequently than the other skills. The type of social media that the majority of the studies focus on appears to be social networking and the most commonly studied SNS is Facebook, followed by WeChat. In these studies of various research designs and contexts, SNSs are mainly investigated in relation to certain aspects of written and oral production. The findings reported and the participants' perceptions tend to be positive in line with the earlier research. However, the studies investigating videoconferencing report mixed results. Videoconferencing seems to be effective and positively perceived when it is the only option for

communication, yet when there is a comparison to face-to-face practices, it is found to be neither more effective nor more preferred. The videoconferencing tool that attracts the greatest attention from the researchers is Skype. As for wikis, which are explored as potential platforms for collaborative learning, especially collaborative writing, the research reviewed by the present study provides positive evidence, supporting their use in language instruction. A common theme for these studies is the opportunities wikis provide for peer interaction, and Wikispaces is the platform mainly used by the studies. When it comes to blogging/voice blogging, one of the less-studied platforms, the studies tend to find positive effects only on some, but not on the greater number of the areas investigated, and hence is the need for more research to be conducted. Similarly, as there was only one study on it, there remain several aspects of the use of forums in language instruction about which relatively little is known.

To conclude, the research reviewed by the present study collectively outlines a critical role for social media in enhancing language teaching and learning. It is hoped that this study will generate fresh insight into the use of social media in language instruction by providing a review of the research carried out in the last five years and contribute to the wider integration of social media into education. It is clear that there are many ways of utilizing social media tools in language classrooms, which could include but not limited to the ones suggested by the research reviewed in this study, and language professionals will need to experiment with these ways themselves to see what fits their teaching contexts best. Needless to say, it seems that social media will continue to attract the attention of researchers, teachers and learners as new platforms for language teaching and learning in the years to come, and further research will be needed as long as social media keeps changing various aspects of our lives, including how we teach and learn languages.

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Is it possible to teach English through EBA TV? Exploring student teachers' concerns and self-efficacy beliefs

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Article Info	Abstract
Keywords: Emergency remote teaching EBA TV Second language teacher education Self-efficacy beliefs Teacher concern The Covid-19 pandemic Research Article	This qualitative study explored student teachers' perceptions and feelings about teaching English in an emergency remote teaching platform, Educational Information Network TV. To this end, sixty-eight student teachers participated in this study. The participants were first invited to watch English language courses specifically designed for primary and secondary-level education provided through this medium of instruction. They were later asked to write two-page reflective journals on the strengths and weaknesses of these courses drawing upon their own feelings and opinions. Their written reflections were content analyzed, and the findings revealed two main themes: student teachers' concerns and self-efficacy beliefs. More specifically, the student teachers were concerned about macro-level factors, pedagogical issues, teachers' competencies, and context-dependent factors. Additionally, the findings shed light on the contributing factors to their self-efficacy beliefs. They attributed their future success to student-oriented factors, teacher-oriented factors, and parental involvement. The overall findings showed that their concerns outweighed their perceived self-efficacy beliefs. We hope that these findings will inform second language teacher education programs for the future since it could be of pivotal importance to prepare student teachers for distance or online learning platforms by helping them deal with their concerns and enriching their self-efficacy beliefs in their own teaching contexts.

1. Introduction

In Turkey, as in many other countries, the Covid-19 pandemic has called for a sudden paradigm shift from face-to-face education to emergency remote teaching. Emergency remote teaching offers "temporary access to instruction and instructional supports in a manner that is quick to set up and is reliably available during an emergency or crisis" (Hodges et al., 2020, p. 6). Additionally, it requires using different strategies and approaches, in which learners are enmeshed into learning as an "obligation" (Bozkurt & Sharma, 2020, p. ii). Succinctly, it helps to sustain education outside the traditional classrooms, especially during such troublesome moments. Accordingly, as an emergency remote teaching platform, Educational Information Network TV (EBA TV, henceforth) started broadcasting on March 23, 2020 in Turkey.

EBA TV is run by the Turkish Ministry of National Education (MoNE) in collaboration with the Turkish Radio and Television Corporation [Türkiye Radyo Televizyon Kurumu, TRT] and provides courses specifically designed for primary, secondary, and high school education. Instructional materials, course

content, teaching methods, and techniques have been tailored accordingly to benefit from such an educational platform. Nevertheless, it might have come with a few challenges for language teachers. Within this framework, this sudden change necessitates exploring English language student teachers' feelings and opinions to amplify opportunities for the necessary guidance and support for the future and prepare student teachers better to teach in distance or online teaching platforms no matter whether a sudden paradigm shift is obligatory or not.

It is necessary to be cognizant of student teachers' feelings to promote both professional and personal dimensions in teacher education. That said, emphasizing these both dimensions will "contribute to educational goals that go far beyond the development of the individual teacher" (Meijer et al., 2009, p. 308) since good teachers are more than "well-oiled machines" (Hargreaves, 1998, p. 835) and "certain isolated competencies" (Korthagen, 2004, p. 79). Therefore, this study attempts to portray student teachers' opinions and feelings about teaching English through an emergency remote teaching platform in general and unveil their concerns and self-efficacy beliefs in particular.

2. Literature Review

Teacher Concern

Teaching is "an emotional practice" (Hargreaves, 2000, p. 824). Understanding teacher concern thus is the main impetus behind scaffolding student teachers to deal with their prominent concerns and fostering their professional development as well as enriching their personal beliefs before they embark on the teaching profession (O'Connor & Taylor, 1992; Guillaume & Rudney, 1993; Poulou, 2007). In this sense, Fuller's (1969) concerns-based model has acted as a catalyst, for the first time, in understanding and sifting through teachers' concerns in their professional careers. According to the model, all the teachers pass through the same developmental stages: self-concerns, task-related concerns, and impact concerns, respectively (Fuller et al., 1974; Boz, 2008). More specifically, self-concern is related to teachers' ideas about their own competencies and survival skills in the classroom as well as receiving positive comments from others; task-related concern refers to their worries about the teaching task itself such as teaching methods, insufficient classroom time, and lack of materials; and, impact concern addresses teachers' concerns about meeting their students' social, and emotional needs (Fuller, 1969; Fuller et al., 1974; Reeves & Kazelskis, 1985; Swennen et al., 2004). Three stages follow a linear pattern; as such, once self-concerns are resolved, teachers develop task-related concerns and then impact concerns (Reeves & Kazelskis, 1985). However, the duration of the stages differs among the teachers (Boz, 2008). Some scholars provide further evidence regarding this linear view of developmental stages (e.g., Fuller & Bown, 1975; Butler & Smith, 1989). Nevertheless, many scholars run counter to this view by advocating the simultaneous development of multiple teacher concerns (Reeves & Kazelskis, 1985; Guillaume & Rudney, 1993; Pigge & Marso, 1997; Boz, 2008). They further argued the complexity of the development of student teachers' high level of concerns (Burn et al., 2003).

Fuller's model could also describe student teachers' concerns (Fuller, 1969). However, as to the distinction between student teachers' and in-service teachers' development of concerns, Fuller and her colleagues (1974) put forward that student teachers develop more self-concerns whereas in-service teachers develop more impact concerns. Based on this model, an array of research studies has attempted to probe student teachers' concerns about the teaching profession in the field of teacher education (e.g., Guillaume & Rudney, 1993; Burn et al., 2003; Swennen et al., 2004; Poulou, 2007; Boz, 2008; Boz & Boz, 2010). These studies have been carried out in different countries and in various teacher education programs such as primary school teacher education (e.g., Swennen et al., 2004), elementary education (e.g., Guillaume & Rudney, 1993; Poulou, 2004), secondary science, and mathematics education (e.g., Boz & Boz, 2010). Besides, studies have examined teachers' concerns in traditional classrooms. More recently, Farmer and West (2019) have explored teachers' concerns in online learning environments. They have indicated that

both teacher education programs and online teaching organizations should address teachers' concerns such as lack of autonomy over the course content and then relieve their concerns accordingly. Building on this previous literature, the present study aims to depict student teachers' concerns in a second language teacher education program by specifically drawing upon their feelings about an emergency teaching platform instead of traditional classrooms in addition to their self-efficacy beliefs. The importance of teacher self-efficacy beliefs is fleshed out below.

Teacher Self-Efficacy Beliefs

Self-efficacy is rooted in Bandura's social cognitive theory predicated on "an agentic perspective in which individuals are producers of experiences and shapers of events" (Bandura, 2000, p. 75). Self-efficacy belief is delineated as "people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances" (Bandura, 1986, p. 391). Whereas capability addresses having essential skills to carry out a specific task, what matters is one's belief in their capability to perform well in this task. Individuals with higher self-efficacy beliefs, holding a stronger faith to succeed, might perform better than those with a higher capability but with lower self-efficacy beliefs (Williams & Burden, 1997). Besides, those with higher self-efficacy beliefs are construed as more self-regulated, more positive, and more persistent or resilient when faced with a challenge (Usher & Schunk, 2018). In this sense, since the teaching profession is grappled with complexity, stress, and challenges, understanding teachers' self-efficacy beliefs might pave the way for providing them with the necessary guidance and support in teacher education programs (Gibbs & Miller, 2004).

Teacher self-efficacy beliefs refer to "teachers' evaluation of their abilities to bring about positive student change" (Gibson & Dembo, 1984; p. 570). Previous research indicated that teachers' self-efficacy beliefs affect their students' achievement (Aston, 1984), leaving the teaching profession (Glickman & Tamashiro, 1982; Hong, 2012); commitment to their job (Coladarci, 1992); burn-out (Brouwers & Tomic, 2000); students' resilience (Sosa & Gomez, 2012); preferred teaching styles (Heidari et al., 2012); collaboration with parents (Hoover-Dempsey et al., 1987; 1992); job satisfaction (Demir, 2020; Kasalak & Dağyar, 2020); and teaching concerns (Boz & Boz, 2010). Among these studies, Boz and Boz (2010) investigated the relationship between student teachers' concerns and self-efficacy beliefs, and they found that those with higher self-efficacy beliefs had less concerns about teaching.

Self-efficacy belief is construed as more than a stable trait. As such, Bandura (2012) acknowledges that self-efficacy beliefs "vary across activity domains and situational conditions rather than manifest uniformly across tasks and contexts in the likeness of a general trait" (p. 13). In a meta-analysis on teachers' self-efficacy beliefs, Kasalak and Dağyar (2020) further articulate that their beliefs might even vary according to their access to technology and information over the years. Thus, we believe that exploring student teachers' concerns and efficacy beliefs about teaching English through a remote teaching platform merits further attention.

Emergency Remote Teaching of English Language

As previously explained, emergency remote teaching is defined as "a temporary shift of instructional delivery to an alternate delivery mode due to crisis circumstances" (Hodges et al., 2020, p. 6). Since the Covid-19 pandemic was an unexpected phenomenon, language teachers having little or no experience in distance or online teaching beforehand might have encountered various challenges during this sudden transition. In this sense, several studies have attempted to examine these challenges. For instance, Atmojo and Nugroho (2020) analyzed sixteen Indonesian English language teachers' experiences during the pandemic, and they indicated challenges such as, *inter alia*, technological constraints, students' low digital literacy and lack of motivation, late submission of the assignments, and "teachers' lack of experience and knowledge" (p. 66) as well as their "lack of preparation and readiness" (p. 67) in online learning. Similarly, Bailey and Lee (2020) probed English language instructors' perceived challenges and benefits of

emergency remote teaching and indicated that novice teachers experienced a lack of preparation for online teaching. They further stressed the importance of developing teachers' online teaching competencies.

In another study, Todd (2020) similarly searched teachers' perceptions about the transition to emergency remote teaching and found that this transition provided affordances such as flexibility in time and students' taking the responsibility for their own learning. Nevertheless, they addressed several constraints such as technological problems, checking students' reactions and understanding, and practicing speaking skills in pairs. More recently, Hazaea et al. (2021) examined university instructors' challenges and similarly found technological constraints and pedagogical challenges such as student engagement and assessment, lack of real communication, preparing appropriate materials, and adopting the necessary teaching strategies. These findings were also echoed in Erarslan (2021), who reviewed sixty-nine studies examining English language teaching during the emergency remote teaching process. Accordingly, this process brought several challenges such as technological problems like internet connection and access to smartphones or computers and teachers' lack of preparation and "insufficient technological and pedagogical content knowledge" (p. 359) even though it facilitated teachers' development of digital literacy skills.

Building on this line of research, the present study is expected to contribute to the literature in several ways. First of all, as seen from the findings above, student teacher preparation is of pivotal importance in order not to be caught off guard once again in an emergency, if any. Secondly, student teachers reflected on their own opinions, perceptions, and feelings about the conceptualization of remote teaching. Therefore, their reflections might contribute to the amelioration of the second language teacher education program in Turkey. Thirdly, all the participants watched specific pre-recorded lessons, and thus it might be easier to compare their feelings. Fourth, they reflected on not their own learning and teaching experience but evaluated others' teaching performance as an outsider, so their self-efficacy beliefs and concerns appeared more naturally. At the heart of this descriptive study thus were two research questions:

1.   What are the student teachers' concerns about teaching English through EBA TV?

2.   What are their perceived self-efficacy beliefs in teaching English through this remote teaching platform?

3. Methodology

3.1. Data Collection

This qualitative study adopts a case study design which offers "an intensive description and analysis of a phenomenon or social unit such as an individual, group, institution, or community." (Merriam, 2002, p. 8). The data were collected through written reflective journal entries to reveal participants' feelings, concerns, worries, and internal thoughts that "may be inaccessible from the researcher's perspective alone" (Mackey & Gass, 2005, p. 178). The student teachers were assigned to watch three different English lessons specifically designed for primary (third grade and fourth grade) and secondary-level (seventh grade) education (links to these three sessions were provided in Appendix A). These lessons were selected based on three criteria: i) they were representative in terms of variety of activities such as games and songs, ii) there were critical points for student teachers to reflect upon, and iii) the topics were interesting and familiar (transportation, clothes, and public buildings). The student teachers were later asked to write two-page written reflections on their opinions and feelings about the English classes broadcasted on EBA TV (they were free to watch more than three lessons). They were specifically asked to reflect on their perceptions and feelings about the strengths of the classes and the points that need to be improved. Finally, they uploaded their papers on Google Classroom, which facilitated the learning and sharing process throughout the semester.

3.2. Study Group

This study was carried out at a state university in Ankara, Turkey with a total of 68 student teachers. They were second-year (n= 50) and third-year (n= 18) students enrolled in a four-year Bachelor of Arts Program in English Language Teacher Education. There were 43 females and 25 males, and their ages ranged between 19 to 52 (*M*= 21,23). Data were collected at the end of the Spring semester of the 2019-2020 academic year. At the time of the data collection, the participants were taking a compulsory second-year course in the program titled 'Language Acquisition' which covers the theoretical underpinnings of first and second language acquisition. The second graders were also taking a methodological course named 'English Language Teaching Methodology I', and the third graders were taking 'ELT Methodology II' and 'Teaching Language Skills I' at the same time. As a requirement of these courses, they were presenting micro-lessons to their classmates, but they had very little or no real classroom teaching experience. The participants were selected purposefully for the study based on two criteria: i) they provided clear and detailed reflections on their feelings about distance education, and ii) they agreed that their papers could be used for research purposes. The disclosure of the identity of the participants was taken into consideration for the present study.

3.3. Data Analysis

The reflective journals were content analyzed (Krippendorff, 2018) by following these steps: i) reading the journals repeatedly to gain a general understanding and identifying the initial codes, ii) determining the recurring codes and categories, iii) making links between them to identify the main themes. First of all, the researchers read the data repeatedly and coded the data individually. Then, we worked together, discussed the initial codes and identified 35 codes. To ensure inter-coder reliability, we negotiated the codes and categories until there was a full agreement and combined seven codes with other relevant codes in the pool. A total of 28 codes were provided below. Later, the first researcher discussed the recurring codes and categories with another researcher holding a doctoral degree in the field, and she suggested only a few changes in terms of word choice. We used MAXQDA (version 20.1.0), computer software for the qualitative analysis, to facilitate the process of data analysis, calculate the frequencies, store the data, and retrieve excerpts from the data based on the themes.

3.4. Findings and Discussion

The findings from the written reflections revealed two main themes: student teachers' concerns and their self-efficacy beliefs. The distribution of the data was provided according to the number of the participants. In other words, the number of participants was considered rather than the frequency of their repetitive statements.

Concerns: "We cannot teach English successfully…"

The overall findings indicated that more than half of the student teachers approached teaching English via EBA TV with trepidation. They firmly pointed out that it was impossible to teach English successfully, and they were expecting to be back in the traditional classrooms. More specifically, their concerns were related to four categories: i) macro-level factors, ii) pedagogical issues, iii) teachers' competencies, and iv) context-dependent factors. The distribution of the codes and categories about their concerns was provided in Table 1 below.

Table 1.

