INTERNATIONAL ONLINE JOURNAL OF EDUCATIONAL SCIENCES

ISSN:1309-2707

Volume 14 Issue 4 October 2022

iojes

www.iojes.net

International Online Journal of Educational Sciences

IOJES is an international, peer-reviewed scientific journal (ISSN:1309-2707) is published five times annually-in March, May, July, September and November.

Volume 14, Issue 4, Year September - 2022

INDEX

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Publication Type: Published in March, May, July, September and November.

Indexing

Education Abstract (H. W. Wilson)
Education Full Text (H.W. Wilson)
Turkish Education Index (TEI)
EBSCO host Educational Sources
ERA Routledge
The Asian Education Index
Cite Factor
Index Copernicus

Language editing
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International Online Journal of Educational Sciences

ISSN: 1309-2707

Microtonal Ear Training Application Usage in Turkish Music Education

Research Article

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To cite this article: Demirtas, E., & Ozcelik, S. (2022). Microtonal ear training application usage in Turkish music education, *International Online Journal of Educational Sciences*, *14*(4), 897-907.

ARTICLE INFO

Article History:

Received: 02.08.2021

Available online: 25.09.2022

ABSTRACT

The aim of this study is to examine the effect of microtonal ear training mobile application usage in Turkish music education. For this, first of all, a mobile application that can be used in the Turkish music system has been developed. The study group of the research, in which the quasi-experimental model was used, was formed from the students of Gazi University Music Education Department. For four weeks, the experimental group conducted ear training studies for Turkish music using a mobile application. At the beginning and end of the experiment process, an achievement test was applied to the students. The validity and reliability studies of the achievement test were carried out with 105 participants from 3 universities. Wilcoxon signed-rank test was used to compare the pretest and posttest scores. The effect size of the result obtained was also calculated. As a result of the research, it was determined that the mobile application developed for Turkish music education contributed significantly to the success of the students.

Keywords:
Application development, musical application, music education, ear training

Introduction

It can be said that one of the most important reflections of technological advances today is mobile devices. With mobile devices, many needs such as learning, listening, and communication can be met anytime and anywhere. Mobile applications come to the fore in the increasing use of mobile devices, especially smartphones. Mobile applications related to every field, from finance to sports, from health to education, provide great convenience to human life.

Nowadays, mobile applications are developed for almost every field for mobile devices. Considering their number and diversity, it is seen that music applications have an important place among the areas where applications are developed. Music applications are developed to serve many different purposes in line with

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DOI: https://doi.org/10.15345/iojes.2022.04.001

musical needs, apart from general topics. For example, with a mobile application, automatic transcription of a wind instrument can be done (Skoki, Ljubic, Lerga, & Stajduhar, 2019), correct finger positions of many instruments can be learned, or metronome and musical expression skills can be checked. In general, a wide variety of music applications created in the fields of listening to music, music production, virtual instrument, music sharing, music education, etc. are available in application markets.

When music education practices are examined in general, it is seen that there are many types such as theory, history, instrument, singing, ear training. Miller (2012) stated that ear training applications on tablet computers are quite functional. He stated that students can perform interval, melody, chord, rhythm, and many other exercises required in music learning using tablets and that students can do these exercises without the need for a piano or computer, without time and space limitations. In developing musical skills such as rhythm work and singing (Burton & Pearsall, 2015; Chen, 2015), instrument training (Palazón & Giráldez, 2018; Ng, Lui, & Kwok, 2015), theory studies (Chong, 2019; Ng, Lui, & Lo, 2013) mobile application usage gives very successful results academically. The use of mobile applications in the development of musical hearing skills attracts students, thus increasing their motivation (Chen, 2020). The use of mobile applications optimized with modern teaching methods in music lessons positively affects academic achievement and general quality level (Tong, 2016). Mobile application-supported music education helps students to be more creative (Moreno, 2014), to analyze their favorite music better, and to discover new music genres (Stowell & Dixon, 2014).

When the application markets of Apple and Android, which are the most common mobile application platforms today, are examined, it is seen that there are many applications created to contribute to the development of musical aural skills (Demirbatır & Çeliktaş, 2021). With these applications, different aural and theoretical studies such as interval recognition, scale recognition, chord recognition, pitch recognition, tempo recognition, and melodic dictation studies can be performed (Demirtaş, 2021). In addition, there are applications for making hearing studies related to special areas such as equalizer and sound level. When the applications related to Turkish music are examined, there are applications related to music listening, instrument training, sheet music providers, and theory. It is seen that the number of mobile application related to Turkish music education is quite low when compared to Western music. No application related to Turkish music similar to ear training applications developed according to the Western music system has been encountered.

Turkish music sound system has its own rules and naming. In the Western music system, the major second interval is divided into two equal parts, while in the Turkish music system it is divided into nine parts, each of which is called "coma" (Özkan, 2011). The frequency values of the sounds and the use of intervals are used differently according to the Western music system. In Turkish music, the tuning system is used for the frequency values of the sounds and is named accordingly. Basically, the tuning called “Bolahenk” is used. The sound of la (A), which is used in the Western music system at a frequency of 440, is used as re (D) in this tuning. Other systems are calculated and named according to their distances from the “Bolahenk” system (Özkan, 2011).

When the curricula of primary and secondary education music lessons in Turkey are examined, it is seen that Turkish music subjects are also intensively studied together with the Western music system. When the music education undergraduate program is examined, it is seen that Turkish music lessons are included in the curriculum. Considering the increasing use of mobile applications, it is thought that the mobile application that can be used for the Turkish music system will meet an important need. For this reason, within the scope of the research, a mobile application related to Turkish music education was developed and its effect on the success levels of music education department students was tried to be examined. In this context, the research problem was formulated as follows:

- What is the effect of using microtonal ear training mobile applications in Turkish music education?