The distribution of the codes and categories and themes related to teacher concern

Themes	Categories	Codes	The number of STs (68)
Concerns	Macro-level factors	Limited classroom hours	16
		Constraints in measurement	5
		Insufficient response time for students	3
	Pedagogical issues	Having limited social interaction	38
		Checking students' understanding	26
		Drawing students' attention	24
		Monitoring active participation	19
		Limited comprehension due to use of target language only	16
		Providing immediate feedback	14
		Developing speaking skills	12
		Receiving feedback from students	11
		Teachers monitoring themselves	7
		Noticing students' emotions	4
	Teachers' competencies	Making pronunciation mistakes	8
		Displaying digital literacy	6
		Integrating four skills	5
	Context-dependent factors	Learning in a distracting environment	16
		Students' technological constraints	14
		Students' unfamiliarity with this mode of learning	10
		Parents' negative attitudes towards learning	3

The findings demonstrated the student teachers' concerns about macro-level factors referred to organizational planning of the courses. To be more precise, each class lasted between twenty and twenty-five minutes, and several student teachers (*n*= 16) pointed out that time limitation negatively impacted the effectiveness of the courses and caused teachers to act quickly and speak fast:

"Because of this limit, it becomes more challenging for teachers. It should be extended a little bit in order to let teachers teach English lessons more effectively." (Ela)

Some of them (n= 3) also expressed that this time limitation led to insufficient response time for students since teachers waited only a little bit after asking questions:

"Teachers are quite fast, and they just wait for two seconds and give the answer. Although we are all aware that there is a time limit for every lesson, I feel like students struggle to keep up the pace with their teacher." (Zeynep)

On the other hand, a few student teachers (n= 3) favored time limitation in terms of students' concentration span and one of them expressed that:

"Since teachers are restricted with a time limit, they get fully prepared before the lesson starts and they put a great effort while teaching." (Ersin)

In addition, some student teachers (*n*= 5) highlighted the importance of measuring students' progress and attributed students' success to the measurement and evaluation:

"They [teachers] cannot evaluate the students' outcome. As long as we cannot see the outcome or evaluate it, I think we cannot call it learning." (Neslihan)

The findings indicated that several student teachers (*n* = 12) were concerned about the lack of opportunities for developing speaking skills. They voiced that language learning could not take place unless learners produced. One of them stated that:

"Language cannot be learned by watching the lessons, so there will possibly be deficiencies in using the language. Distance education can be improved, but again it will never be as efficient as in school." (Gizem)

Besides, sixteen student teachers commented negatively on using only the target language as the medium of courses and claimed that it could lead to a lack of comprehension for students. In other words, students could not follow the instructions, and they might feel confused or demotivated since they were mostly being exposed to their mother tongue in their traditional classrooms:

"…considering the fact that most of the teachers use Turkish in their classrooms, it must be hard for the students to get used to an English spoken lesson. Thus, students may get bored, lose their interests and don't want to listen to the teacher." (Neşe)

Factors related to pedagogical issues stemmed from the problems caused by the physical distance. A great majority of student teachers (*n*= 38) articulated that it was nearly impossible to teach English through EBA TV due to limited social interaction. They claimed that English classes were teacher-centered and learners were passive. Besides, there was no student-student or student-teacher interaction, and students had no chance to ask questions when they encountered problems:

"I think that it can never be good as the learning that conducted with physical face to face interaction especially in English context where interaction and socialization have huge importance. Without good interaction, we cannot create a suitable social context to teach English." (Ahmet)

Furthermore, the student teachers noted that it was quite challenging to check students' understanding, draw their attention, monitor their active participation, and notice students' feelings and emotions. Some of them stated that a relaxing and stress-free learning environment might cause students to lose their interest quickly. Thus, they believed in the necessity of an authority to encourage their active participation:

"Taking the students' attention is a challenging job. In distance education, it is much harder because there is no authority to control students whether they are listening carefully or not." (Emre)

Besides, only a small number of student teachers underscored the facilitative role of parents in motivating and monitoring students and developing their autonomy. They also stressed the importance of providing (*n*= 14) and receiving (*n*= 11) immediate feedback for a successful language learning process. Additionally, they reported that teachers would not have any opportunities to recognize their mistakes immediately while recording the courses on their own and modify their input accordingly:

"Teachers are not able to get instant feedback from students; they may not be able to detect the phrases or activities that need further explanation for pupils..." (Ecem)

Concerning the teachers' competencies, the student teachers pointed out that teachers were in a position that required to be digitally literate immediately (*n*= 6) and capable of integrating four skills successfully (*n*= 5) to teach in front of the cameras. They also expressed the importance of teachers' pronunciation skills in order not to cause any fossilized mistakes difficult to rehabilitate in the future:

"The teachers should pay close attention to their pronunciation while in front of the screen because many students watch them, and the mistake of the teachers can cause many students to learn wrong pronunciation" (Mehtap)

Student teachers were also concerned about such context-dependent factors as learning in a distracting environment (*n*= 16), students' technological constraints (*n*= 14), their unfamiliarity with distance learning (*n*= 10), their parents' negative attitude towards teaching English or distance learning (*n*= 3). Some of them verbalized that students needed to be alone to concentrate on the courses easily whereas others indicated that their parents should accompany them in case they might feel alone or comfortable. If they felt comfortable and relaxed, they might not have a desire to complete their assignments.

"The disciplined atmosphere that the schools have may not be created at home, which possibly will result in lack of motivation if the families have little children or babies, the students probably will have concentration problems because of the noisy" (Azra)

Self-efficacy beliefs: "We can teach English successfully if we feel supported..."

As previously mentioned, self-efficacy beliefs refer to individuals' beliefs in their own capacity and their persistence to achieve a challenging task. Nearly twenty student teachers held positive self-efficacy beliefs, and they were optimistic that they would teach English successfully through distance learning:

"We don't know what the future holds, so we need to make all the improvements we can make in the field to provide a better education" (Beren)

"Teachers should be prepared for every condition and should know how to renew themselves." (Özge)

"These days have taught us that we have to improve ourselves as an individual and as a future teacher. We should learn new strategies for teaching and add more things to our teaching skills. (Defne)"

These student teachers sounded more likely open to change, flexible and resilient. To wit, they could positively adapt to the changing situations and teaching in every condition:

Looking at the current situation, it is easy to realize that there may arise many problems. But the thing is the ability to come up the obstacles. (Selen)

"This is change and change inevitable, we are living in 2020 and years ahead to come will only bring more such developments. In my opinion, this should be used as a stepping stone to boast [boost] ourselves into future. People are having a hard time realizing old methods are now obsolete and predated, and we the new generation of new era that is Technology Era should adapt. It wouldn't be surprising to see online education to replace the traditional education, so why don't we just use this golden opportunity. With what we know, and what we'll experience we can make it better, we can make it right." (İpek)

As seen from the student teachers' excerpts, if they were expected to go through a necessary transformation, they would seem ready to make the necessary adjustments. They marked that they could teach English if they felt supported. We juxtaposed three contributing factors to their self-efficacy beliefs as student-oriented and teacher-oriented factors and parental involvement as tabulated in Table 2.

Table 2.

The distribution of the codes and categories and themes related to self-efficacy beliefs

Themes	Categories	Codes	The number of STs (68)
Self-efficacy beliefs	Student-oriented factors	Students' autonomy	6
		Students' motivation	6
	Parental involvement	Creating a suitable learning environment	11
		Monitoring students	10
		Motivating students	6
		Developing students' autonomy	3
	Teacher-oriented factors	Collaborating with parents and students	14
		Using various and interactive activities	12

The student teachers enunciated that they could teach English once their students were motivated and autonomous. In fact, to be able to teach English successfully, nearly half of the student teachers in total (n= 29) voiced that they heavily relied on parental involvement and support one way or another. They marked that parents should consider the children's needs, encourage them to learn more, and create a silent, comfortable and suitable learning environment by eliminating the factors that distracted their attention:

"The change of educational environment might harm students' motivation. For this reason, the parents need to manage the process effectively and make the situation as clear as possible for their children. it is essential for parents to prepare a convenient atmosphere so that the students can be easily adapted to the process." (Dicle)

They further verbalized that parents played an important role not only in motivating but also in monitoring the children's learning process:

"...parents should also monitor their child's process and participate in their lessons and assignments willingly." (Damla)

"Students can only study more precisely by the help of supervision of the parents." (Nil)

In accordance with teacher-oriented factors, unlike some student teachers (*n*= 12) who pronounced that it was not possible to develop speaking skills in distance learning as mentioned above, fortunately twelve student teachers expressed that actual classroom teachers could facilitate language learning process by using various tools and activities such as web 2.0 tools, e-portfolio systems, online group projects:

"Students might feel alone. Thus, providing feedback and quick answers to their questions may be helpful to engage them in the learning. Furthermore, teachers need to build a sense of classroom community among students. There must be a space for students to get connected with one another. Discussions, online group projects, chats and virtual tools such as zoom app and other tools might boost a sense of real classroom". (Afra)

Some student teachers (*n*= 14) epitomized the importance of teachers' collaboration with parents and students in providing immediate feedback if necessary, informing both of them about the learning process, supporting the learning process as well as having an understanding attitude:

"Parents, students and teacher all should try to cooperate with each other and they all should take responsibility for both learning and teaching." (Gül)

The findings of this study showed that the student teachers held a bunch of task-related concerns including macro-level factors and pedagogical issues, which need to be resolved for an effective teaching and learning process. These findings tallied somewhat with those in Boz (2008), who provided further evidence that student teachers' task concerns were high in a teacher education program in Turkey. Moreover, a great majority of student teachers shared high levels of impact concerns, including pedagogical issues and context-dependent factors. More specifically, student teachers were mainly concerned about controlling students' behaviors in terms of drawing their attention, motivating them when they get side-tracked, and monitoring their active participation, meaning that student teachers paid close attention to the pupils' emotional and social needs. Succinctly, student teachers' impact concerns were higher than their self-concerns, indicating that they took pupils' emotional and social needs into account. This finding might be attributed to the fact that student teachers could be sympathizing with the pupils because they somehow went through similar learning processes and experience challenges more or less. Additionally, they evaluated other teachers' performance, which unfortunately could have limited the opportunity of reflecting on their own survival in the class. Nevertheless, these findings were consistent with those found in Reeves and Kazelskis (1985), O'Connor and Taylor (1992), and Swennen and her colleagues (2004) who indicated high levels of impact concerns among student teachers. Besides, the findings run counter to developmental stages in Fuller's (1967) model whereas they reinforced the findings of several previous studies (e.g., Reeves & Kazelski, 1985; Pigge and Marso, 1997; Boz, 2008) by indicating that the student teachers had developed different teaching concerns simultaneously rather than sequentially.

It is noteworthy that limited social interaction concerned a great majority of student teachers as. In a very recent study, Hebebci et al. (2020) similarly proved that both students and teachers were concerned about the lack of interaction and communication due to the asynchronous nature of EBA TV. In addition, student

teachers had a right to bemoan this constraint since it has been a well-established fact in the literature that social interaction yields to language development *ipso facto* (Vygotsky, 1962, 1978). Overall, we stand at the threshold of understanding student teachers' concerns to relieve them for the future in case distance learning platforms might topple the long-standing sovereignty of traditional education soon. Even if it does not supplant it, it will supplement the traditional education in a better scenario. Parallel to this aim, teacher educators need to prepare teachers for the future by developing their online teaching competencies as also argued in Atmojo and Nugroho (2020) and Bailey and Lee (2020) by enhancing student teachers' self-efficacy beliefs. In addition, self-efficacy beliefs should be enhanced since teachers with higher self-efficacy beliefs might "invite and receive more parent involvement…" (Hoover-Dempsey et al. 1992, p. 292).

Additionally, as revealed by their utterances, some student teachers with lower self-efficacy beliefs interestingly shared the concern that parents should take responsibility for their children's learning process. They regarded the parents as the authority figures and seemed to favor helicopter parenting, i.e., "over-controlling parenting" (Schiffrin et al., 2014, p. 548), over autonomy-supportive parenting. Although this distance education process emerged as a novel and compulsory practice, it might nudge both teachers and parents into the point that they should abandon the role of helicopter parenting since it may harm students' well-being and lead them to depression (Schiffrin et al., 2014). Otherwise, we might not be able to raise self-regulated and autonomous children. On the other hand, only a few student teachers with higher self-efficacy beliefs underscored the importance of raising autonomous children for the efficacy of distance education. In fact, it is a well-established fact in the literature that the success of online or distance education depends on by and large learner autonomy. As also stipulated by Moore (1972), learner autonomy should be emphasized more on a par with the lower level of dialogue.

Nevertheless, the overall findings showed that their concerns outweighed their perceived self-efficacy beliefs, and they mostly attributed their success to –rightly or wrongly- external factors such as parental involvement and classroom teachers' support. They sounded plausible in that "collaboration and communities of practice reduce the sense of isolation and the feeling that students are facing the world of learning alone" (Nunan, 2012, p. xi) in distance learning. The findings unfold that student teachers' self-efficacy beliefs could be enhanced through collaboration with others since distance learning platforms are beset with some constraints such as lack of interaction and lack of opportunities for providing immediate feedback and implementing production-based activities as also reiterated in Todd (2020), Erarslan (2021), and Hazaea et al. (2021).

Last but certainly not least, 'The Future of Education and Skills: Education 2030' report released by the Organisation for Economic Co-operation and Development (OECD, 2018) accentuated that new jobs would be created, and new technologies would appear in ten years. Grappling with this uncertainty and complexity, schools should prepare individuals who "develop curiosity, imagination, resilience and self-regulation" (OECD, 2018, p. 2) to find solutions to challenging problems. Therefore, teachers might need to be less worried but more resilient and reinforce their students' self-efficacy beliefs, self-regulation and autonomy, which are closely related to each other. As Bandura (2012) marked, self-efficacy beliefs could be "strengthened by reducing anxiety and depression, building physical strength and stamina, and correcting the misreading of physical and emotional states" (p. 13).

4. Conclusion and Suggestions

This study attempted to unveil student teachers' concerns and self-efficacy beliefs about teaching English through EBA TV. Based on the findings of the study, we can claim that teachers' concerns about teacher competencies might bring their tacit self-concerns to the fore; as such, they are hopefully aware that teachers need to improve certain skills in order to survive as a teacher in such a platform. We believe that realizing the importance of these qualities in the first place could be a poignant way of improving them in the future. Even though student teachers' beliefs and concerns might not automatically transfer into their actual

classroom practices, the findings provide an insight into their feelings for further support and guidance in order to boost resilient self-efficacy beliefs for the future. Thus, we hope these findings could galvanize teacher educators to relieve student teachers' concerns about distance learning by helping them develop their digital identities rather than blind obedience to the traditional classes. Likewise, teacher educators should help individuals become cognizant of their own concerns to develop their teaching competencies and professional identities or mission (Korthagen, 2004). Additionally, it is noteworthy to mull over the opportunities for designing and practicing online tools to supplement distance education in order to enhance student teachers' sense of efficacy. Enhancing their sense of efficacy is of pivotal importance for them to raise students with higher self-efficacy beliefs in the future since, as teachers, "consciously, we teach what we know; unconsciously, we teach who we are" (Hamachek, 1999, p. 209).

Succinctly, the findings of the present study portrayed the current situation of teaching English through distance learning. Rather than plunging into teaching English behind the scenes, now we have a chance to hone the challenging points into advantages. Nevertheless, we should note that equally important to having an insight into these points is directing student teachers to get them through immediately, if possible. Nevertheless, the present study is a cross-sectional study, and these findings constitute only a rudimentary framework for student teachers' feelings about a distance education platform. Therefore, teacher concern and self-efficacy beliefs warrant further in-depth explorations, especially by employing in-service teachers.

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Appendix A

Links to the English courses student teachers are assigned to watch have been provided below.

https://www.trtizle.com/sinif3/3-sinif-ingilizce/ders-3-transportation-1-1803679

https://www.trtizle.com/sinif4/4-sinif-ingilizce/ders-2-my-clothes-1-1802295

https://www.trtizle.com/sinif7/7-sinif-ingilizce/ders-3-public-buildings-1-1810134

Development of the learning management systems evaluation scale based on transactional distance theory

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Article Info	Abstract
             Research Article	This study aimed to develop the Learning Management Systems Evaluation Scale (LMSES) with reference to Transactional Distance Theory (TDT). At the first stage of the scale development, it was observed that 19 items with three factors explained 63.73% of the total variance. The variance amounts explained by the scale factors are Dialogue (D=8 items, 23.06%), Structure (S=7 items, 25.74%), and Autonomy (A=4 items, 14.93%). As a result of the confirmatory factor analysis performed at the second stage of the scale development, it was determined that the scale had a sufficient reliability coefficient (Cronbach's alpha S=0.90, D=0.89, A=0.82) and fit indices (χ^2=252.78; sd=146; χ^2/sd =1.73; CFI=0.95, NFI=0.90, GFI=0.89, AGFI=0.85, SRMR=0.06, RMSEA=0.06; p<0.001). The overall Cronbach's alpha coefficient of the scale was calculated as 0.94. Furthermore, the structural reliability of the scale (S_ω=0.90, S_{AVE}=0.57; D_ω=0.88, D_{AVE}=0.49; A_ω=0.82, A_{AVE}=0.54) and the results of the HTMT ($r_{S\text{-}D}$=0.68, $r_{A\text{-}D}$=0.80, $r_{A\text{-}S}$=0.76) correlation ratio analysis were examined, and the evidence for the validity of the scale was supported. According to these research findings, the LMSES has the potential to provide a statistically verified measurement structure based on TDT and support advanced theoretical and statistical studies.

1. Introduction

The rapid development of communication technologies and the proliferation of information have played a role in the spread of education and training systems worldwide. Especially in the last decade, online learning has become an important part of higher education, while the COVID-19 pandemic has made e-learning a necessity. In periods such as the pandemic when restrictions are increased, information technologies offer alternative solutions in all areas. In this age when we can see that information technologies can be adapted to all areas of life, it is inevitable to discuss the use of information technologies in the domain of education, especially considering the level of participation. Technology has always been a helpful tool in performing simple tasks such as improving the traditional learning process (Raza et al., 2021). E-learning tools have made it possible to continue the learning process in periods such as the pandemic when restrictions are intense and face-to-face education is interrupted (Zwain, 2019). In the digital age, when technology has become indispensable for life, learning tools and learning environments have also turned to digitalization in accordance with e-learning. Multimedia tools, from text-based information sources to audios and videos, from simple web pages to interactive learning sources, have experienced a significant uptrend in recent years. The virtualization of learning sources in the digitalizing world has created a group of online learners and brought the learner to the position of information receiver and producer. The fact that e-learning tools can be developed and adapted to educational environments has paved the way for learners to be active learners rather than passive listeners. E-learning tools are frequently used in today's technology age since

students can structure information as active users and use many interactive tools together. The rapid development of information technologies has supported online learning or e-learning applications. With e-learning, students can acquire new information and access educational material at any time, share their knowledge and use assessment systems that can measure their comprehension. With e-learning, students can use technical tools and experience learning independently. Teachers, on the other hand, can monitor students through homework, discussion forums, and other activity tools and find the opportunity to meet and evaluate students on digital platforms (Muhardi et al., 2020). The digital learning environment where e-learning is carried out in a planned and holistic way is Learning Management Systems (LMS). LMS, which is designed to make it easier for students to structure information themselves, integrate multiple learning sources and flexibly present them, draws attention as an important learning tool (Chen & Cui, 2020).

2. Literature

2.1. Learning Management Systems (LMS)

LMS are internet-based software applications used to access, plan, implement, perform, monitor, and evaluate learning content by communicating with teachers and students (Elfeky, 2020). Common examples of LMS include a lot of different software such as Moodle, Canvas, Blackboard, and ALMS. In LMS, in addition to loading learning materials with word processing programs, more interactive structures can be used by establishing various discussion and chat environments, and achievement can be evaluated with measurement tools. At the same time, various features such as keeping an e-portfolio, saving notes, schedule and calendar reminders can be provided via LMS, and multimedia materials such as music, sound, and animation can be used (Byrd, 2018). Animated videos can be prepared with multimedia content, and virtual classrooms can be created, enabling students to interact with a virtual laboratory (Hamzah et al., 2019). In addition to accessing the content provided by their teachers, students can also use LMS to communicate with their peers. LMS have become a widely used learning tool to create, distribute, and monitor various learning and teaching materials, supported by innovative technology, especially in higher education, providing a gateway to learning and teaching (Mershad & Wakim, 2018; Sinclair & Aho, 2018). Therefore, it is important to use LMS effectively and efficiently in education processes. Thus, LMS should be preferred in line with the educational purpose. Accordingly, it should be discussed which criteria should be taken into account in the use and preference of LMS. Considering that LMS is used as a distance education method in e-learning processes, it is necessary to examine LMS based on distance education theory for effective use. Similarly to the structure of distance education and LMS, it is thought that transactional distance theory, in which learning is evaluated within the concept of distance, will create an appropriate theoretical framework in explaining LMS in this study.

2.2. Transactional Distance Theory and Theoretical Framework

The main feature of distance education is that the teacher and the student do not have to be physically in the same place (Cohen et al., 2007). While this situation emphasizes that there is a real physical distance between the teacher and the student, the e-learning environment allows communication in the internet environment despite this distance. Taking the distance in distance education, which is the basis of e-learning, as a theoretical basis, Moore used it in a broader sense and evaluated it as not only a physical distance but also a social distance (Moore, 1989). In the literature, this distance was interpreted as the distance caused by the psychological and communicative gap allowing for misunderstanding (Moore & Kearsley, 1996). Based on this, Moore (1993) developed Transactional Distance Theory (TDT). The concept of the transaction is explained as "behavioural patterns that occur in any situation, environment and individuals affecting each other" (Moore & Kearsley, 1996). When distance is considered within the framework of this concept, the distance that prevents individuals from affecting each other is interpreted as transactional distance (Horzum, 2013). TDT consists of two dimensions, including distance and student autonomy (Moore, 1996). The distance dimension is divided into the structure and dialogue components

(McIsaac & Gunawardena, 1996). The dialogue component in the distance dimension in distance education explains the two-way interaction between student-teacher and student-student. The program with high dialogue allows for unpredictable new learning outcomes and new findings. The structure component refers to the combination of elements that can meet the needs of students in course activities and contents at the time of student-content and student-interface interaction. The over-structured program results in an inflexible learning environment that limits the student's ability to perform personal learning in different ways. The student autonomy dimension is that students make decisions about the process of self-learning and structure their knowledge within the framework of their own experience (Horzum, 2013). When the implementation of distance education in the e-learning environment is considered within the framework of TDT, preparing an e-learning environment in a way that will increase dialogue and student autonomy may have a positive effect on learning. On the other hand, the structural dimension of the e-learning environment should be reduced, and it should be created flexibly so that the student can use different options. In this context, it is important to take into account the components of TDT while preparing LMS used as today's e-learning environment and to develop them on this basis.

2.3. Aim of the Study

It is known that e-learning-based LMS are used extensively in the implementation of distance education, especially in higher education. It is important to prepare LMS in a way enabling meaningful learning that supports students' learning, communication, and motivation. Therefore, it is considered useful to examine LMS based on TDT that structures learning in distance education for effective use. According to this, when the literature was reviewed, it was determined that there was no valid and reliable data collection tool for evaluating the effective use of LMS. Concerning to aforementioned requirement, it was aimed to develop the Learning Management Systems Evaluation Scale (LMSES) based on TDT in this study. In line with this purpose, statistical analyses consisting of dissection, verification, reliability, and validity processes were carried out to develop a valid and reliable LMSES that can serve different e-learning environments.
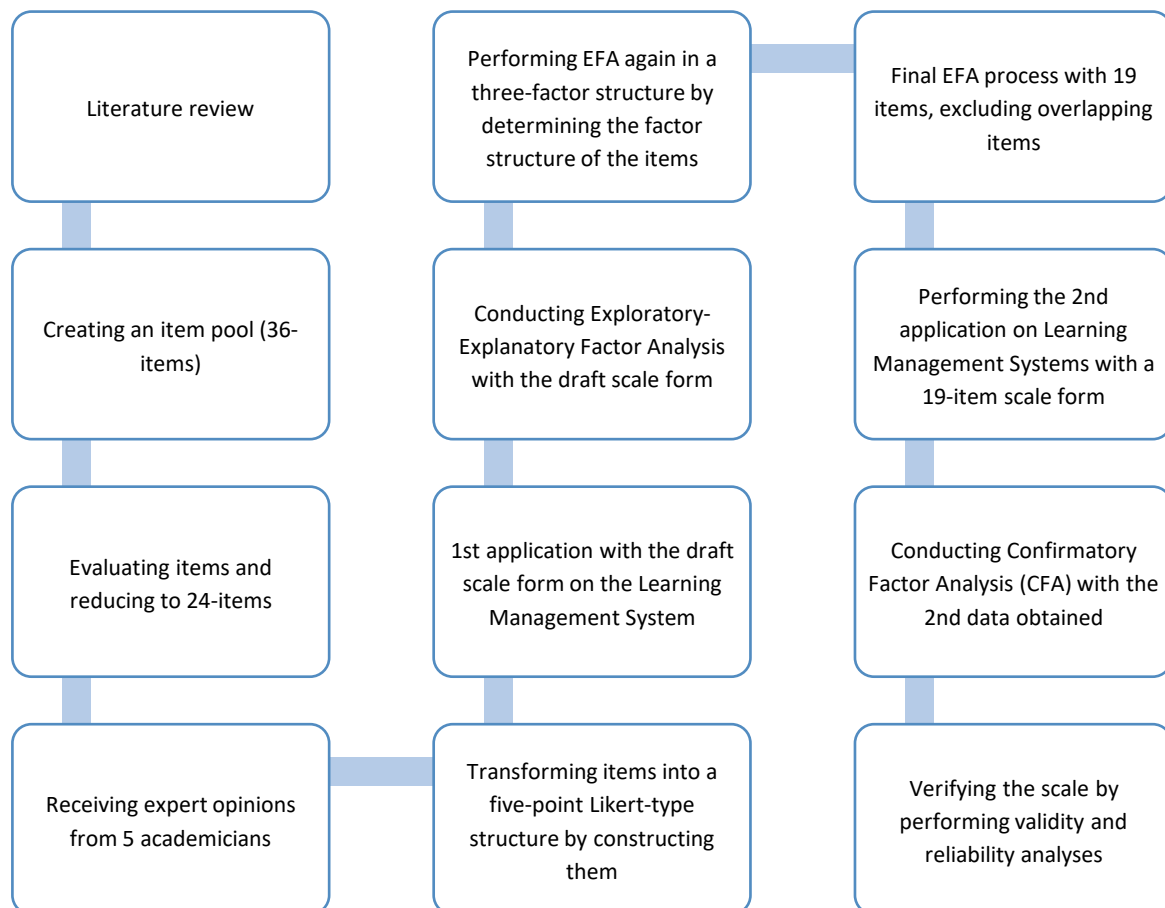
3. Methodology

3.1. Research Design

This study was designed based on the scale development process. The study was conducted with the participation of 389 university students, 172 participating in the first stage of the scale development through ALMS, which was used as LMS, and 217 participating in the second stage. In the fall semester of the 2020-2021 academic year, undergraduate students, who continue their learning with distance education at a state university because of the COVID-19 pandemic restrictions, have voluntarily participated the data collection process for the current research. The provision of the questionnaire to the participants was carried out using Google Forms through the university-wide LMS (i.e., ALMS).

3.2. Development of the Data Collection Tool

In the study, a scale development study was carried out to evaluate the LMS used in universities. Before creating the scale items, it was revealed that there were data collection tools related to the evaluation of internet-based learning environments in the literature, but there was no validated and verified scale concerning the evaluation of LMS. In line with this, the data collection tools created regarding the evaluation of LMS, internet-based systems and courses at the beginning of the scale development process were examined (Arbaugh et al., 2008; Ateş, 2013; Demirkol & Şeneler, 2018; Horzum, 2011; Gürses, 2006; Kılıç Çakmak et al., 2011; Mtebe, & Raisamo, 2014; Özonur et al., 2019; Sarıkaya, 2014; Turan & Canal, 2011; Zaharias, & Pappas, 2016). In this context, firstly, an item pool of 36 questions was created regarding relevant literature. The created items were evaluated within the framework of TDT and constructed in a way to support the dimensions of the theory. The number of constructed items was reduced to 24 and turned into a multiple-choice questionnaire. One of the items is a reverse item that contains a negative statement and should be reverse scored. To receive expert opinion for the 24-item questionnaire, one-to-one

interviews were held with five academicians, including experts in the domains of Information Technologies, Assessment and Evaluation and Education Programs and Teaching, and the items were discussed. The comprehensibility, scope, clarity, and way of expression of the questionnaire items were examined with the expert opinions received, and they were reconstructed in the Likert format. Thus, a form of 24 items in the five-point Likert type progressing from "Strongly disagree" to "Strongly agree" was created.

| Literature review	Performing EFA again in a three-factor structure by determining the factor structure of the items	Final EFA process with 19 items, excluding overlapping items
Creating an item pool (36-items)	Conducting Exploratory-Explanatory Factor Analysis with the draft scale form	Performing the 2nd application on Learning Management Systems with a 19-item scale form
Evaluating items and reducing to 24-items	1st application with the draft scale form on the Learning Management System	Conducting Confirmatory Factor Analysis (CFA) with the 2nd data obtained
Receiving expert opinions from 5 academicians	Transforming items into a five-point Likert-type structure by constructing them	Verifying the scale by performing validity and reliability analyses

Fig. 1. Scale development process

The 24-item data collection tool, which was created at the first stage to evaluate the LMS of university students within the framework of TDT, was applied to 172 undergraduate students who were receiving education through ALMS and participated voluntarily (n_{female}=106, n_{male}=66). The mean age of the participants was 21.92 (SD=4.24; n=172). Of these participants, 50.58% were students of the Faculty of Arts and Sciences, 28.49% were students of the Faculty of Communication, 6.40% were students of the Faculty of Education, 5.81% were students of the Faculty of Health Sciences, 4.65% were students of the Faculty of Nursing, and 4.07% were students of the Faculty of Fine Arts and Design. Before analyzing the obtained data, the prerequisites were examined. Analyses were started by reverse scoring an item containing a negative statement. The values of skewness and kurtosis in univariate normality were evaluated by taking the -1.5, +1.5 interval as a criterion. Mahalanobis distances were examined for multivariate extreme values (Hodge & Austin, 2004). To this end, a new variable was created by calculating the mean scores of the scale items. By following a strict attitude over this mean score variable, the data of three persons above the critical value of 3.84 at alpha 0.05 significance level according to the degree of freedom (df=1) were sampled. The SPSS 22 packaged software was used in the exploratory-explanatory factor analysis (EFA)

process of the study, and the AMOS 22 program was used in the confirmatory factor analysis (CFA) process.

The significance of the result (χ^2=2772.83; df=276; p<0.001) showed that the assumption of multivariate normality and linearity of the data was obtained when Bartlett's test of sphericity was performed to test the conformity of the data obtained from the first questionnaire application with EFA. To determine whether the sample was sufficient for EFA or not, the Kaiser-Meyer-Olkin coefficient was calculated as 0.94, and it was found to be sufficient (Comrey & Lee, 1992; Çokluk et al., 2012; Pallant, 2007). In the EFA process, the principal components analysis method was used as the factorization method to determine the minimum number of factors that best reflected the relationship between variables, and the Varimax rotation method, which is the most used orthogonal approach (Akbulut, 2010; Aldrich, 1997; Field, 2005), was used as the rotation technique. In determining the number of factors, Kaiser's criterion of eigenvalue greater than 1 and Cattell's scree plot methods were taken into account (Pallant, 2007; Tabachnick & Fidell, 2007). When the analysis results were examined, it was observed that three factors with eigenvalues greater than 1 were formed for 24 items. At the same time, it was decided that a three-factor structure was suitable due to the horizontalization of points after the third interval in the scree plot (Figure 2).
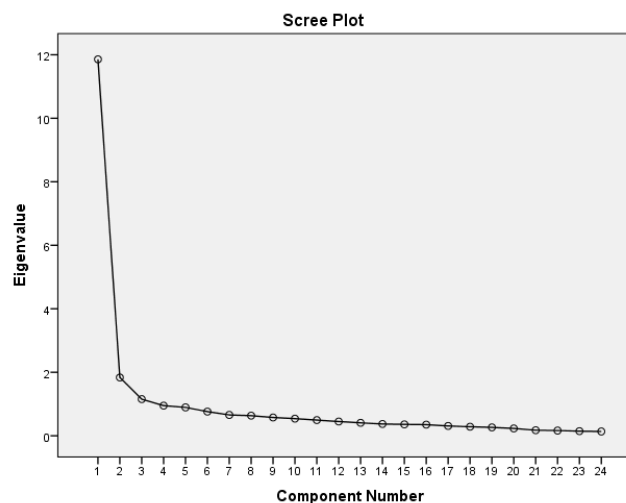
Fig. 2. Scree plot for the first EFA

In the repeated analysis for three factors, it was observed that 24 items explained 62.43% of the total variance. When the factor loads of the items were examined, it was revealed that the factor loads of the five items were smaller than 0.10, which is the overlapping item limit (Walker & Madden, 2008). The exclusion of each of the overlapping items from the data set and their effects on variance were examined. It was determined that excluding these items had a low effect on variance and would not adversely affect the content validity of the scale. Therefore, it was decided to exclude the five complex items from the data set. It was observed that the 19 items and the three-factor structure, which were repeated after the aforementioned overlapping items were excluded from the scale, explained 63.73% of the total variance. Since the first factor alone explains 49.05% of the scale, firstly, it comes to mind that the scale can be transformed into a single-factor structure. However, the eigenvalues of the three factors were also greater than 1, and when the meanings of the items under each factor were evaluated, it was found that the items were distributed to the factors following the TDT dimensions. Thus, it was decided to create the scale in a three-factor structure, and the factors were named Dialogue-Communicationality (D=8 items), Structure-Formality (S=7 items), and Autonomy-Functionality (A=4 items). The proportions of the variance amounts explained by the factors rotated by the Varimax technique on their own were determined as S=25.74%, D=23.06%, and A=14.93%, respectively. When Table 1 was examined, it was determined that the eigenvalues of these factors were greater than 1, and the factor loads of the items belonging to the factors varied between 0.57 and 0.82, and they were greater than the recommended value of 0.30 (Pallant, 2007).

Table 1.