Related Studies

Buonviri and Paney (2020) examined the use of technology for aural skills. They used an electronic questionnaire as a data collection tool. The study group consisted of 317 teachers. According to the results of the study, 91% of teachers use technology for the development of hearing skills. Of those who used technology, 93% reported using websites, 47% used computer programs, and 38% used mobile applications. The advantages of using technology are that it provides extra practice for students and can be organized according to students' needs.

Chen (2015) examined the effect of using mobile applications on the development of hearing skills. In the research, an application called Auralbook, which can perform singing, recording, rhythm, and theoretical studies were used. An online questionnaire, application data, and interview form were used as data collection tools. The data collection process took six months. As a result of the research, it was concluded that the use of mobile applications increases motivation and is an effective tool in the development of musical skills. In addition, it has been suggested to educators to use mobile learning environments especially to follow the progress of students.

Chen (2020) examined the use of mobile devices as a composing tool and the use of mobile technologies in music education. The study was conducted with 159 middle school students. Students were given six weeks of lessons on pop music, hip-hop, jazz and rock genres. For the next six weeks, they used GarageBand application to compose according to the styles they learned. As a result of the study, it was determined that the use of mobile applications had a positive and significant effect on students' motivation. According to the teachers' opinions, the use of mobile applications increased the learning speed of the students.

Chung and Wu (2019) developed mobile music games for preschool children and observed their effects on children. The contents of the prepared mobile music games include rhythm, interval matching, pitch recognition, melodic pattern improvisation. The researchers collected data through observation, video recordings and data records of tablets. As a result of the study, it was determined that music applications provide children with musical experience and at the same time support them to bring their musical knowledge and skills to a higher level.

Chong (2019) examined the effectiveness of the music theory application he developed on the subject of chord connections. With the application called Harmonia-on-the-Go, designed as a personal learning tool, students can work on chord connections anywhere and receive feedback. The study was conducted with 37 students. It took 5 weeks for the students to use the mobile application. The test was applied before and after the application usage. As a result of the research, it was concluded that the rate of correct answers increased and the number of students who could not detect errors decreased by one-third.

Debevc, Weiss, Sorgo, and Kozuh (2020) examined the effectiveness of a mobile application called mySolfeggio, where solfeggio, rhythm, and theory studies can be done. Experimental design was used in the conduct of the research. As a result of the research, 66.7% of the control group students and 71.1% of the experimental group students were evaluated as good. It has been determined that the difference is especially in the elements of interval and rhythm. The effect size was calculated as small (r=0.17). It has been evaluated that the mobile application will be a good support tool in the studies of the students, especially for the basic solfeggio training.

Method

Research Model

This study was conducted based on a quantitative research perspective. Creswell & Creswell (2018) defines quantitative research as "the researcher tests a theory by specifying narrow hypotheses and the collection of data to support or refute the hypotheses" (p. 54). Accordingly, the relationship between the variables determined in the study was examined using a one-group pretest–posttest design, one of the quantitative research methods.

A one-group pretest–posttest design is "a type of research design that is most often utilized by behavioral researchers to determine the effect of a treatment or intervention on a given sample" (Allen, 2017). In this design, "the measurements of the subjects regarding the dependent variable are obtained by using the same subjects and the same measurement tools as pretest and posttest after the application" (Büyüköztürk et al. 2016, p. 201). In the experimental process, first of all, the achievement test developed by the researcher was applied to the experimental group. After the pretest application, a total of four weeks of processing was carried out with the experimental group, two days a week. In this process, the experimental group was enabled to work on the subject of Turkish music scales by using the mobile application developed by the researcher. The entire transaction process is recorded. After the process, the posttest was applied and the experiment process was terminated.

Participants

To form the participants, it was tried to reach the undergraduate students who continue their education in the Music Education Department of Gazi University in the 2019-2020 academic year. A total of 9 third-year students, 7 male, and 2 female, who participated in the study by giving a positive answer, formed the study group of the research. In the formation of the experimental group, the conditions of taking the Turkish Art Music Theory and Practice I course and being a volunteer were sought.

Data Collection Tool

An online achievement test has been developed on the subject of scale in Turkish music. All scales within the specified subject were recorded using the Logic Pro X program. A total of 200 audio recordings were made. 20 questions were determined for the draft test and the recordings of these questions were recorded on Youtube. The draft form was sent to 3 university professors who are experts in the field of Turkish Art Music and their opinions were taken.

Validity and reliability studies were carried out for the test, which was found sufficient by the experts. For this, the test was applied to 105 students studying at Atatürk University (n=51), Gazi University (n=16), and Muğla Sıtkı Koçman University (n=38) music education departments. The data of the reached student group are given in Table 1.

Table 1. Distribution of participants for the achievement test development stage

	Group	n	%
Gender	Female	61	51,9
	Male	44	41,1
Grade	3	35	33,3
	4	70	66,7
Total		105	100

As seen in Table 1, the majority of the students who participated in the test development phase were 4th-grade students and female students. The test application was carried out online under the supervision of faculty members. Students filled out the test by entering their e-mail addresses.