Item loads of the factors according to the exploratory factor analysis

Factor/Item[*]	Factor Load	Eigenvalue	Variance Explained
Structure Factor		4.89	25.74%
SF1. Required features are easily accessible.	0.62		
SF2. All components of the system are coherent and consistent.	0.58		
SF3. It has a simple navigation structure.	0.82		
SF4. It has a useful design.	0.80		
SF5. It is simple to guess what the symbols and menu items used imply.	0.71		
SF6. The user interface provides clear instructions for navigating to the content.	0.77		
SF7. It is challenging to use. [**]	0.57		
Dialogue Factor		4.38	23.06%
DF1. It is easy to interact with other users.	*0.78*		
DF2. The system offers relevant and timely feedback while utilizing.	*0.62*		
DF3. It contains motivational interactive features.	*0.76*		
DF4. It provides various facilities (i.e., e-mail, forums, etc.) for asynchronous/synchronous communication.	*0.64*		
DF5. It provides a range of supporting systems tools (i.e., e-mail, chat, form, etc.).	*0.65*		
DF6. It may be integrated into various surroundings (i.e., Blogs, YouTube, Twitter, LinkedIn contents).	*0.68*		
DF7. It has customization options.	*0.73*		
DF8. It contains attention-grabbing gamification components (i.e., points, badges, scoreboards, levels, etc.).	*0.58*		
Autonomy Factor		2.84	14.93%
AF1. It is easy to utilize the file upload/download functions.	0.69		
AF2. It has reporting features (e.g., for courses, forums, and exams).	0.73		
AF3. It provides information on learning analytics (i.e., the course analyzes, progress reports, completion rate, etc.).	0.64		
AF4. It provides various facilities for measurement and evaluation (i.e., exams, short exams, homework, peer assessment, group assessment, etc.).	0.60		

Note. *The scale was implemented and developed in the Turkish language. The Turkish version of the LMSES and related supplementary materials are available upon request to the corresponding author.
**Reverse-worded item.

At the second stage of scale development, to evaluate the verification of the 19-item data collection tool with three factors, which had been previously created, a data collection tool was applied to 217 university students who were receiving education through LMS and voluntarily participated in the study (n_{female}=115, n_{male}=102). The mean age of the participants was 22.06 (SD=4.19; n=217). Of these participants, 30% were students of the Faculty of Engineering, 22.1% were students of the Faculty of Education, 14.3% were students of the Faculty of Economics and Administrative Sciences, 8.8% were students of the Faculty of Arts and Sciences, and the remaining 24.9% were students from other faculties. Before analyzing the obtained data, the prerequisites were examined. Analyses were started by reverse scoring an item containing a negative statement. The values of skewness and kurtosis in univariate normality are in the -1.5, +1.5 interval. Mahalanobis distances were examined for multivariate extreme values (Hodge & Austin, 2004). By following a strict attitude, the data obtained from seven persons that were above the critical value of 3.84 at alpha 0.05 significance level according to the degree of freedom (df=1) were excluded from the sample because they were extreme. As a result of the preliminary analysis of the items, the three-factor 19-item measurement model obtained from the previous EFA was tested using the maximum likelihood method within the scope of CFA. It was observed that the chi-square goodness of fit value obtained as a result of CFA was significant (χ^2=252.78; df=146; p<0.001). According to Schermelleh et al. (2003), a ratio

of χ^2/df below 2 in scale studies developed for large samples indicates a good level of fit (252.78/146=1.73). Furthermore, the fit indices of the model in the final CFA result were determined as SRMR=0.06, CFI=0.95, NFI=0.90, GFI=0.89, AGFI=0.85, and RMSEA=0.06. The approach of the CFI, NFI, GFI, and AGFI fit indices toward 0 indicates a model's misfit, and 1 indicates a perfect fit. In the literature, 0.95 and above in CFI indicates a perfect fit (Hu & Bentler, 1999; Thompson, 2004), 0.90 and above in NFI indicates a good fit (Tabachnick & Fidell, 2001; Thompson, 2004). GFI of 0.80 and above (Hair et al., 2010) and AGFI of 0.70 and above (Byrne, 1998; Qi et al., 2004) indicate an acceptable fit. In cases when SRMR is lower than 0.08, it is stated that the model has a good fit (Brown, 2006; Hu & Bentler, 1999). The approach of the RMSEA value toward 0 indicates a perfect fit, while RMSEA greater than 1 indicates a misfit (Yılmaz, 2004). It is stated that the RMSEA value of the model between 0.08 and 0.1 is acceptable and indicates a moderate fit (Browne & Cudeck, 1993; Bryne, 2000). As a result, when the CFA result fit index data of the model were examined, it was determined that there were acceptable, good and perfect fit values between the model and the observed data.
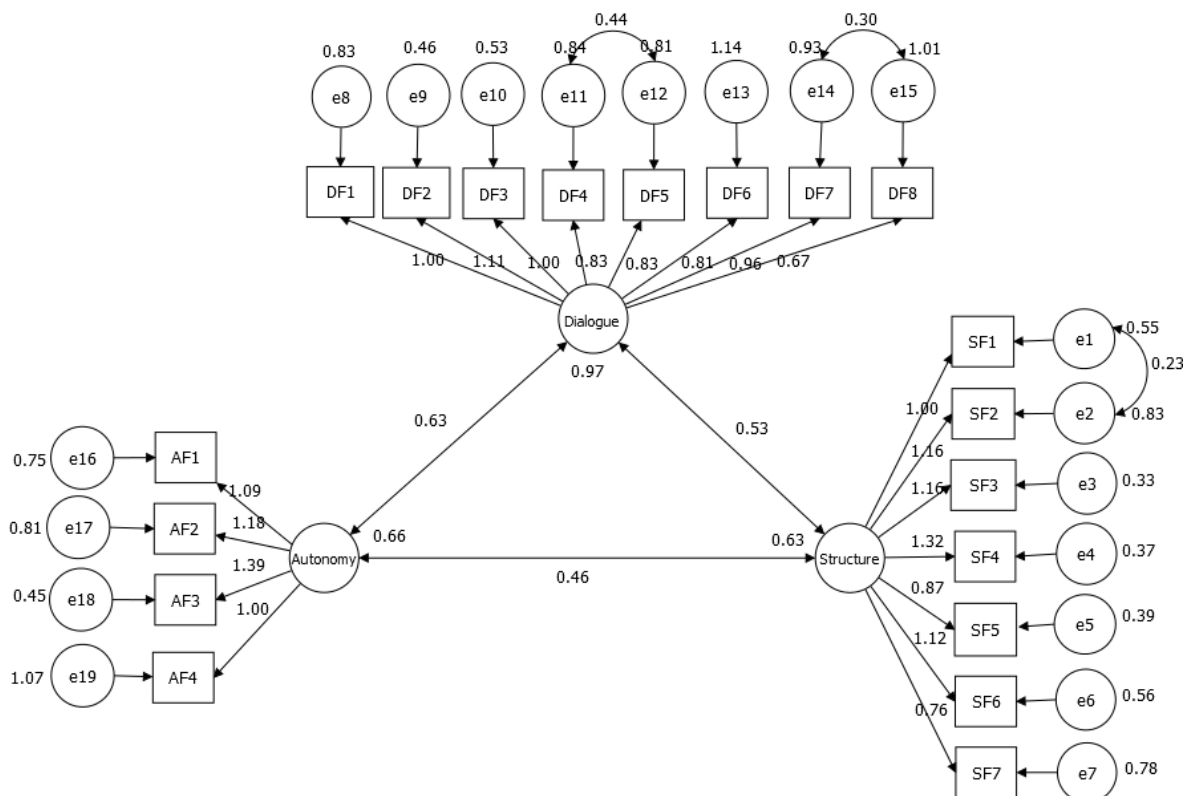

Fig. 3. CFA graph of the measurement model

The path coefficients of the measurement model obtained as a result of CFA and the variance amounts explained by the factors on their items are shown in Figure 1. When the CFA indicators were reviewed, it was determined that there were three modification suggestions. Even if no modification is carried out in the measurement model, the structural values of the scale are sufficient for verification. However, it was determined that the modifications suggested in the analysis outcomes would provide valuable contributions to the chi-square and other fit indices. Therefore, it was decided to carry out the suggested modifications. As a result, according to the CFA result of the scale, the standardized path coefficients of the factors ranged from 0.67 to 1.39 and were found to be statistically significant (p<0.001).

3.3. Reliability Results

Internal consistency coefficients and item-total correlations were calculated based on CFA data to calculate the reliability of the three-factor scale consisting of 19 items. Table 2 shows the reliability analysis and descriptive statistics for all factors of the model.

When the reliability analysis outcomes of the scale factors were examined, it was determined that they had a Cronbach's Alpha coefficient of 0.9 for the Structure factor, 0.89 for Dialogue and 0.82 for Autonomy (shown in Table 2). The overall Cronbach's Alpha internal consistency coefficient of the scale was 0.94. In the scale development literature in social sciences, the reliability coefficient of the scale between 0.65 and 0.80 is sufficient for its reliability (Vaske, 2008).

Table 2.

Reliability analysis results and descriptive statistics of the scale factors

Factor	Cronbach's Alfa	Min-Max	ω	AVE	Mean	SD	Correlation Coefficient	
							Dialogue	Autonomy
Structure	0.90	7-35	0.90	0.57	27.11	6.22	0.62*	0.66*
Dialogue	0.89	8-40	0.88	0.49	22.15	7.68	1	0.69*
Autonomy	0.82	4-20	0.82	0.54	13.91	1.17		1

On the other hand, corrected item-total correlations were found to range from 0.51 to 0.81 for *Structure*, 0.54 to 0.75 for *Dialogue*, and 0.55 to 0.75 for *Autonomy*. In the literature, it is stated that items greater than 0.30 for the item-total correlation value are intended to measure the same statement and distinguish the participants well (Pallant, 2007). Accordingly, it is understood that the items in each factor of the scale measure the same structure together. The high score obtained from the scale shows to what extent the examined LMS is an adequate and useful tool for the participant group based on TDT, to what extent it is suitable for the TDT dimensions and its usability in distance education in the context of the course applied with the participant group. The correlation coefficients between the factors indicate a moderately positive correlation between 0.30 and 0.70 (Büyüköztürk, 2012). Accordingly, when Table 2 is reviewed, it can be stated that the factors of Structure, Dialogue, and Autonomy are in a moderately positive and significant correlation with each other. Therefore, all factors of the scale serve the whole of the scale within the same general purpose.

To test the construct validity of the scale, analysis with convergent and divergent validity is recommended (Fornell & Larcker, 1981). In the literature, the average explained variance (AVE) value is expected to be smaller than the convergent validity value (ω), the AVE value to be greater than 0.5, and the ω value to be greater than 0.7 (Fornell & Larcker, 1981; Hair et al., 2010). Moreover, the AVE value greater than 0.4 is also stated as acceptable in the literature (Khaleghinejad & Ziaaldini, 2015). Furthermore, it is stated in the literature that if the convergent validity value is greater than 0.7, AVE can be accepted up to 0.4 and is still suitable for construct validity (Fornell & Larcker, 1981; Huang et al., 2013). Accordingly, in the calculations made for the three-factor scale, it was determined that each of the AVE values is smaller than the structural reliability values (ω). Structural reliability (ω) values are greater than 0.7, and the values greater than 0.4, although only the *Dialogue* factor is smaller than 0.5 among the AVE values, indicates a relatively acceptable value. This situation emphasizes that the AVE value is affected by the sample size, and it is stated that the AVE value increases from 0.5 to 1 as the sample size increases (dos Santos & Cirillo, 2021). The sample size for CFA is 210 after excluding the extreme values, and the KMO Bartlett's test of sphericity result, which shows the adequacy of the sample size, is 0.93 (p<0.001). According to the KMO Bartlett's test of sphericity result, even if the sample size is sufficient to perform CFA, it is thought that this affects the AVE value to remain at the limit value. It is estimated that the AVE value will show better results if it is done with higher sample size, but it is understood that the available data are in the acceptable range.

Stating that the variance-based comparisons of Fornell and Larcker (1981) regarding structural reliability would not be sufficient in determining the discriminant validity, Henseler et al. (2015) proposed a new analysis technique for validity. The Heterotrait-Monotrait Ratio of Correlations (HTMT) criterion was taken into account in the examination of discriminant validity according to this technique. According to the HTMT criterion, the correlation threshold value should be lower than 0.85 when evaluated strictly (Clark

& Watson, 1995; Kline, 2011) and lower than 0.90 when evaluated flexibly (Gold et al., 2001; Teo et al., 2008) (Henseler et al., 2015). The HTMT analysis results suggested as a new approach for the discriminant validity of the scale are presented in Table 3.

Table 3.

Heterotrait-Monotrait (HTMT) Correlation Ratio Analysis Results

	Dialogue	Structure	Autonomy
Structure	0.68		
Autonomy	0.80	0.76	

When the HTMT analysis results given in Table 3 were investigated, it was determined that the HTMT results calculated among the factors of the developed scale were lower than the suggested critical values. Accordingly, it was concluded that the scale had suitable values for HTMT analysis and had discriminant validity. The fact that the HTMT analysis results, which is an alternative method for validity analysis, are also suitable and the AVE value is within acceptable ranges does not pose an obstacle to the average explained variance and the scale's validity. Therefore, it is understood that the scale meets various criteria for validity with all its factors in addition to the reliability criteria.

4. Discussion and Conclusion

In the study, the LMSES, including three factors consistent with the TDT framework, was developed. Although the scale has three different factors of Structure, Dialogue, and Autonomy, it is measured in a five-point Likert type in a consistent and correlated manner with each other. In addition, the fact that the variance of the single-factor structure was quite high during the dissection process of the scale revealed the idea that the scale could be evaluated as a single-factor scale. Along with the development of a three-factor scale model, the second-order measurement model was also tested to measure the single-factor structure of the scale based on TDT. This is the step examined after determining the sub-factors in the scale development process (Koc & Barut, 2016). It is recommended to evaluate the use of the total of the scale under a single structure (Noar, 2003). When the second-order single-factor measurement model of the scale was tested, it was observed that the model was suitable in terms of fit indices and good levels. When the three-factor structure of the scale and the single-factor structure were compared, it was determined that the three-factor structure had better fit indices, but both models were suitable for use. Thus, an alternative model to the first-order three-factor measurement model of the scale was presented. Evidence for the single-factor use of the scale was provided by establishing the second-order measurement model. The decision regarding the factor structure of the scale was left to the preference of the researchers in the context of the theoretical basis. Researchers can perform analyses with the three-factor structure or use it as a variable within the framework of a single structure over the total or mean scores of all items.

Theoretically, the LMSES offers a statistically verified measurement structure within the framework of TDT. Thus, it is understood that TDT is a valid and reliable measurement tool in evaluating LMS used in distance education. In addition, to determine the effect of LMS used in determining the effectiveness of the education provided, the LMSES developed in this study can contribute as a useful data collection tool. It also emphasizes the lack of a valid and reliable data collection tool for evaluating LMS and the contribution and importance of the LMSES, which was developed to fill this gap. At the same time, it is thought that the LMS developed regarding TDT and the verification of the three-factor and one-factor measurement model will support its use with different variables for researchers. With the use of the LMSES, improvements can be made by determining the use of the correct LMS in the context of variables such as the participant group or the intended purpose. Considering the effect of effective use of LMS on the learning process (Zwain, 2019), the necessity of evaluating LMS and the use of LMS developed for this purpose arises. It is estimated

that LMS, a mandatory solution to eliminate disruptions in distance education during the pandemic, will continue to be used for a long time in the future. Moreover, educators who get used to providing their courses through distance education during the current period experienced the convenience of distance education compared to face-to-face education. Therefore, even if the pandemic conditions come to an end, it is thought that LMS will be used in the long term, and the development of a scale for evaluating LMS has the potential to contribute to educators and researchers. Thus, multi-dimensional evaluation processes can be employed to design e-learning environments that will improve the learning process.

5. Suggestions and Limitations

In conclusion, it is thought that this study and the LMSES with proven validity and reliability will contribute to the literature. The findings present an important rationale in encouraging the LMSES to theoretical and statistical studies based on TDT. This study has the potential to contribute to the research of LMS, used by necessity in higher education, especially during the COVID-19 pandemic, in the context of various variables. The relationship of the LMS used with the student's interest, attitude, and motivation can be a suggested subject for future studies. However, the necessity to explain the limitations of the study should not be overlooked. The current study was conducted during the compulsory distance education procedure, which was put into use urgently during the COVID-19 pandemic era. Therefore, the implementation of the research was carried out with learners who were thought to be affected physically, socially and psychologically due to the LMS and COVID-19 pandemic restrictions used in the emergency distance education procedure amid the pandemic. There is hence the possibility that the research procedure will be affected by pandemic restrictions that researchers cannot manipulate. In addition to this, the LMSES developed in this study is limited within the framework of TDT and the LMS where the research application is carried out (i.e., ALMS). In addition, since it is limited in the context of validity and reliability tests applied during the scale development process, it can be tested with different analysis techniques in future studies. On the other hand, due to the limited number of participants in the study, the LMSES can be tested and verified in different participant groups. Furthermore, due to the intensive use of LMS in higher education, the scale was developed with a limitation to the sample of university students. However, considering that during the COVID-19 pandemic, distance education is provided at each of the education levels, the LMSES can be re-developed by adapting the scale in the context of samples at various educational levels (i.e., K-12 level, etc.).

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Pre-service teachers' decoding skills in information and communication technologies and critical thinking dispositions**

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Article Info	Abstract
Keywords: Critical thinking dispositions Decoding skills in ICT Information and communication technologies Pre-service teachers Research Article	This research aims to examine the relationship between the critical thinking dispositions of preservice teachers and their decoding skills in information and communication technologies (decoding skills-ICT). As a research method, survey and correlational research models from quantitative research approaches were used. Research universe is a Faculty of Education at a state university in Turkey. With the use of the convenience sampling method, 262 preservice teachers who voluntarily participated in the online survey constitute the sample of the research. The research data were obtained using the Marmara Critical Thinking Dispositions Scale (MCTDS) and the Decoding Skills in Information and Communication Technologies (decoding skills-ICT) Scale in the 2020-2021 academic year. Among the significant findings of the study are that the average scores of preservice teachers for decoding skills-ICT are at an average level and the average scores for critical thinking dispositions are high. Finally, it has been found in the study that there is a moderately positive relationship between critical thinking dispositions and decoding skills-ICT. According to regression analysis, decoding skills-ICT explains 17.8% of the variance of critical thinking dispositions. This study also aimed to investigate the relationship between decoding skills-ICT and different higher-level thinking skills and to examine the impact of attitudes, dispositions, and skills of different groups of participants on decoding skills-ICT.

1. Introduction

Human is a thinking being. However, individuals may not always exhibit consistent behaviour with their thoughts (Parra et al., 2021). Due to some incomplete information and prejudices, people may think incorrectly, ignoring some facts, evidence, and reasoning (Parra et al., 2021). However, when thinking, it is necessary to question what is true to conclude by combining available clues. In contrast, individuals do not prefer systematic thinking with the convenience of easy and effortless access to ready-to-use information (Tishman et al., 1993). For this reason, it will not be enough to think only when making decisions, believing in a situation or phenomenon. The act of thinking needs to be systematically transformed into quality thinking (Parra et al., 2021; Paul and Elder, 2006). For this purpose, individuals must access the information provided by the source with the use of exploratory methods, rather than getting

as it is (Paul and Elder, 2006). One of the methods mentioned in this framework is critical thinking (Fadel, 2008; Partnership for 21st Century Skills., 2019).

Critical thinking is defined as a purposeful and self-controlling process of judgment that allows individuals to find a way to interpret, analyse, evaluate, infer, explain, and combine details, making a judgment (Facione, 1990; S. Özdemir, 2005; Solmaz, 2014). Organisation for Economic Co-operation and Development [OECD] (2018) highlights cognitive and metacognitive that each individual is supposed to have through critical thinking, such as creative thinking, learning to learn and self-regulation to keep up with changing and evolving conditions. In the field of psychology, Cüceloğlu (2003, p.216) defines critical thinking as an active and organized mental process that aims to understand ourselves and the events around us through our own thought processes, taking into account the others' thought processes and applying what we have learned. Critical thinking is a skill that benefits from problem solving, requires a correct way of thinking and working, and allows us to be more accurate and specific in recognizing related situations (Saenab et al., 2021). Critical thinking is also the ability to apply reasoning and logic to new or unusual ideas, views, and situations (Broadbear and Keyser, 2000).

Today's field experts believe that critical thinking is an important output of higher education and that helping gain critical thinking dispositions is a fundamental part of learning (Bravo et al., 2020; Lou, 2018; Morales Carrero, 2020). For this reason, individuals need to be educated through educational processes by having critical thinking as a cognitive interrogation tool to establish the foundation of a rational and democratic society that provides consistent and useful information (Ennis, 1985; Facione, 1990; Scheffler, 1973). Cognitive and metacognitive strategies, which help individuals to use their prior knowledge or schemata, are known to have increased their participation in the learning process and thus raised more awareness regarding critical thinking (Salameh, Salameh, and Al-Emami, 2019). When considered from this point of view, it could be claimed that there is a link between cognitive schemata and critical thinking.

Piaget defines a scheme as "a coherent, repeatable sequence of actions with component actions that are tightly interconnected and regulated with a fundamental meaning" (Piaget, 1965). Schemata start as reflexes at birth (Piaget, 1965). Problems experienced throughout life are reshaped with new experiences (Bartlett, 1932) once they are solved (Mayer, 1983). It becomes more complex towards adulthood (Wadsworth, 1989). Besides, these are cognitive structures that serve to transfer new information to long-term memory and call to working memory when necessary (Gagne, 1986).

When an experience is encountered, the schemata and new situation are matched (Wadsworth, 1989). Equilibrium is achieved if matching could be done smoothly (McLeod, 2018). However, this is not always the case. It means that a problem that needs to be solved and a new disequilibrium that needs to be learned has emerged if schemata cannot match the new situation appropriately (McLeod, 2018; Phillips, 1975; Piaget, 1965; Wadsworth, 1989). Akgül (2021) mentions decoding skills, with which individuals can overcome disequilibrium with their self-awareness.

Decoding skills are based on the schemata approach. It is a mental and cyclic process that helps adapt to the new situation, integrating the existing information into a new event. In case of failure to provide such adaptation in this process, the sense-making, debugging, and problem-solving stages are used for the identification of the cause of the error and solve it (Akgül, 2021). The decoding process has a wide-ranging structure that can be used in reading, communication, neural activities, humour production, information and communication technologies. It needs to be "solved" to get an understandable result from the coded data. Therefore, awareness regarding decoding skills needs to be raised, learned, and used (Akgül, 2021). However, decoding skills, which are inherently associated with different disciplines, must be defined in a discipline-specific way in order to be measured and acquired in individuals (Akgül, 2021).

Based on this idea, Akgül (2021) proposes a structure that can use decoding skills based on information and communication technologies (ICT). Individuals' sense-making of the messages received through digital technology, inspecting the causes of errors encountered, obtaining good or bad results in the solution

attempt of these problems reveals decoding skills in information and communication technologies (decoding skills-ICT) (Akgül, 2021). Sense-making in ICT is the association of schemata created with past ICT experiences with the new ICT experiences. Debugging in ICT is the cognitive identification of possible causes that cannot be understood in an ICT experience (Akgül, 2021). Problem-solving in ICT is a process that aims to solve the problems set in an ICT experiences. This process includes the stages of interpretation of the problem, planning the solution, implementing, and evaluating the result. At the end of the process, a new experience is gained, and cognitive schemata are formed (Akgül, 2021; Mayer, 1983). When consider from this point of view, the purpose of decoding in ICT is to understand an ICT experience based on past experiences. Failure to understand the experience is corrected by identifying the sources of the error and supporting with relevant problem-solving processes (Akgül, 2021). Overcoming biases in the decoding process and heading towards evidence/data (Abrami et al., 2008; Facione, 1990; Larsson, 2017; Williams, 2005) is thought to be related to critical thinking dispositions. This study is carried out as a strengthening study of the relationship between critical thinking and decoding skills.

At this point, preservice teachers who will educate new generations and who will guide the development and progress of society have to take big responsibility. Considering that preservice teachers use their pedagogical knowledge to transfer their cognitive skills as well as their content knowledge to new generations that will shape the future (Orhan-Göksun and Kurt, 2017), it is expected that they have a high level of cognitive skills at the last stage of their education life before they step into the teaching profession. Besides, it is suggested that decoding skills can be used to develop high-level cognitive skills. For this reason, this study aims to reveal the relationship between the critical thinking dispositions of preservice teachers and decoding skills in information and communication technologies (decoding skills-ICT).

This study aims to examine the relationship between the use of critical thinking dispositions and decoding skills in information and communication technologies (decoding skills-ICT) of preservice teachers studying at the Faculty of Education. For this purpose, the following research questions were developed in the study:

a. What is the decoding skills-ICT level of pre-services teachers?

b. What is the critical thinking disposition level of pre-services teachers?

c. What is the relationship between decoding skills-ICT and the critical thinking dispositions of preservice teachers?

d. Are pre-services teachers' decoding skills-ICT a meaningful part of their critical thinking dispositions?

2. Methodology

2.1. Research Model

This study was carried out using the survey and correlation research models. Survey model research often deals with the views of a large group of people on a particular topic (Fraenkel et al., 2012). However, the correlational survey model was used in the study to examine the relationship between critical thinking dispositions and decoding skills-ICT. The correlational survey model defines the degree to which two or more quantitative variables are related and uses a correlation coefficient to do this (Fraenkel et al., 2012). Such studies allow researchers to make inferences about the universe (Creswell, 2012).

2.2. Study Group

The universe of the research is a Faculty of Education of a state university in Turkey. The research universe of the study consists of the students at the same Faculty who are studying at the undergraduate level in the 2020-2021 academic year. The research universe consists of 3859 preservice teachers.

It was considered impossible to reach the entire universe, due to time, cost, and pandemic-related factors. For this reason, a sample that could represent the whole universe was determined. The sample was chosen by single-stage sampling and convenience sampling method. Regarding how to decide the number of

samples, Fraenkel et al., (2012) stated that there is not any precise calculation method, and so suggested that the minimum number of participants should be 100 and 50 for a correlation study.

After receiving the relevant permissions, an email was sent to each of the 178 academics teaching at the Faculty of Education. In the email sent to academics, they were requested to share the scale link created via Google Forms with the students of the Faculty of Education through online platforms. Ethics committee approval and documents of data collection permission were attached to the sent e-mail. At the end of the data collection process, 331 participants who voluntarily participated in the survey were obtained. The responses were then examined. Through control items in the scale, 69 participants were found to have marked the items without reading them, and the data obtained through these items were excluded from the evaluation. In this way, 262 filled surveys were obtained, and the relevant descriptive details are given in Table 1.

Table 1.

Descriptive statistics regarding participants

		Female (f)	Female (%)	Male (f)	Male (%)	Total (f)	Total (%)
Gender	18	8	72.7%	3	27.3%	11	4.2%
	19	45	93.8%	3	6.3%	48	18.3%
	20	41	74.5%	14	25.5%	55	21%
	21	57	89.1%	7	10.9%	64	24.4%
	22	36	81.8%	8	18.2%	44	16.8%
	23	17	81%	4	19.0%	21	8.0%
	24	2	28.6%	5	71.4%	7	2.7%
	25+	9	75%	3	25.0%	12	4.6%
	TOTAL	**215**	**82.1%**	**47**	**17.9%**	**262**	**100%**
Class level	1	41	82%	9	18%	50	19.1%
	2	59	83.1%	12	16.9%	71	27.1%
	3	58	77.3%	17	22.7%	75	28.6%
	4	46	92%	4	8%	50	19.1%
	Preparatory	11	68.8%	5	31,3%	16	6.1%
	TOTAL	**215**	**82.1%**	**47**	**17,9%**	**262**	**100%**
I took "Computer" course at the primary school.	Yes	187	81.7%	42	18.3%	229	87.4%
	No	28	84.8%	5	15.2%	33	12.6%
	TOTAL	**215**	**82.1%**	**47**	**17.9%**	**262**	**100%**
I took "Information Technologies" course at the undergraduate Level	Yes	194	83.3%	39	16.7%	233	88.9%
	No	21	72.4%	8	27.6%	29	11.1%
	TOTAL	**215**	**82.1%**	**47**	**17.9%**	**262**	**100%**

When Table 1 was examined, there were 215 (82.1%) female and 47 (17.9%) male participants. The youngest of the participants was found to be 18 years old, and 9 participants were found to be aged 25 and above. According to class level, preparatory (N=16), first-year (N=50), second-year (n=71), Third-year (n=75) and fourth/last year (N=50) students took part in the study. On the other hand, according to the status of taking computer courses in primary education, 229 (87.4%) participants were found to have taken this course, while 33 (12.6%) of the participants did not. When the status of having taken Information Technologies course at the undergraduate level, 233 (88.9%) of the participants were found to have taken this course and 29 (11.1%) of them did not.

With the new regulation in the teacher education at the undergraduate program in 2018, the "Information Technology" course became a compulsory course. 16 of the pre-service teachers were found not to have taken this course as they were at the preparatory level. On the other hand, 3 of the preservice teachers who did not take the Information Technology course were found to be the first-year students of Japanese teaching. According to the Japanese teaching program, this course is given in the 3rd semester. Of the

remaining 10 preservice teachers, 3 of them were in the 3rd grade and 7 of them were in the 4th grade. The fact that these preservice teachers stated that they did not take the compulsory Information Technology course could be explained with that they were taught with the curriculum implemented before 2018 because there was no course in the name of Information Technology before 2018. Instead, the Computer I and Computer II courses were compulsory in the 3rd and 4th semesters. For this reason, the responses "I did not take the Information Technology course" could be acceptable.
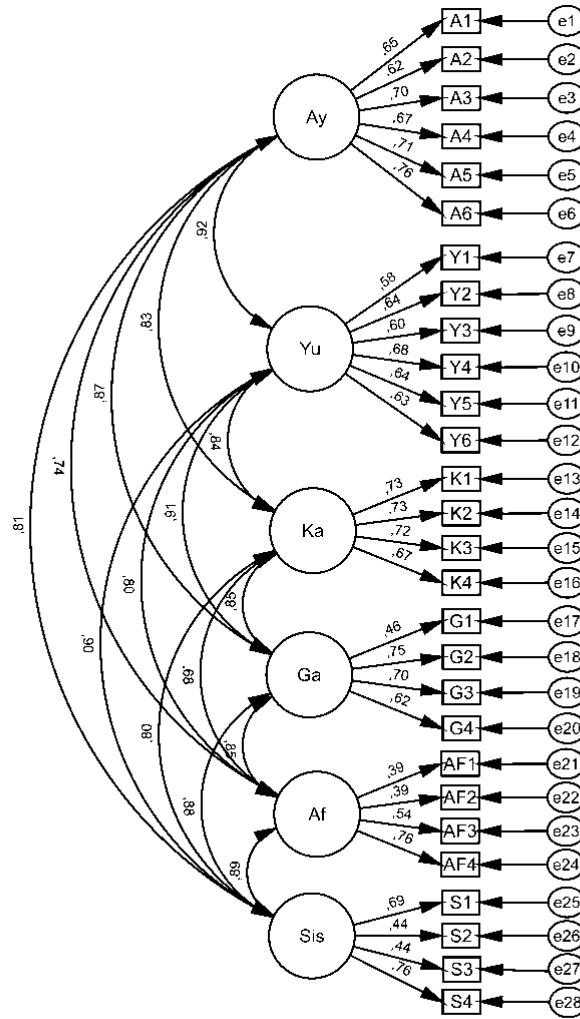
2.3. Data Collecting Tools

The "Marmara Critical Thinking Disposition" and "Decoding Skills in Information and Communication Technologies" (decoding skills-ICT) scales were used as data collection tools in the study.

Marmara Critical Thinking Disposition Scale (MCTDS)

The "Marmara critical thinking disposition scale" developed by Özgenel and Çetin (2018) was used to find out the critical thinking dispositions of preservice teachers. The scale consists of 28 items within a 5-point Likert type and a 6-Factor Structure, which are "reasoning", "reaching judgment", "searching for evidence", "searching for the truth", "open-mindedness", "systematicity". Validity and reliability studies of the original scale were conducted with the data collected from 410 teachers on active duty. It was decided that the target audience of our research was preservice teachers and that the CFA should be carried out as recommended by the scale developers.

CFA data was obtained from 1308 preservice teachers (out of the research universe and with similar demographics to the research universe) who participated voluntarily in the CFA research. With the CFA, which was performed without correction for the model consisting of 6 Factors and 28 items, the model fit indices were found to be as [$\chi2$=1322.240; df=335; $\chi2$/df=3.947 p<, 001; GFI=.929; AGFI=.914; CFI=.932; NFI=.912; NNFI(TLI)=.924; RMSEA= .047; RMR=.023; SRMR=.035] (Figure 1.)

χ2=1322,240; df=335; χ2/DF=3,947; p=,000
GFI=,929; AGFI=,914; CFI=,932; NFI=,912; NNFI(TLI)=,924
RMSEA=,047; RMR=,023; SRMR = ,035

Figure 1. Findings of Confirmatory Factor Analysis (CFA)

Since increasing the sample size causes the value of χ2 to be higher and the value of p to be significant, it can be ignored in such studies (Çokluk et al., 2014). When the fit indices are considered, it is seen that RMSEA, RMR values are in the range of "goodness of fit indices" (Brown, 2006; Browne and Cudeck, 1992; Hu and Bentler, 1998; Schreiber et al., 2006). On the other hand, the χ2/sd, GFI, AGFI, CFI, NFI, NNFI values are in the range of "acceptable fit indices" (Forza and Filippini, 1998; Greenspoon and Saklofske, 1998; Hooper et al., 2008; Kline, 2016; Sümer, 2000; Tabachnick and Fidell, 2013). Based on these findings, it could be claimed that the model structure, consisting of 6 Factors and 28 items, is confirmed for preservice teachers. When internal consistency reliability was examined, Cronbach's alpha values were found to be α=84 for the dimension of reasoning, α=80 for the dimension of reaching judgment, α=.80 for the dimension of searching for the evidence, fact search size α=.70 for the dimension of searching for the truth, α=.62 for the dimension of open-mindedness, α=.93 for the dimension of systematicity α=.93 for the whole scale. According to the results, MCTDS has been adopted as a valid and reliable measurement tool for preservice teachers.

Decoding Skills in Information and Communication Technologies (Decoding skills-ICT) Scale

The scale developed by Akgül (2021) aims to determine the decoding skills-ICT of preservice teachers. The scale consists of 23 items in 5-point Likert type. It has a four-factor structure as "basic digital skills",

"advanced technical skills", "security and social skills in the digital environment", "coding skills". When internal consistency coefficients are examined, it was found to be α=.92 for basic digital skills, α=.93 for advanced technical skills, α=.79 for security and social skills in the digital environment, α=.95 for coding skills. The internal consistency coefficient for the whole scale was also found to be α=.94. In the interpretation of the total scores obtained from the scale, the range [23-53] is taken low, the range [54-84] is taken medium, the range [85-115] is taken high.