As a result of the test, it was determined that the item difficulty indexes were between 0.33 and 0.70. In general, a test is expected to be of medium difficulty, that is, a p-value of 0.50 (Hasançebi, Terzi, & Küçük, 2020, p. 225). Looking at the test in general, it was determined that the mean was 0.497. Accordingly, it can be said that the test has a balanced structure with medium difficulty. When the item discrimination index results were examined, it was determined that 6 items were at a low level.

For the reliability analysis of the achievement test, the Cronbach Alpha internal consistency coefficient was calculated by using the SPSS (Statistical Package for the Social Sciences) 21 program. The Cronbach Alpha reliability coefficient of the 20-item test was found to be 0.65. In the analysis performed again by removing 6 items with low item discrimination indexes, the Cronbach Alpha reliability coefficient was calculated as 0.84.

According to the data obtained, it was decided to exclude 6 items with a weak item discrimination index from the test. As a result of the analyzes made, the measurement tool consisting of 14 valid and reliable multiple-choice items related to scale in Turkish music was given its final shape.

Mobile Application

The developed mobile application consists of two main parts: learn and work. In the learn section, theoretical information about Turkish music was given, and in the work section, auditory tests related to the determined subjects were included. The preparation of the sound files was carried out with the Logic Pro X sound recording and editing program. The program is designed according to the Western music interval system. Adjusting the interval system according to the Turkish music system is done with the Tuning tab in the program. In the Western system, each semitone is in the range of 100 cents (Zarate, Ritson, & Poeppel, 2012). Thus, a tone is composed with a 200-cent interval. In the sound system of Turkish music, a tone range is divided into 9 parts, each of which is called a coma. A tone range was divided by nine and a coma was found to be in the range of 22.2 cents. With this calculation, coma calculations were made for all scales and recorded separately. While it is 440Hz la (A) sound in Western music, this frequency is used as re (D) in Turkish music. The sound recordings used in the application were prepared according to the Turkish music tuning system.

Affinity Photo and Photoshop programs were used to design the graphics related to the application. The test part is designed with four options, one of which is correct for each question. With the play button, the user can listen as much as he wants, and with the skip button, he can switch to the next question. In this way, they can listen to the wrong answer again and can move on to the next question whenever they want (Figure 1).

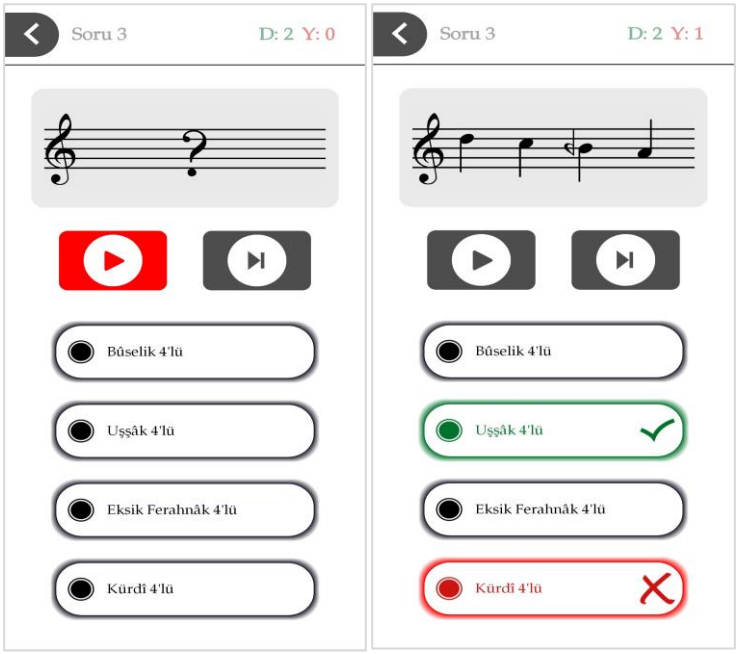

Figure 1. Test Section

Analysis of Data

Test results were entered into the SPSS 21 package program and it was tried to determine whether there was a significant difference between the scores. In the normality test, it was determined that the data were normally distributed. However, it is recommended to use non-parametric tests in studies with less than 15 samples (Bryman & Cramer, 2005, p. 145). In this study, Wilcoxon signed-rank test, which is one of the non-parametric tests, was used due to the small sample size (n=9). Although the Wilcoxon signed-rank test reveals the difference between the means, it does not calculate the magnitude of this difference. For this reason, the effect size was also calculated. The effect size (r) is calculated by dividing the z value resulting from the test by the square root of the sample number (Field, 2018, p. 403). The calculated effect size was interpreted according to the criteria of "0.10 low, 0.30 medium, 0.50 high" (Field, 2018, p. 179).

Results

The findings obtained for the solution of the research problem are given respectively. The data of the pretest results are given in Table 2.

Table 2. Pretest results

Subject	Correct Answers	Score
1	6	42,86
2	4	28,57
3	7	50,00
4	4	28,57
5	5	35,71
6	4	28,57
7	9	64,29
8	6	42,86
9	8	57,14
Mean	5,88	42,06

As seen in Table 2, the highest score obtained from the pretest results was 64.29; the lowest score was 28.57. While three subjects (33.3%) from the experimental group scored 50 and above; six subjects (66.7%)

scored below 50. The mean score of the experimental group was found to be 42.06. The data of the posttest results are given in Table 3.

Table 3. Posttest results

Subject	Correct Answers	Score
1	10	71,43
2	6	42,86
3	9	64,29
4	9	64,29
5	9	64,29
6	8	57,14
7	13	92,86
8	9	64,29
9	13	92,86
Mean	9,5	68,26

As seen in Table 3, the highest score obtained from the posttest results was 92.86; the lowest score was 42.86. While eight subjects (88.8%) from the experimental group scored 50 and above; only one subject (11.2%) scored below 50. The mean score of the experimental group was found to be 68.26.