2.4. Data Analysis

As part of the research, the data obtained with MCTDS and the decoding skills-ICT scale were analysed through quantitative methods at the p<,05 significance level. Which of the analysis methods to use was determined by testing the assumption of normality. The fact that the skewness and kurtosis values are in the range of -1 and +1 indicates that the data is normally distributed (Hair et al., 2013; Tabachnick and Fidell, 2013). The skewness and kurtosis values of the data related to the measurement tools are given in Table 2.

Table 2: The skewness and kurtosis values of the measurement tool

Measurement Tool	Dimension	Skewness	Kurtosis
Decoding skills-ICT Scale	Whole Scale	-.092	-.514
	Basic Digital Skills	-.610	-.090
	Advanced Technical Skills	-.084	-.874
	Security and Social Skills in Digital Environment	-.579	-.281
	Decoding Skills	.965	-.062
MCTDS	Whole Scale	-.229	-.541
	Reasoning	-.352	-.648
	Reaching judgement	-.369	-.189
	Searching for the evidence	-.366	-.836
	Searching for the truth	-.273	-.490
	Open-mindedness	-.500	.147
	Systematicity	-.353	-.334

According to Table 2, it is seen that the skewness and kurtosis values in the whole scale and lower dimensions of the scale are in the range of -1 and +1 regarding the BIT-DS scale and MCTDS data. For both scales and all of their sub-dimensions, it can be said that the data is normally distributed and that the normality assumption is met (Hair et al., 2013). Therefore, parametric tests were used in the analysis of research data. Table 3 presents which analysis methods are used to obtain the results of research questions.

Table 3: Research question, data collection tool, matching data analysis method

Research question	Data collection tool	Data analysis technique
…of preservice teachers.		
1. What is the decoding skills-ICT level?	-Decoding skills-ICT Scale	Descriptive statistics
2.What is the critical thinking disposition level?	-MCTDS	Descriptive statistics
3. What is the relationship between decoding skills-ICT and the critical thinking dispositions?	- Decoding skills-ICT Scale and MCTDS	Pearson correlation coefficient
4. Are pre-services teachers' decoding skills-ICT a meaningful part of their critical thinking dispositions?	- Decoding skills-ICT Scale and MCTDS	Simple Linear Regression

3. Findings and Discussions

In this section, the findings regarding the relationship between the level of decoding skills-ICT, critical thinking dispositions of preservice teachers and decoding skills-ICT and critical thinking dispositions are given.

3.1. Findings regarding decoding skills-ICT level of preservice teachers

Findings regarding the decoding skills-ICT levels of preservice teachers were obtained using the decoding skills-ICT scale. Under this heading, the decoding skills-ICT levels of preservice teachers and their sense-making, debugging and problem-solving levels for decoding skills are presented in Table 4. The findings were then discussed in line with the relevant literature.

Table 4.

Descriptive statistics regarding the decoding skills-ICT levels of preservice teachers

Dimension	f	$\bar{X}$	Sd	S	Sd$_S$	D	Sd$_D$	PS	Sd$_{PS}$
Basic Digital Skills		3.80	.74	4.10	.70	3.65	.87	3.60	.87
Advanced Technical Skills		3.09	1.08	3.15	1.12	3.04	1.10	3.09	1.15
Security and social skills in the digital environment	262	4.02	.70	3.89	1.21	4.21	.71	3.95	.89
Decoding skills		2.00	1.11	2.09	1.18	1.98	1.15	1.92	1.12
Whole scale	262	3.44	.69	3.51	.71	3.40	.72	3.42	.72

Note 1: Sd: Standard deviation
Note 2: S: Average of sense-making, D: Average of debugging, PS: Average of problem-solving
Note 3: Average of the scores taken from the 5-point Likert type scale

According to Table 4, the analysis was conducted with the data obtained from a group of 262 preservice teachers. Averages that preservice teachers took from the decoding skills-ICT scale were found to be as follows; dimension of basic digital skills $\bar{X}$=3.80, Sd=.74; dimension of advanced technical skills $\bar{X}$=3.09, Sd=1.08; dimension of security and social skills in digital environment $\bar{X}$=4.02, Sd=.70, dimension of encoding skills $\bar{X}$=2.00, Sd=1.11, and whole scale $\bar{X}$=3.44, Sd=.69. On the other hand, the averages of each dimension for decoding skills were taken. For the whole scale; sense-making ($\bar{X}$=3.51, Sd=.71), debugging ($\bar{X}$=3.40, Sd=.72), problem-solving ($\bar{X}$=3.42, Sd=.72); for basic digital skills; sense-making ($\bar{X}$=4.10, Sd=.70), debugging ($\bar{X}$=3.65, Sd=.87) and problem-solving ($\bar{X}$=3.60, Sd=.87). For advanced technical skills; sense-making ($\bar{X}$=3.15, Sd=.1.12), debugging ($\bar{X}$=3.04, Sd=1.10) and problem-solving ($\bar{X}$=3.09, Sd=1.15). For security and social skills in the digital environment; sense-making ($\bar{X}$=3.89, Sd=1.21), debugging ($\bar{X}$=4.21, Sd=.71) and problem-solving ($\bar{X}$=3.95, Sd=.89). For coding skills; sense-making ($\bar{X}$=2.09, Sd=1.18), debugging ($\bar{X}$=1.98, Sd=1.15) and problem solving ($\bar{X}$=1.92, Sd=1.12).

In other words, according to the average score received by preservice teachers, they were found to be *high* in the dimension of basic digital skills, *medium* in the dimension of advanced technical skills, *high* in the dimension of security and social skills in the digital environment, and *low* in the dimension of coding skills. In terms of overall scale, the decoding skills in information and communication technologies of preservice teachers were found to be at a *medium* level. Especially in the dimension of social and security skills, it is seen that the results are better compared to those of technical skills. These findings support Kaarakainen's (2018) claims that situations requiring more technical skills are more challenging.

On the other hand, for each dimension, averages of sense-making, debugging and problem-solving related to decoding skills were examined. Averages of preservice teachers according to decoding components for the whole scale were *medium* in the sense-making dimension, *medium* in the debugging dimension and *medium* in the problem-solving dimension. For basic digital skills, their averages were *high* in the sense-making dimension, *medium* in the debugging dimension and *medium* in the problem-solving dimension. For advanced technical skills, their averages were *medium* in the sense-making dimension, *medium* in the debugging dimension and *medium* in the problem-solving dimension. For security and social skills in the digital environment, their averages were found to be *high* in the sense-making dimension, *high* in the debugging dimension, *high* in the problem-solving dimension. For coding skills, their averages were found to be *low* in the sense-making dimension, *low* in the debugging dimension, *low* in the problem-solving dimension.

According to the results, preservice teachers have high and medium levels of sense-making in their decoding skills. This finding reveals that when a new experience is encountered, they can be successful in linking the new experience with the past experiences (Akın et al., 2007; Boyacıoğlu and Aktaş, 2018; Güven, 2004; Schraw and Dennison, 1994) and relate new knowledge to previous learning (Güven, 2004). On the other hand, preservice teachers with low coding skills were found to have low sense-making, debugging and problem-solving levels. Some studies claimed that those with high programming skills have low debugging skills, so debugging is a skill that should be taught separately (Ahmadzadeh et al., 2005; Masuck et al., 2008). This study found that, unlike the relevant literature, coding skill and debugging have consistent levels with each other. Böttcher et al., (2016) suggest that debugging does not only mean gaining technical skills in software or engineering but also means more than the technical meaning of debugging. When the debugging levels of preservice teachers are examined, the fact that the level of debugging in non-technical sub-dimensions is higher supports this view.

3.2. Findings Regarding Critical Thinking Dispositions of Preservice Teachers

Critical thinking dispositions of preservice teachers were obtained with MCTDS. Findings regarding the levels of critical thinking disposition obtained with MCTDS are given in Table 5.

Table 5.

Descriptive statistics regarding the level of critical thinking dispositions

Dimension	f	$\bar{X}$	Sd
Reasoning		4.25	.52
Reaching judgement		4.08	.54
Searching for the evidence	262	4.23	.55
Searching for the truth		4.01	.59
Open-mindedness		4.24	.49
Systematicity		4.21	.54
Whole scale	262	4.16	.41

According to Table 5, the analysis was conducted with the data obtained from a group of 262 preservice teachers. MCTDS averages of preservice teachers are as follows: the dimension of reasoning $\bar{X}$=4.25, Sd=.52; dimension of reaching judgement $\bar{X}$=4.08, Sd=.54; dimension of searching for the evidence $\bar{X}$=4.23, Sd=.55; dimension of searching for the truth $\bar{X}$=4.01, Sd=.59; dimension of open-mindedness $\bar{X}$=4.24, Sd=.49 and dimension of systematicity $\bar{X}$=4.21, Sd=.54. For the whole scale, the critical thinking dispositions of preservice teachers were found to be $\bar{X}$=4.16, Sd=0.41.

The fact that the average score of preservice teachers for critical thinking dispositions is 4 and above could be interpreted as having high critical thinking dispositions. In the studies conducted using a different measurement tool in the relevant field, there are a limited number of studies reporting a high level of critical thinking disposition (for example, Bayraktar and Yağan Güder, 2019; Kiriş Avaroğulları and Şaman, 2020). On the other hand, past research has mainly revealed that the critical thinking levels of preservice teachers are low (Açışlı, 2016; Alkın-Şahin et al., 2014; Can and Kaymakçı, 2015; Güven and Kürüm, 2007; Hayırsever and Oğuz, 2017; Yakar et al., 2010), or at average level (Alper, 2010; Bayat, 2014; Beşoluk and Önder, 2010; Korkmaz, 2009; Ocak et al., 2016; S. M. Özdemir, 2005; Saracaloğlu and Yılmaz, 2011; Sarıgöz, 2014; Semerci, 2010). The studies that claim a high level of critical thinking disposition seem to be more up to date. In this context, it is thought that developments in the education system have a positive effect on critical thinking dispositions.

3.3. The findings regarding the relationship between critical thinking dispositions and decoding skills-ICT

Findings regarding the relationship between critical thinking dispositions of preservice teachers and decoding skills in information and communication technologies are given under this heading. Pearson correlation multiplication coefficient was used to obtain the results. Results obtained from the analysis are given in Table 6.

Table 6: Relationship between critical thinking dispositions and decoding skills (decoding skills-ICT) of preservice teachers

Variable	n	X̄	Sd	Critical Thinking Dispositions	Decoding skills-ICT
Critical Thinking Dispositions	262	4.17	.41	.1	.422**
Decoding skills-ICT	262	3.44	.68	.422**	1

**p<0.01

As seen in Table 6, a positive and moderately significant relationship between the critical thinking dispositions of preservice teachers and decoding skills in information and communication technologies (r=.422, p=.000<.001) was found in the study. This indicates that the critical thinking dispositions of preservice teachers are closely related to ICT. This relationship reveals that developing the disposition to think critically can also improve decoding skills in information and communication technologies.

3.4. The findings of variance explained by ICT-skills towards critical thinking dispositions.

The findings regarding pre-service teachers' decoding skills-ICT explain how much of the variance towards critical thinking tendencies are given under this heading. Simple Linear Regression analysis was used to obtain the findings. The results obtained from the analysis are given in Table 7.

Table 7: Explanation of variance of critical thinking dispositions of decoding skills-ICT of pre services teachers.

Variable	B	Sh	β	t	p
Constant	3.29	.119			
Decoding skills-ICT	.255	.034	.422	7.502	.001

R=.422; R²=.178; F$_{(1,260)}$= 56.28; p<.001

Note: Average of Critical Thinking Trends as Independent Variable

As shown in Table 7, a significant regression model (F$_{(1,260)}$= 56.27, p<.001) was found with the analysis. It was also found that 17.8% (R² = .178) of the variance in critical thinking tendencies was explained by decoding skills-ICT. Accordingly, decoding skills-ICT positively and significantly exhaust critical thinking trends (β=.422, t$_{(260)}$=7.502, p<.001). Every 1-point increase in decoding skills-ICT leads to a .255 point increase in critical thinking dispositions (B=.255). Accordingly, the Y=a+bX regression equation, which fatigues the critical thinking trend score, is as follows:

Critical thinking dispositions = 3.29 + 0.255 x decoding skills-ICT.

Conclusion and Suggestions

This research examined the relationship between decoding skills in information and communication technologies and critical thinking dispositions through preservice teachers. The decoding skills-ICT of preservice teachers was found to be at the medium level. It was also found that as the need for technical knowledge increased, the decoding skills-ICT levels decreased accordingly. It is necessary to examine whether this shows similarities in the new research to be conducted with different working groups. In particular, it seems that preservice teachers received low scores in coding skills. Information and communication technologies within every part of life. For this reason, it is proposed to conduct educational studies to develop the coding skills of preservice teachers that will allow them to communicate through the used technologies. It has been observed that preservice teachers, especially in coding skills, are at a low level in debugging and problem-solving skills. In future research, it is recommended to design training and activities that support debugging and problem-solving processes to improve coding skills. On the other hand, this may also concern the content of Information Technology courses taught at universities. The contents of these courses can be restructured to support debugging and problem-solving skills in decoding skills.

The critical thinking dispositions of preservice teachers were found to be high. When the past research was examined, it is seen that more recent studies report a similarly high disposition regarding critical thinking

(Bayraktar and Yağan Güder, 2019; Kiriş Avaroğulları and Şaman, 2020). It is recommended to conduct meta-analysis studies that examine this in a more detailed way and observe the change in critical thinking dispositions of preservice teachers by year. Besides, it is recommended for researchers to conduct research that examines the critical thinking dispositions of preservice teachers through various measurement tools.

It has been found that ICT has a moderately positive relationship with critical thinking dispositions. This finding could be a new way to achieve critical thinking dispositions. In fact, ICT explains 17.8% of critical thinking tendencies. Therefore, it could be claimed to be a significant finding. There are studies that have concluded that decoding and critical processes should be combined in reading (Nascimento and Franco, 2017), the supporting role of decoding and critical thinking tendencies in reading (Kılıç et al., 2017), and that the meaning of reading improves other cognitive skills, including critical thinking (Lisitsina et al., 2020). Within the framework of the research results, decoding skills-ICT contributed to critical thinking trends. In this respect, it supports the relevant literature. On the contrary, Nascimento and Franco's (2017) finding suggesting that students read online without a scientific and critical perspective does not correspond to the research findings. However, it is necessary to examine whether or not this is confirmed by different participants. Besides, this relationship could be tested again using different measurement tools to determine critical thinking dispositions. In future research, it is recommended to investigate the relationship between decoding skills-ICT and different high-level thinking skills. Besides, the effect of attitudes, dispositions and skills of different research groups on decoding skills-ICT could be examined. Thus, different ways of achieving critical thinking dispositions can be used.

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A structural equation modeling on pandemic session dataset: Turkish university students' new media literacy

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Article Info	Abstract
Keywords: Online self-regulation Online self-efficacy New media literacy Epistemic emotions Argumentativeness Research Article	This study was conducted to examine the relationship among university students' new media literacy, epistemic emotions, argumentativeness, online self-regulation learning, and online learning self-efficacy perceptions. An associational research design guided the study including structural equation modeling analysis. A total of 3395 students from a state university in Turkey participated in the study through online learning management system of the university during Covid-19 pandemic period. Five different Likert scales were utilized to collect data. Analyses showed that university students' self-efficacy perceptions and online self-regulated learning skills seemed to be effective on their epistemic emotions, argumentativeness and new media literacy skills. Also, participants' epistemic emotions partly predicted their argumentativeness and new media literacy skills. Considering these results, designing online learning environments respectful for university students' intellectual differentiation was suggested.

1. Introduction

In the 21st century, issues such as organ transplantation, obesity, consumption of GMO foods, establishment of nuclear power plants, smart tools, cyborg applications, and the ways to protect against coronavirus are surrounding us. Individuals find themselves in these discussions through various media tools such as news channels, WhatsApp and Facebook. In the citizen typology that individuals should have in such environments, it is observed that individuals have to perform a series of actions such as accessing information and evidence sources using media tools, evaluating this information, adding content, affecting the opinions of others and respecting ideas (Anagun, Atalay, Kilic, & Yaşar, 2016; Chen, Wu, & Wang, 2011; Koc & Barut 2016). These chains of actions mentioned are collected under the concept of media literacy as an umbrella concept. The concept of media literacy, which is one of the popular literacy concepts of the 21st century, has once again made its importance felt in the recent pandemic process experienced by the world countries. Many citizens of the countries have reached local and global statistics about the pandemic, measures and sanction decisions taken by the countries, the types of pandemics that occurred in history, news and scientific content about Covid 19 and the discussions and suggestions of scientists through media tools during the pandemic process. Many countries have also managed to continue their citizens' education and training processes through different types of media tools and online systems. As it

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is stated by Thoman and Jolls (2008, p. 42), "Media no longer just influence our culture. They are our culture" and seem to continue.

In this case, it has now become an obligation for individuals to demonstrate practices such as accessing information, using evidence sources and evaluating them fairly, sharing their own knowledge, and being aware of their own identity and social values in creating media content through media tools, in brief to grow up as media literate individuals (Chen et al., 2011). Because only media literate individuals will have characteristics that can make effective decisions in the media environments that include manipulative and propaganda elements along with correct and necessary information and can filter the contents in media. These structures have been recently discussed under the title of New Media Literacy (NML) in the literature due to some distinguishing features (e.g., media is not just consumption but production) (Chen et al., 2011; Lee, Chen, Li, & Lin, 2015). When NML's four main literacies, including Functional Consumption Literacy, Critical Consuming Literacy, Functional Prosuming Literacy, and Critical Prosuming Literacy, and its components under these literacies are examined, it can be concluded that the theoretical elements of NML are closely associated with the key concepts of educational psychology literature. Despite this relationship which is implicit and waiting for being discovered, it is observed that there is a limited number of NML studies and that there is a need for studies showing the relationship of NML with other variables in different contexts (Tugtekin & Koc, 2020). In this context, to reveal the cognitive and affective factors with which NML is associated may contribute to the literature. Therefore, in this study, it was aimed to examine the relationship of NML with the concepts of epistemic emotions, argumentativeness, self-regulation, and self-efficacy by structural equation modeling. The theoretical reasons for the selection of these concepts are presented in the following titles.

2. Theoretical Framework

2.1. Self-Regulation

Self-regulation focuses on the fact that individuals are responsible for their own learning, can control their own learning processes, make regulations in the learning process when needed and motivate themselves throughout the learning life (Zimmerman, 2000). Self-regulated students can control their learning processes by developing metacognitive strategies such as planning, being organized and motivated (Yukselturk & Bulut, 2007). Individuals with self-regulation skills are expected to manage their resources effectively (Anderton, 2006). These individuals are expected to keep their own learning process under control without needing for teachers and family (Zimmerman, 2002).

The characteristics of self-regulated learners can be explained under three titles: metacognitive, behavioral and motivational (Gaskill & Woolfolk-Hoy, 2002). In this context, when self-regulation is considered in terms of learners, they are individuals with metacognitive characteristics, such as goal setting, planning, monitoring and evaluating their own learning process. From behavioral aspects, they have characteristics such as seeking help, organizing their own learning environment and realizing their own reinforcement in learning. Motivationally, they are self-confident and self-aware individuals who are aware of the responsibility of learning outcomes.

Self-regulated learning also refers to students' systematic efforts to manage learning processes to achieve their goals (Pintrich, 2004; Zimmerman & Schunk, 2011). Self-regulated learning is usually described in the context of the integration of motivation, emotion and learning strategies (Abar & Loken, 2010). Students who have self-regulation skills in terms of motivation tend to gain competence by specializing in what they do (Pintrich, 2004; Zimmerman, 2011). The studies indicate that motivation and emotion, which are among the components of self-regulation, significantly affect the student's learning experiences (Cho & Heron, 2015). The metacognitive, motivational and behavioral characteristics of successful online experiences under the control of online learners should be examined to observe this effect (Shea & Bidjerano, 2010).

2.2. Self-Efficacy

Self-efficacy is individuals' beliefs about how well they can do the necessary actions to deal with possible situations (Bandura, 1977). Zimmerman (1995) defined self-efficacy as the judgment of an individual about his/her ability to perform and achieve a job. According to Pajares (2002), self-efficacy is the key concept of Social Cognitive Theory, which defends that individuals need to have self-confidence before they can use their skills effectively. When this concept is considered in terms of online learning, it can be defined as an individual's belief in his/her ability to organize and execute the related actions to perform online tasks or activities.

Alqurashi (2016) examined self-efficacy studies in terms of online learning. According to the study the issue is addressed multidimensionally by being not only limited to computer, internet and information seeking skills would make significant contributions to the literature, while revealing the relationships between self-efficacy and online learning. Similarly, Shea and Bidjerano (2010) indicated that self-efficacy is a component of self-regulation, which has a great structure in understanding success in online learning environments.

Furthermore, some studies argue that self-efficacy can be a key component of academic achievement in online learning (Hodges, 2008). Shen, Cho, Tsai and Marra (2013) indicated that self-efficacy was also associated with students' previous online learning experiences and gender, apart from success in online learning. Furthermore, Zimmerman and Kulikowich (2016) also stated that students with a high level of online learning self-efficacy are more likely to be successful in online classes. Lim (2001) indicated that students' computer self-efficacy had a significant effect on their satisfaction and their thoughts about attending online courses in the future.

2.3. New Media Literacy

Along the spread of media tools such as smartphones, tablets, twitter and facebook, individuals have reached a position in which they not only consume the media but also produce. These new technological tools, which are developed and reached individually, have constituted a new phenomenon that appears in the form of new media. Koc and Barut (2016) state that NML is a relatively new phenomenon and define it as a combination of socio-cultural environments created by network technologies, in which any message is digitally generated and distributed by any user. Unlike traditional media literacy, individuals experience a process in which they create, analyze and evaluate their knowledge and content in these socio-cultural environments. In this context, NML includes basic process skills such as access, analysis, evaluation, criticism, production and/or participation in media content (Lee et al., 2015). Therefore, in the 21st century, individuals should be raised as individuals with NML who comprehend the technical and socio-cultural characteristics of the new media, unlike classical literacy (Chen et al., 2011). In their study, Chen et al. (2011) unpacked the NML, and they based this concept on three main mottos. As a result of these three main mottos, including "From Consuming to Prosuming Media Literacy", "From Functional to Critical Media Literacy" "From Computer Literacy to New Media Literacy", Chen et al. (2011) proposed a conceptual framework for NML consisting of (a) functional consuming, (b) functional prosuming, (c) critical consuming and (d) critical prosuming literacies. Lin, Li, Deng, and Lee (2013) revised this framework by justifying that this quadruple structure roughly depicts NML and that this structure is unable to distinguish between cultural environments served by some technological tools (Web1 and Web2). After this new framework, they defined the NML which consisted of ten components under the titles of (a) functional consuming, (b) functional prosuming, (c) critical consuming and (d) critical prosuming.

Accordingly, NML includes specific skills such as

- creating media content by critically understanding a series of technical skills (Consuming Skill) required to consume media content and understanding the meaning of media content at the text level under the **functional consuming literacy**,

- being able to structure media messages on their own (analysis), significantly sampling and rearranging media content (synthesis), questioning, criticizing and appealing the reliability of media content (evaluation) within the context of **critical consuming literacy,**
- a set of technical skills (prosuming skill) required to produce/create media content, activities for distributing the available information (distribution), increasing (partially or completely) or mixing (production) media contents within the context of **functional prosuming literacy,**
- interactive and critical participation in the media (participation), socio-cultural values and ideology issues within the context of **critical prosuming literacy.**

2.4. Epistemic Emotions

Epistemic emotions are related to the knowledge-producing qualities of cognitive tasks and activities (Brun, Doguoglu, & Kuenzle, 2008). Knowledge and the production of knowledge in terms of epistemic emotions are the objects of emotions (Pekrun, Vogl, Muis, & Sinatra, 2017). In brief, individuals' knowledge and the emotions they feel during the acquisition of knowledge can be called epistemic emotions. These emotions generally reveal themselves during cognitive congruity and cognitive incongruity (Muis et al., 2015). However, the factor to take into account here is that cognitive congruity or incongruity does not only arouse epistemic emotions, it may also trigger other emotions (Pekrun et al., 2017). The distinctive factor here is the focus of emotion. For instance, a student's disappointment on failure to find a correct solution to the math problem is considered an epistemic emotion if it is focused on cognitive incongruity caused by unresolved problem. However, the student's disappointment is considered a sense of achievement if the focus is on personal failure and failure to solve the problem (Pekrun et al., 2017). In general, individuals have epistemic beliefs that they are familiar with knowledge and the acquisition of knowledge. When individuals encounter a situation that contradicts their epistemic beliefs, negative emotions are triggered in them, while positive emotions arise in case of epistemic equilibrium. These positive (e.g., enjoyment, curiosity) and negative epistemic emotions (e.g., anxiety, frustration) are effective in maintaining or abandoning a behavior (Muis et al., 2015). In this context, cognitive congruity and incongruity that individuals encounter in new media environments with regard to their epistemological beliefs may trigger individuals' positive and negative emotions about obtaining knowledge, which may enable individuals to choose different strategies in media environments. For instance, in the study of Muis et al., (2015), it was found that epistemic emotions were effective in choosing deep or shallow processes strategies in learning processes. Therefore, epistemic emotions can be an effective parameter on individuals' media literacy levels and this relationship is worth exploring.

2.5. Argumentativeness

Individuals have different orientations during argumentation processes. While some individuals tend to argue (argument approach) during discussions, others tend to avoid (argument avoidance) discussion. This individual tendency that individuals adopt for argumentation is defined as the concept of argumentativeness in the literature (Infante & Rancer, 1982). Argumentativeness is an individual's disposition and explains the attitudes adopted by individuals in the discussion. According to Infante and Rancer (1982), the reason for this individual feature is closely associated with the emotions that individuals have during the discussion. While some individuals consider the argumentation process as an exciting intellectual activity and exhibit an argument approach attitude, some individuals move away from the argumentation through the discussion itself and the negative emotions they have during the argumentation (Infante & Rancer, 1982).

Recent studies include important evidence of the relationship between the concept of argumentativeness and epistemological belief (Nussbaum & Bendixen, 2003) epistemic emotions (Bahcivan, 2019) and self-regulation skills (Yavuzalp & Bahcivan, 2021), although their number is limited. For instance, in a study of Bahcivan (2019), it was concluded that advanced epistemological beliefs triggered positive epistemic

emotions and that these emotions predicted whether individuals participate in argumentation. In that study, a sophisticated epistemological belief also directly affected the attitude of being argument approach. In another study, Demirbag (2021) concluded that the development of metacognitive-self regulation skills positively predicted being an argument approach. As can be seen, the concept of argumentativeness is closely associated with other main concepts (self-regulation, epistemic emotions) selected for this study.

When it is considered in the context of NML, new media tools developed today support the tasks of individuals to create their own products, share them, reflect their social values and identity, and even their ideology. In such environments, individuals share their ideas, open them to the criticism of others and experience a socio-cultural discussion environment. The argument approach or avoidance in such an environment may affect the attitude that individuals adopt in media environments. While individuals who are inclined to discussion consider discussion as an exciting activity and exhibit practices such as creating their own arguments, seeking evidence and problem solving using new media tools related to challenge or conflict issues, individuals with an avoidance attitude may prefer a passive position away from discussion in media environments. Therefore, this individual feature may be effective in predicting the level of media literacy.

3. The Proposed Model and Hypotheses

As can be seen, NML theoretically consists of four main titles and ten components. When the studies are examined, it can be said that the concept of NML is a relatively new concept, and perhaps for this reason, the number of studies examining this concept is considerably limited. Therefore, Tugtekin and Koc (2020) pointed to this situation and examined the NML's relationship with communication skills and democratic tendencies by indicating the need for new studies aimed at developing the scale related to NML, determining the NML levels of individuals and investigating the effects of NML on social and political life, apart from the conceptual structure of NML. In our opinion, despite these enterprising efforts, it is necessary to increase the number of studies on NML and to reveal other variables related to its theoretical background. In particular, according to the literature search we conducted, the relationship of NML with the main keywords in the field of educational psychology is waiting to be discovered.

In this sense, it is highly important to reveal cognitive and affective variables that affect NML. Revealing the relationship of NML with these concepts will contribute to understanding which parameters should be changed and what kinds of interventions should be made to improve NML in the whole picture. Therefore, in this study, it was aimed to test the relationship of NML with the concepts of epistemic emotions, argumentativeness, self-regulation, and self-efficacy by the structural equation modeling.

In the selection of these concepts, the concepts with which the different dimensions included in NML are (probably) associated, even if NML is not directly associated with them were selected. For instance, according to some researchers (Chen at al., 2011), it is known that the concept of digital literacy in the content of NML is intertwined with epistemological beliefs (i.e. Gunes & Bahcivan, 2018) self-regulation (Perera, Gardner, & Peiris, 2016) and self-efficacy (Prior et al., 2016). We also have evidence indicating that these concepts are associated with epistemic emotions and argumentativeness (e.g., Bahcivan, 2019). These indirect relationships triggered the idea of discussing these variables together with NML as a whole.

Furthermore, the theory of Rokeach (1968), which is one of the strong theoretical frameworks of educational psychology literature, was used to determine the theoretical relations of the main concepts and to establish the proposed model presented in Figure 1. According to this theory, individuals' behaviors and practices are fed by a belief system that is layered from a central core structure to the surface (from Type A to Type E) and leaks between each other, as in an atomic model. Accordingly, since the variables related to self (self-efficacy and self-regulation) are accepted between Type A and B beliefs, they are among the most central beliefs of the belief system and shape all other belief types. Furthermore, Type C beliefs are called authority beliefs and include beliefs about the source of knowledge. From this point of view, Type

C beliefs can be associated with epistemological beliefs. In this study, epistemological beliefs were represented by emotions based on the result that they predicted epistemic emotions strongly (Bahcivan, 2019). Rokeach (1968) defined a cumulative relationship from the very center to the surface. In this case, Types A and B beliefs should predict Type C. Furthermore, it should be accepted that everything that Type C predicts is predicted by Types A and B.

The NML and argumentativeness variables in this study are not among the belief types indicated by Rokeach (1968). These variables can be considered as knowledge and skill-focused variables surrounded by belief systems. As it was previously demonstrated by Bahcivan (2019), argumentativeness has a very close relationship with epistemic beliefs since it is directly knowledge focused, in other words, it is the way of knowing. On the other hand, NML appears as a comprehensive type of literacy affected by both ways of knowing skills and various belief types. In this context, it can be indicated that argumentativeness is a structure that is affected by epistemic emotions and is closer to epistemic beliefs, while NML is a larger structure that is affected by all the variables mentioned here. Therefore, within this theoretical framework, argumentativeness appears as a variable that also affects NML.
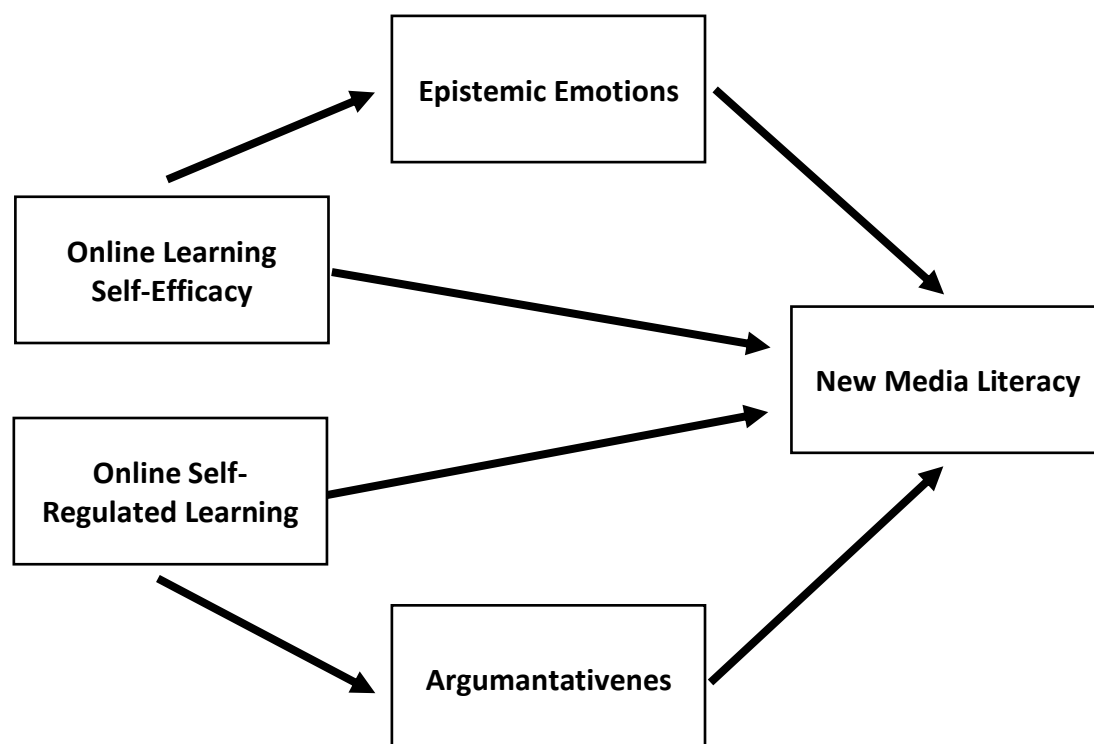

Fig. 1. Suggested model for the study.

4. The Problem Statement

Considering the purpose and the proposed model presented above, this study was conducted to respond the following research problem:

•   What are the structural relations among university students' online learning self-efficacy perceptions, online self-regulated learning skills, epistemic emotions, argumentativeness and new media literacy skills?

5. Methodology

Possible relationships among university students' new media literacy skills, online self-regulated learning skills, epistemic emotions, argumentativeness and online learning self-efficacy beliefs were queried to

make comprehensive predictions. Therefore, this study has an associational research design (Fraenkel, Wallen, & Hyun, 2011).

5.1. Participants

3395 university students studying at state university participated voluntarily in the study. A convenience sampling was applied to reach maximum number of participants (Creswell, 2008). The distribution of participants in terms of certain demographic properties was represented in Table 1. Accordingly, students' ages were mostly observed between 19-26 (M=22.29 and Sd=3.79). Most of participants were faculty students (77.8%).

Table 1.

Demographic Distributions of Participants.