Wilcoxon Signed Ranks Test was used to determine whether there was a statistically significant difference between the pretest-posttest mean scores of the experimental group students. The results of the related analysis are given in Table 4.

Table 4. Wilcoxon signed ranks test result

Posttest - Pretest	n	Mean Rank	Sum of Rank	z	p
Negative Ranks	0	0	0	-2,69	**0,007**
Pozitive Ranks	9	5	45		

The effect of the use of the Turkish music ear training mobile application developed within the scope of the research on the subject of scales in Turkish music was investigated. As a result of Wilcoxon Signed Ranks test conducted to determine whether there is a difference between the average of achievement test scores of the experimental group of 9 people before and after mobile application usage: the average of pretest scores before mobile application usage ($\bar{x}_{Pretest}$=42.06) and posttest after mobile application usage A significant difference was found between the mean scores ($\bar{x}_{Posttest}$=68.26) [z = -2.69, p<0.05]. The effect size calculated as a result of the test (r=0.89) shows that this difference is high. It can be said that the use of the Turkish music education mobile application by the experimental group of students has a high and significant effect on their success in scales in Turkish music. Data for the comparison of test results are given in Table 5.

Table 5. Test scores comparison

Subject	Pretest	Postest	Difference	Rate
1	42,86	71,43	28,57	66,66
2	28,57	42,86	14,29	50,02
3	50,00	64,29	14,29	28,58
4	28,57	64,29	35,72	125,03
5	35,71	64,29	28,58	80,03
6	28,57	57,14	28,57	100,00
7	64,29	92,86	28,57	44,44
8	42,86	64,29	21,43	50,00
9	57,14	92,86	35,72	62,51
Mean	42,06	68,26	26,19	62,27

In Table 5, the differences between pretest and posttest scores are given based on subjects. Accordingly, the highest increase was observed in Subject 4 (125.03%), and the lowest increase was observed in Subject 3 (28.58%). The overall average increase in the test scores of the experimental group was calculated as 62.27%. It can be said that the absence of any negative values and the increase of 28% even at the lowest rate is an indication that the use of mobile applications makes a significant contribution to scales in Turkish music.

Discussion

Digital tools designed to be used in music education offer new ways for learning-teaching environments (Waldron, 2013). Although the face-to-face education model is more suitable for music education with high interaction by its nature, digital tools designed to support learning attract students' attention, increase their focus and motivation, and thus can be effective on success (Birch 2018; Magalhães, Monteiro, Carvalho, Magalhães, & Monteiro, 2018; Upitis, Abrami, Brook, Boese, & King, 2016). Upitis and Abrami (2017) concluded that with the mobile application they developed, music students can perform more effective individual studies and thus show faster academic progress. Chong (2019) concluded that with the application of hearing and theory developed to support traditional teaching, students can practice more and their learning levels increase. Ng, Lui, and Kwok (2015) concluded that with the mobile application they developed to assist piano students in their studies, students' sight-reading, music theory, and hearing skills increased. Sabet (2018) concluded that the use of mobile music creation applications increased the level of students' learning and class participation in the subject of composing music. Khoury (2017) found that by using the mobile music application, students' improvisation techniques increased, and thus their musical creativity improved. In studies conducted with younger age groups, it has been observed that especially gamified music education applications help children acquire basic musical skills (Burton & Pearsall, 2015; Chung & Wu, 2019; de Villiers, 2018). In addition to academic success, the use of mobile application support in music education helps to make comprehensive study plans, monitor students' progress, and provide immediate comprehensive feedback (Upitis & Abrami, 2017). Because of these benefits, music teachers also think that the use of technology support in music learning contributes positively to the development of students (Upitis, Abrami, & Boese, 2016).

When other research results are examined, it is seen that mobile application-supported music education studies have positive contributions to the learning level. Other studies cited support the results obtained from this research. The mobile application, which was prepared within the scope of the research, supported the development of Turkish music hearing skills of music teaching students in accordance with its purpose.

Conclusion and Recommendations

In this research, a mobile application for Turkish music education was developed and the effect of this application on academic achievement was tested. An achievement test for Turkish music ear training was developed by conducting validity and reliability studies. This test was applied to the students forming the study group as pre-test and post-test. As a result of the analysis, a positive increase was found in the test scores of the students using the mobile application developed. This difference, which occurs according to the calculated effect size, is at a high level.

Based on the research results: encouraging the use of applications that will support learning by examining music education curricula; developing different mobile applications to support theoretical and performance skills related to Turkish music; it is recommended to plan guiding activities such as courses and seminars related to mobile application development.

Acknowledgements

This study was produced from the first author's doctoral dissertation. To review the relevant mobile application, visit: https://play.google.com/store/apps/details?id=com.ebt.musiki

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iojes
www.iojes.net

International Online Journal of Educational Sciences

ISSN: 1309-2707

A Meta-Analysis On Using 3d Virtual Worlds In Foreign Language Education*

Research Article

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To cite this article: Ozdemir, O., & Dag, K. (2022). A meta-analysis on using 3d virtual worlds in foreign language education, *International Online Journal of Educational Sciences*, *14*(4), 908-921.

ARTICLE INFO

Article History:

Received: 30.12.2021

Available online: 23.09.2022

ABSTRACT

The aim of this study was to examine the effect of using 3D virtual world applications in foreign language education on student success. A brief literature review shows that 3D virtual world applications are used in foreign language education and there are studies investigating student success. However, there is not a study using the meta-analysis method. Based on this gap in the literature, an answer was sought to the question of "Is there a significant difference in the academic achievement of the students in the experimental studies examining the effectiveness of using 3D virtual world applications in foreign language education". The meta-analysis method, one of the systematic review methods, was employed in the study. Science Direct, ERIC, Taylor & Francis, EBSCO, JSTOR, DergiPark, Google Scholar, CoHE Thesis databases, which are frequently used in the field of educational sciences, were scanned. A total of 47,168 studies were reached in the first search using the pre-determined keywords. The dependent and independent variables of the studies were examined individually. Studies in which the dependent variable was the student success and which used 3D virtual world applications in foreign language teaching were identified. Then, based on the inclusion and exclusion criteria. a total of 16 studies were included in the meta-analysis. The studies included in the meta-analysis were analyzed using the Hedges' g value, and as a result, it was found that the overall effect size (d=1.190) had a large positive effect, which indicated that using 3D virtual world applications in foreign language education had a positive effect on student success. With its re-designable structure, 3D virtual worlds can be considered as a significant alternative in foreign language education. The courses that will be designed by diversifying the environments in 3D virtual world applications can help students in the foreign language learning process.

Keywords:

3d virtual worlds, Foreign language learning, 3d virtual worlds and success, Meta-analysis

* This article is derived from a part of Kubranur DAG's Master thesis entitled "A meta-analysis study for the use of 3D virtual worlds in foreign language teaching", conducted under the supervision of Oguzhan OZDEMIR

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DOI: https://doi.org/10.15345/iojes.2022.04.002

Introduction

Today, the easier and cheaper access to technological tools have paved the way for the internet and related technologies to become widespread. With the rapid inclusion of the Internet in education, the experts have become interested in this issue and as a result a large number of studies have started to be conducted. The field of foreign language education have also had its share in that computer and internet-based technologies started to be used in foreign language education.

Foreign language learning is a skill containing several steps and involving a particular amount of time and practice to acquire. One of the findings in the literature is that with traditional language teaching and learning methods, students have some problems in the application and testing stages and cannot move to the final stage or have great difficulty. The development of computer technology in the 1960s led to the establishment of various settings for beginner learners to have speaking experience, and these settings have been improved with today's computer and internet-based technology (Seferoğlu, 2005). The studies in the literature reveals that there are different applications that have emerged in parallel with the development of technology to facilitate foreign language teaching. 3D virtual world applications appear as one of these developing technologies (Özkul and Girginer, 2014). Virtual worlds are systems that one can access online, allowing numerous users to interact through an interface and perform various operations (Dinçer, 2008). These systems can also be described as a computer-based display that creates a sense of reality in the environment and allows an interactive use of the environment, although users are not physically present in the environment (Schroeder, 1996). This feature of virtual worlds can be considered as one of the reasons why 3D virtual world applications are studied in this study since virtual worlds allow individuals experience environments where learning is not physically suitable whenever and wherever as well as contributing to the diversification of the foreign language learning environment and increase the exposure time (Milton, 2012). In this sense, Abal (2013) stressed that virtual world applications in English language teaching have a significant potential, which was recently included in the agenda of the experts.

3D virtual worlds, which have different definitions proposed by different researchers, is evaluated based on their features. In these definitions, researchers emphasized the use of character, possibility of rediscovery, independence from geographical location, presence of visually imitative environments, augmented learning quality and openness to collaborative learning (Bainbridge, 2007; Squire & Jenkins, 2004; Jarmon, Traphagan, Mayrath, & Trivedi, 2008).

Considering its designable and re-buildable structure, 3D virtual world applications have significant potentials in foreign language teaching and can contribute to increasing students' social interactions and cultural involvement (Von Der Emde, 2001). Accordingly, the effect of education carried out in social or educational environments on success has started to be investigated. The researchers have investigated the process in the environments designed in accordance with the nature of different foreign languages. For example, they tried to teach Mandarin Chinese by visualizing it using 3D virtual world applications and examined the changes and developments of the students in this process.

The Problem of the Study

Studies on 3D virtual world applications revealed that these applications have features such as providing the opportunity to learn through virtual experiences that make individuals feel as if they were in a real environment (Türel & Gur, 2012), facilitating learning, supporting permanent learning (Thakral, Manhas & Kumar, 2010), contributing to the elimination of difficulties and enhancing learning and teaching processes. It is stated, in terms of foreign language education, that these features have the potential to support the interaction between the participants, and to contribute to student success (Ghanbarzadeh, 2018).

Virtual world applications were examined in different dimensions such as students' self-efficacy perception, social presence levels, motivation and attitudes, the effect of using different teaching techniques, the advantages and disadvantages of using virtual worlds in education (Yılmaz et al., 2014; Tüzün et al., 2016; Güler & Erdem, 2014).

A brief literature review shows that although there are several studies investigating student success in foreign language education using 3D virtual world applications, there is not a meta-analysis study on the effect of using 3D virtual world applications in foreign language education on student success. For this reason, this study tried to examine the effect of the use of virtual world applications, which can be used in many different ways, on the academic success of students in foreign language education, by examining the overall effect size through the meta-analysis method. Accordingly, the problem of this study was to examine the effect of using virtual world applications in foreign language education on the academic success of students using meta-analysis method.

The Purpose and Significance of the Study

The aim of this study was to examine the effect 3D virtual world applications, one of today's popular technologies, in foreign language education on student success through meta-analysis method. The answer to the question "Is there a significant difference in the academic achievement of the students in the experimental studies examining the effectiveness of using 3D virtual world applications in foreign language education?" was sought in the study.