Variable	Trait	Number	Percentage
Gender	Female	2115	62.3
	Male	1280	37.7
Age	19 and under	270	8.0
	20	609	17.9
	21	791	23.3
	22	690	20.3
	23	446	13.1
	24	227	6.7
	25	119	3.5
	26 and above	243	7.2
Class	1 (Freshman)	748	22.0
	2 (Sophomore)	875	25.8
	3 (Junior)	802	23.6
	4 (Senior)	919	27.1
	Graduate	51	1.5
School Type	Faculty	2642	77.8
	College	174	5.1
	Vocational School	528	15.6
	Graduate School	51	1.5
Total		**3395**	**100**

5.2. The Questionnaire

It involved 5 scales measuring participants' scores related to the variables.

Online Self-Regulated Learning Scale

This scale was firstly developed by Lan, Bremer, Stevens and Mullen (2004) to measure university students' self-regulation skills in online learning environments. The scale originally included 86 five-point (from 1 for completely disagree to 5 for completely agree) Likert items distributed to 6 dimensions labeled as goal setting, environment structuring, task strategies, time management, help seeking and self-evaluation. Barnard, Paton and Lan (2008) validated a short version of this scale which included 24 items. This short version of the scale adapted into Turkish by Kilis and Yildirim (2018) with a sample of 321 university students. These researchers validated the instrumentation results with confirmatory factor analysis and reported acceptable fit indices ($\chi2/df=2.45$, CFI=0.90, TLI=0.89 and RMSEA=0.06) as well as alpha reliability scores between 0.67-0.87. In this study, we conducted a confirmatory factor analysis (n=3395) and found acceptable fit indices for the statistical model ($\chi2/df=11.76$, CFI=0.97, TLI=0.96 and RMSEA=0.06). Alpha reliability scores were observed as 0.94, 0.94, 0.87, 0.89, 0.86 and 0.88 respectively for goal setting, environment structuring, task strategies, time management, help seeking and self-

evaluation dimensions. Also, factor loading values (standardized regression weights) were observed between 0.74-0.91. Therefore, this scale was utilized to produce valid and reliable testing results.

Online Learning Self-Efficacy Scale

The scale was developed by Zimmerman and Kulikowich (2016) to measure university students' self-efficacy perceptions in online learning environments. It originally involves 22 five-point (from 1 for completely disagree to 5 for completely agree) Likert items distributed to three factors labeled as learning in the online environment, time management and technology use. Yavuzalp and Bahcivan (2020) adapted the scale into Turkish with a sample of 2087 university students and reported a one factor solution covering 21 items considering the exploratory factor analysis results. Cronbach alpha reliability score was also reported as 0.98 in the same study. In this study, a confirmatory factor analysis (n=3395) was applied for validation. Validation results presented that the scale had acceptable fit indices ($\chi2$/df=18.98, CFI=0.95, TLI=0.94 and RMSEA=0.07). Cronbach alpha reliability score was also calculated as 0.97. Factor loading values of items were observed between 0.70-0.83. Therefore, considering validation analyses, it could be claimed that this scale would produce valid and reliable results.

Epistemic Emotions Scale

This scale was developed by Pekrun, Vogl, Muis and Sinatra (2017) to measure university students' epistemic emotions. It originally involves 21 five-point (1 for not at all and 5 for very strong) Likert items distributed to 7 emotions (factors): curiosity, surprise, anxiety, enjoyment, confusion, frustration and boredom. Each emotion was represented with three adjectives in the scale. Bahcivan (2019) adapted the scale by exploratory factor analysis with a sample of 612 university students. The analysis resulted with a two-factor solution: positive emotions (5 items) and negative emotions (8 items). Alpha reliabilities were also reported as 0.74 and 0.85. In this study, we validated scaling results with a confirmatory factor analysis (n=3395) which resulted in acceptable fit indices ($\chi2$/df=23.52, CFI=0.95, TLI=0.94 and RMSEA=0.08). Alpha reliability scores were calculated as 0.88 and 0.93 respectively for positive and negative emotion dimensions. Factor loading values were observed between 0.62 and 0.84. Considering these results, it can be claimed that this scale produces valid and reliable results.

Argumentativeness Scale

The scale was developed by Infante and Rancer (1982) to measure university students' argumentativeness. It involves 16 five-point (from 1 for completely disagree to 5 for completely agree) Likert items which are equally distributed to 'argument approach' and 'argument avoidance' factors. Bahcivan (2019) previously adapted the scale into Turkish with a sample of Turkish university students and reported 0.79 and 0.80 alpha reliability scores for each dimension. In this study, a confirmatory factor analysis (n=3395) was conducted for validation. Accordingly, statistical model had acceptable fit indices ($\chi2$/df=14.19, CFI=0.96, TLI=0.95 and RMSEA=0.06). Alpha reliability scores were calculated as 0.93 and 0.91 respectively for argument approach and argument avoidance dimensions. Also, factor loading values were observed between 0.69-0.85. Therefore, it was decided that the scale would produce valid and reliable results.

New Media Literacy Scale

This scale was developed by Koc and Barut (2016) to measure university students' media literacy skills. The scale is composed of 35 five-point Likert items distributed to 4 factors: functional consumption, critical consumption, functional presumption and critical presumption. The researchers conducted factor analyses for validation and reported good fit indices (SRMR=0.050, RMSEA=0.049, GFI=0.89, CFI=0.98 and

NFI=0.97). They also reported Cronbach alpha reliability scores as 0.85, 0.87, 0.89 and 0.93 respectively for functional consumption, critical consumption, functional presumption and critical presumption. In this study, we conducted a confirmatory factor analysis (n=3395) for validation and found acceptable fit indices (χ2/df=23.33, CFI=0.94, TLI=0.93 and RMSEA=0.08). Alpha reliability scores were observed between 0.97-0.98 for all the factors. Factor loading values of each item were also observed between 0.82-0.93. Therefore, according to validation results, this scale was accepted to produce valid and reliable results.

5.3. Data Collection Process

Data collection process was realized through learning management system of the university so that participants responded to the scales through online learning mediums. This process comprised of three sessions. In the first session, participants were requested to reply for online learning self-efficacy and epistemic emotions scales. The second session was realized two weeks later to collect data for online self-regulated learning and argumentativeness scales. Two weeks later, the last session was conducted to reply for the new media literacy scale. Participants were informed about the variables and data collection processes at the beginning of each session. If they selected to participate voluntarily, they were not allowed to leave any item unanswered. After the last session, the data of the participants, who responded to all scales, were combined in the dataset file. This file also involved participants' demographic variables which were provided automatically by the learning management system of the university. All the data was collected solely for this research study during Pandemic session (April-May 2020).

5.4. Data Analysis

Data analyses included two steps. The first step was realized for validation. Confirmatory factor analysis was preferred to produce evidence for validation, because, all the scales were previously adapted into Turkish and/or utilized with a sample of Turkish university students (Tabachnick & Fidell, 2013). Reliability of scaling results were examined by calculating Cronbach's alpha coefficients with SPSS. The second step of data analyses was conducted by structural equation modeling (n=3395) for responding the research problem of the study. Both confirmatory factor analyses and structural equation modeling analyses were conducted with AMOS program. In these analyses, fit index values were examined to check fit of data to the model. Among them, 'χ2/df' is critically important; however, Kline (2016) states that chi-square test is very sensitive to sample size. Therefore, high number of participants in the sample may be responsible for high value of 'χ2/df' in this study.

6. Result and Discussion

A structural equation modeling analysis was conducted to examine the possible connections among university students' online learning self-efficacy perceptions, online self-regulated learning skills, epistemic emotions, argumentativeness and new media literacy skills. Analyses yielded a model (see Figure 2) holding acceptable fit indices (χ2/df=7.59, CFI=0.91, TLI=0.90 and RMSEA=0.04). Complex relationships among the variables of the study get lowered clarity in Figure 2. Therefore, Table 2 was prepared to represent all the relationships among these variables. Table 2 demonstrated also level of significance for these standardized regression weights (β).
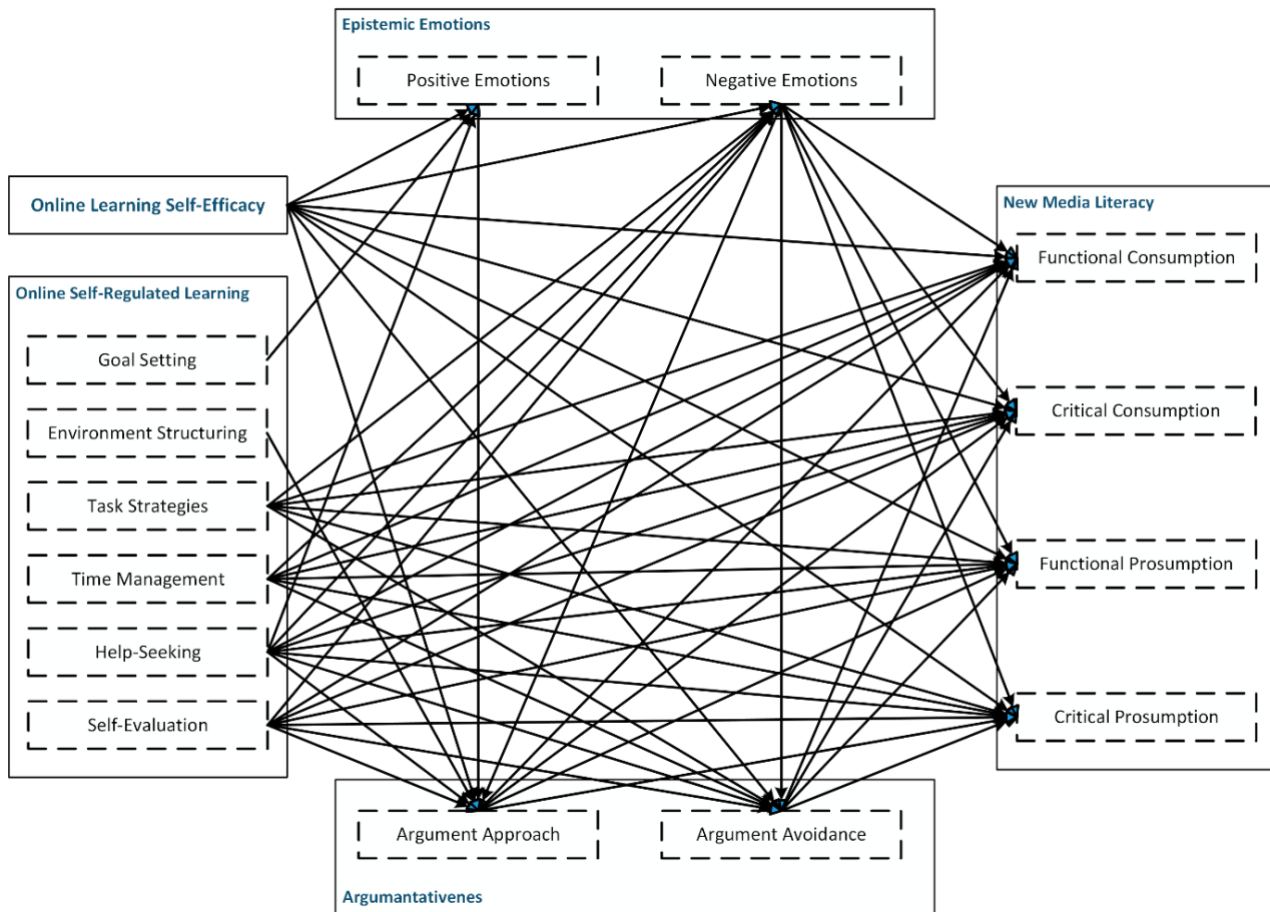
Fig. 2. Significant Relations Observed in the Statistical Model.

As can be seen in Figure 2, most of the proposed relations were observed in the statistical model. In general, university students' self-efficacy perceptions seemed to be effective on their epistemic emotions, argumentativeness and new media literacy skills. A very similar result was also handled for participants' online self-regulated learning skills. However, results also showed that participants' self-regulation skills under goal setting and environment structuring dimensions were not related to their new media literacy skills. Just a limited number of relationships were observed between self-regulated learning skills, classified under goal setting and environment structuring, and other variables of the proposed model. In addition, results showed that the relationship between positive epistemic emotions and other variables seemed limited in terms of amount. Positive epistemic emotions were just positively related to argument approach. Whereas negative epistemic emotions significantly related to all dimensions in argumentativeness and new media literacy skills. Finally, results showed that both dimensions of argumentativeness were significantly related to all dimensions of new media literacy.

Table 2.

Standardized Regression Weights of Significant Relations in the Model.

Predictor Variable	Direction	Dependent Variable	β	ρ<
Goal Setting	→	Positive Emotions	0.13	0.05
Environment Structuring	→	Argument Approach	0.11	0.05
Task Strategies	→	Negative Emotions	0.18	0.05
	→	Argument Avoidance	0.40	0.05
	→	Functional Consumption	0.75	0.05
	→	Critical Consumption	0.76	0.05
	→	Functional Presumption	0.87	0.05
	→	Critical Presumption	0.94	0.05
Time Management	→	Negative Emotions	-0.14	0.05
	→	Argument Avoidance	-0.28	0.05
	→	Functional Consumption	-0.77	0.05
	→	Critical Consumption	-0.76	0.05
	→	Functional Presumption	-0.78	0.001
	→	Critical Presumption	-0.78	0.05
Help Seeking	→	Positive Emotions	0.43	0.001
	→	Negative Emotions	0.90	0.001
	→	Argument Approach	0.49	0.001
	→	Argument Avoidance	0.87	0.001
	→	Functional Consumption	0.88	0.001
	→	Critical Consumption	0.90	0.001
	→	Functional Presumption	0.88	0.001
	→	Critical Presumption	0.86	0.001
Self-Evaluation	→	Negative Emotions	-0.32	0.001
	→	Argument Approach	-0.15	0.05
	→	Argument Avoidance	-0.70	0.001
	→	Functional Consumption	-0.45	0.001
	→	Critical Consumption	-0.45	0.001
	→	Functional Presumption	-0.48	0.001
	→	Critical Presumption	-0.46	0.001
Self-Efficacy	→	Positive Emotions	0.08	0.05
	→	Negative Emotions	-0.32	0.001
	→	Argument Approach	0.08	0.05
	→	Argument Avoidance	-0.39	0.001
	→	Functional Consumption	-0.59	0.05
	→	Critical Consumption	-0.64	0.05
	→	Functional Presumption	-0.56	0.05
	→	Critical Presumption	-0.62	0.05
Positive Emotions	→	Argument Approach	0.50	0.001
Negative Emotions	→	Argument Approach	-0.29	0.001
	→	Argument Avoidance	-0.47	0.001
	→	Functional Consumption	-0.80	0.001
	→	Critical Consumption	-0.81	0.001
	→	Functional Presumption	-0.79	0.001
	→	Critical Presumption	-0.76	0.001
Argument Approach	→	Functional Consumption	0.11	0.05
	→	Critical Consumption	0.11	0.05
	→	Functional Presumption	0.09	0.05
	→	Critical Presumption	0.11	0.001
Argument Avoidance	→	Functional Consumption	-0.34	0.001
	→	Critical Consumption	-0.32	0.001
	→	Functional Presumption	-0.34	0.001
	→	Critical Presumption	-0.31	0.001

The results of this study are mostly coherent with previous findings and theoretical approaches in the literature. For example, self-regulation and self-efficacy beliefs, labeled as Types A and B beliefs, predicted epistemic emotions (Type C) as Rokeach (1968) stated. Also, epistemological emotions were significantly related to argumentativeness. Similar findings were declared by Bahcivan (2019). When the results on NML are examined, while argument approach positively predicts all components of NML, argument avoidance negatively predicts all components of NML. This is an expected result according to the clues we obtained from certain research studies, although there is no study directly on these two variables. Because, when it is examined carefully, it will be observed that the strategies such as questioning, evaluating and criticizing sources of evidence, which are frequently used in argumentation environments by the individuals who are inclined to argue, are closely associated with NML (Lee et al., 2015). Furthermore, individuals with argument approach participated in the discussion through new media and exhibited their own ideas, which may have positively predicted their new media literacy features. Similarly, NML levels of those with avoidance attitude may therefore be negatively predicted. Because many studies showed that new media environments are positively related to the communication abilities and democratic engagement that can be considered to be closely associated with the discussion action (Kim & Yang, 2016; Tugtekin & Koc, 2020). When the relationship between epistemic emotions and NML is examined, negative epistemic emotions predicted NML negatively, which is also an expected result, although it is not a study directly based on these two concepts. Because negative epistemic emotions generally trigger shallow learning processes (Muis et al., 2015). Furthermore, negative epistemic emotions are triggered by naive epistemological beliefs. Naive epistemological beliefs negatively predict digital literacy (Chen et al., 2011), which can be considered as one of the sub-components of NML (Gunes & Bahcivan, 2018). The data obtained from these studies confirmed the result we found.

7. Conclusions and Implications

In conclusion, considering the results and the discussions presented above, it can be stated that university students' beliefs about self, epistemic emotions and argumentativeness are effective on their NML skills. Therefore, it can be suggested that online learning environments respectful for intellectual differentiations can be arranged and implemented for university students. Online learning environments may affect university students' beliefs about self positively so their NML skills. Following researchers should conduct research studies to examine the possible effects of such learning environments on NML skills via experimental designs. These learning environments may also involve digital technologies related to argumentation focused pedagogies. These technologies and learning experiences handled through them will most probably be effective on students' argumentations skills positively. According to the results of the study, argument approach students presented better literacy skills related to new media in comparison to argument avoidance students. Therefore, argumentation focused pedagogies should be implemented in university learning mediums.

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