As a part of the study, meta-analysis method was used in order to reveal the effect of using 3D virtual world applications in foreign language education on the academic achievement of students. Examination of the studies with the meta-analysis method and calculating the general effect size can provide useful ideas to the researchers willing to work in this field and contribute to the applications to be developed.

Method

Research Model

In this study, the meta-analysis method, one of the systematic analysis methods, was used. The main aim of the meta-analysis method is to combine data reported in different studies on the same subject and to reach a general conclusion (Dinçer, 2014).

Universe and Sample

In the study, the studies on the use of 3D virtual world applications in foreign language education were examined through meta-analysis. Accordingly, the following keywords were used to reach the related studies: 3d virtual worlds, language learning in 3d virtual worlds, 3d virtual worlds & achievement, 3d virtual worlds, and 3d virtual worlds in a language learning. As a result, a total of 47,168 studies, which were the universe of this study, were obtained. In the selection of the sample, the limitations of the study were taken into consideration. Accordingly, based on the inclusion criteria, 16 studies in which 3D virtual world applications were used in foreign language education were selected as the sample.

Data Collection Procedure

The procedure followed in the performance of the meta-analysis method is shown in Figure 1.

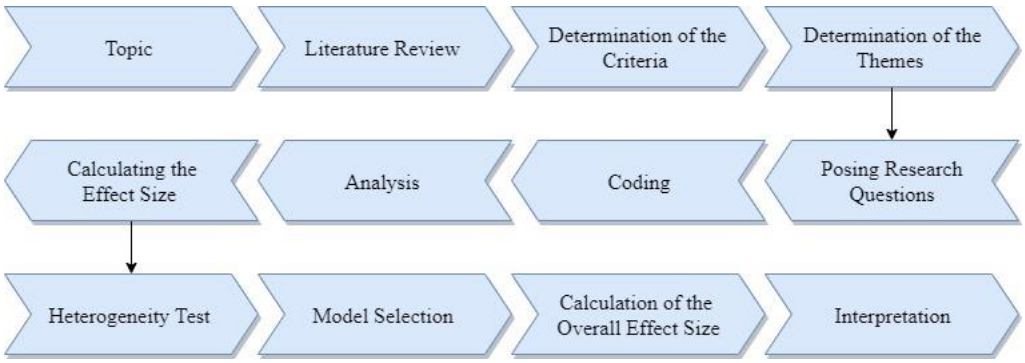

Figure 1. Meta-Analysis Process (Dinçer, 2014)

The Databases

On the basis of the research questions, articles and theses related to the investigated topic were searched in 8 databases: Google Scholar (2020), ERIC (2020), JSTOR (2020), Taylor & Francis (2020), DergiPark (2020), EBSCO (2020), Science Direct (2020), CoHE Thesis (2020). As shown in Table 1, the keywords "3d virtual worlds in a language learning", "3d virtual worlds & achievement" were used to scan the databases. The first search in these databases was carried out on November 1, 2020, and the final search was carried out on April 15, 2021. The databases were constantly checked through periodical scans during the process until the data were analyzed. These databases were selected due to the fact that they are frequently used in the field of educational sciences and provide electronic access to all of the studies.

Table 1. Analysis of the Keywords On the Basis of the Databases.

Keyword	Database	Result
3d virtual worlds in a language learning	Google scholar	4080
	EBSCO	2607
	ERIC	1801
	Taylor & Francis	8642
	JSTOR	744
	DergiPark	1170
	Science Direct	1537
	CoHE Thesis	1
Total		20.581
3d virtual worlds & achievement	Google scholar	20.200
	EBSCO	632
	ERİC	274
	Taylor & Francis	602
	JSTOR	850
	DergiPark	2.258
	Science Direct	1771
	CoHE Thesis	0
Total		26.587

Inclusion and Exclusion Criteria

The inclusion criteria in the study was as follows:

Criterion 1: In order to calculate the effect size, experimental method needs to be used in the studies, experimental and control groups should exist, the dependent variable should be academic achievement, and the independent variable should be a 3D virtual world application.

Criterion 2: In order to calculate the effect size, descriptive data on the experimental and control groups of the studies are needed. For this reason, the values presented below should be included in the experimental and control groups:

- Sample Size (N)
- p value
- Arithmetic Mean ($\bar{x}$)
- F value
- T
- Z

Criterion 3: Studies should be accessible in Google Scholar, ERIC, JSTOR, Taylor & Francis, DergiPark, EBSCO, Science Direct, CoHE Thesis databases, which are frequently used in the field of Educational Sciences.

Criterion 4: Studies should be accessed through the keywords "3d virtual worlds", "language learning in 3d virtual worlds", "3d virtual worlds & achievement", "3d virtual worlds", "3d virtual worlds in a language learning".

Studies that did not meet these criteria were excluded in the study.

The Coding Procedure

In meta-analysis studies, the researcher decides the selection criteria of the studies and the variables to be used, which may sometimes influence the objectivity of the study. In order to select the studies to be included in the meta-analysis and to contribute to the objectivity of the research, the features presented in Table 2 were used in the selection/elimination processes that provide an idea about the identity, content and data of the studies.

Table 2. The Form and Section Contents Used in the Study

Section and content of the coding form	
Identity of the Study	• Assigned Number • Title • Author(s) • Publication Year • Publication Type
Content of the Study	• Used virtual world application • Target language • The environment used in the virtual world • Level • Application time
Data	Statistical data sought after in the Experimental and Control groups • F • N • x • p • Z

Data Analysis

The dependent and independent variables and effect size (Cronbach's Alpha, Hedges' g) of the studies were examined, respectively.

Dependent Variable of the Study

The dependent variable of this study was the academic achievement of the students. Table 3 shows the dependent variables of the studies included in the meta-analysis. It can be seen that different concepts were used for academic achievement.

Table 3. The Dependent Variables of the Studies Included in Meta-Analysis

The Studies included in the Meta-Analysis	The Dependent Variable used in the study
(Güzel & Aydin, 2016); (Alhajya, 2018); (Lan & Kan, 2016); (Chen, 2020); (Canto & Jauregı, 2013);	Oral communication performance
(Shahri & Ashraf, 2016); (Levak & Son, 2016);	Listening and speaking Skills
(Kruk, 2014);	Grammar
(Jacob, 2012); (Chiang & Yang, 2014);	Academic Achievement
(Toral, 2013);	Language use performance
(Lan & Lyu, 2019); (Abdallah & Mansour, 2015);	Writing Skill
(caZheng & Young, 2010);	Task Performance
(Lan & Fang, 2018);	Contextual Vocabulary Learning
(Wang & Calandra, 2012)	Effective practice skill
(Canto & Jauregi, 2017)	Learning activities

Independent Variable of the Study

The independent variable of the study was 3D virtual world applications used in foreign language education. Thus, the studies in which foreign language education was conducted through these platforms were examined in the study. Table 4 shows the independent variables of the studies included in the Meta-Analysis. It was found that the effectiveness, comparison of the application and pre-task planning effectiveness were mostly selected as independent variables in the studies.

Table 4. The Independent Variables of the Studies Included in Meta-Analysis

The Studies included in the Meta-Analysis	**The Dependent Variable used in the study**
(Güzel & Aydin, 2016; (Jacob, 2012); (Kruk, 2014); (Lan & Kan, 2016); (Shahri & Ashraf, 2016); (Toral, 2013); (Wang & Calandra, 2012); (caZheng & Young, 2010); (Canto & Jauregı, 2013); (Abdallah & Mansour, 2015); (Chiang & Yang, 2014);	The effectiveness of the used 3D virtual world
(Canto & Jauregi, 2017); (Levak & Son, 2016);	The comparison of a different application with a 3D virtual world (Skype-Video recordings)
(Cheng, 2020)	Pre-task planning effectiveness

Effect Size

Effect size is a statistical value that allows researchers to observe how much the results obtained by examining the sample differ and deviate from the null hypothesis (Cohen, 1994; Vacha-Haasse & Thompson, 2004). This value, which researchers use to interpret their findings, is employed to investigate whether the used method, experiment or data collection tools such as tests or questionnaires are effective. The effect size can be broadly defined as the quantitative differences between the null and alternative hypotheses.

In the study, effect sizes were calculated based on the Hedges' g value. Statistical significance level was determined as 0.5 and studies were evaluated by making appropriate classifications. Determining the classification level and ranges facilitate the researcher to interpret the significance level. The classification of Cohen's d and Hedges' g values, which are among the most preferred effect sizes in the literature, is presented in Table 5.

Table 5. The Classification of Effect Size

Effect Size Classification (Cohen' d , Hedges' g)	
d, g= between 0.20 and 0.50	Small
d, g= between 0.50 and 0.80	Medium
d, g= 0.80 and above	Large

Findings

In this section, the findings of the meta-analysis on the use of 3D virtual worlds in foreign language education are presented. The research problem of the study was "Does foreign language education in 3D virtual worlds have an effect on students' academic achievement?" In order to answer this problem, analyzes were performed on the studies included in the study. The effect sizes of the studies were calculated using the Hedges' g value, heterogeneity test was performed and the random effects model was employed.

Examination of Publication Bias of Studies

In meta-analysis, first publication bias need to be examined (Kış, 2013). Therefore, the funnel chart method was used in this study to examine publication bias. In order to interpret the funnel plot, the effect size values of the studies are required. While the Y axis shows the standard error values of the studies, the X axis demonstrates the effect sizes of the studies. In order to argue that there is no publication bias, the overall effect sizes of the studies should be distributed symmetrically around the vertical line in the middle and the standard error value should be placed at the end of the funnel with close to zero (Borenstein, Hedges, Higgins, & Rothstein, 2009). The fact that the studies are located symmetrically in the middle region and are close to the effect size value indicates that there is no publication bias (Şad, Kış, Demir, & Özer, 2016).

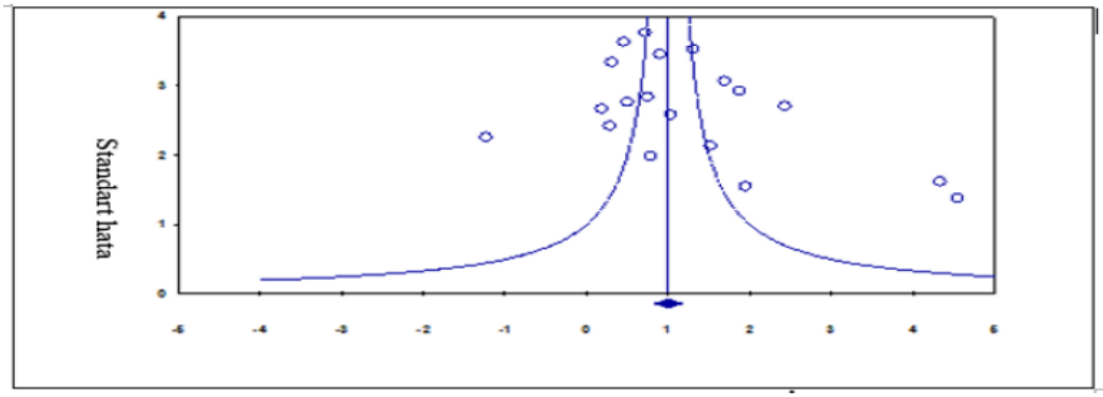

Figure 2. Funnel Plot for Publication Bias

As seen in Figure 2, there was no symmetry and there was a condensation at the top of the plot. Accordingly, it was concluded that there was no publication bias in the studies.

Investigation of Individual Effect Sizes of Studies

In order to obtain the overall effect size in the meta-analysis, the effect size of each study should be calculated. It was found that some of the data (sample size, p value) used by the researchers in the studies included in meta-analysis were the same. However, the researchers did not report all of the data in their studies since the data collection tools used in the studies were different. For the studies in which all of the data

were not reported, the researchers were contacted via e-mail. However, only one of five researchers agreed to share the data, which was then added to the study. Researchers who did not share their data expressed that this was due to university policies. As a result, effect size values were calculated for 16 studies included in this study. The effect size values are presented in Table 6.

Table 6. Statistics of Studies Included in the Meta-Analysis

Studies	**Statistics in the Studies**						
	Hedges' g	Standard error	Variance	Minimum value	Maximum Value	Z score	P value
Lan -2016	0,500	0,361	0,130	-0,208	1,208	1,384	0,166
Wang-2012	0,898	0,289	0,084	0,331	1,465	3,104	0,002
Alhajya-2018	1,866	0,342	0,117	1,196	2,536	5,458	0,000
Lan-2019	1,306	0,283	0,080	0,751	1,862	4,608	0,000
Toral-2013	0,745	0,352	0,124	0,055	1,434	2,116	0,034
Jacob-2012	0,456	0,275	0,076	-0,083	0,995	1,660	0,097
Güzel-2017	0,308	0,299	0,089	-0,278	0,895	1,031	0,302
Kruk-2014	0,181	0,374	0,140	-0,552	0,915	0,484	0,628
Shari-2016(speaking)	1,691	0,326	0,106	1,053	2,329	5,191	0,000
Shari-2016(listening)	2,428	0,369	0,136	1,704	3,153	6,574	0,000
Canto-2013	4,328	0,616	0,380	3,120	5,536	7,024	0,000
caZheng-2010	0,721	0,265	0,070	0,201	1,242	2,718	0,007
Levak-2016(English)	0,285	0,412	0,170	-0,524	1,093	0,690	0,190
Levak-2016(Croatian)	-1,232	0,441	0,195	-2,097	-0,367	2,791	0,005
Abdallah-2015	0,783	0,502	0,252	-0,201	1,781	1,560	0,019
Chiang-2014	1,943	0,644	0,415	0,691	9,206	3,018	0,003
Canto-2017	4,539	0,722	0,021	0,124	5,954	8,288	0,000
Chen-2020(Accurateness)	1,518	0,488	0,219	0,501	2,434	3,246	0,001
Chen-2020(Complexity)	1,032	0,387	0,150	0,273	1,780	2,666	0,008
Total	1,190	0,229	0,053	0,741	1,640	5,191	0,000

As shown in Table 6, the effect of 3D virtual world applications in foreign language education on academic achievement was investigated in 16 studies in which 843 participants took part. The standardized effect size values ranged between -1.232 and 4.539, and the overall effect size was calculated as 1.190. It was found that 11 of these studies indicated a statistical significance ($p<0.05$), while five of them did not report a statistically significant difference ($p>0.05$).

Homogeneity Test Results of the Studies

In the meta-analysis, whether the studies in the analysis have a homogeneous distribution is examined in order to determine the effect model to be used in interpretation stage. Fixed effects model is used when there is a homogeneous distribution. In cases where the distribution is not homogeneous, the distribution is considered heterogeneous and the random effects model is used in the analysis.

Table 7. Homogeneity Test Results of the Studies

Q value	Df (Q)	P	I^2 value
130,095	18	0,000	86,164

The homogeneity test revealed a significant difference was found among the effect sizes of the studies in which the effect of 3D virtual world applications in foreign language education on the academic achievement of students was examined (Q=130,095; p=0,00). Accordingly, it was concluded that the data did not show homogeneous distribution and thus it was heterogeneous.

The Random Effects Analysis

In this study, in which the effect of using 3D world applications in foreign language education on the academic success of students was investigated through meta-analysis, the effect size, standard error, lower and upper limit values, z score and p value were examined based on the random effects model.

Table 8. Analysis Based on Random Effects Model

Studies	Effect Size	Standard value	Variance	Lower limit	Upper limit	Z score	P value
Random Effects Model	1,190	0,229	0,053	0,741	1,640	5,191	0,000

As seen in Table 8, the data of 16 studies included in the meta-analysis were analyzed on the basis of the random effects model. The upper limit of the 0.229 standard error and 95% confidence interval was calculated as 1.640 and the lower limit as 0.741, and the effect size value was determined as 1.190. It was found that the z value was 5.191 and the p value was 0.000 ($p<0.05$), which was statistically significant.

Discussion And Conclusions

In this study, an answer was sought to the question "What is the effect of using 3D virtual worlds in foreign language education on the academic achievement of students". In order to provide an answer to this question, 16 studies were analyzed using the meta-analysis method. In order to examine and interpret the data using the meta-analysis, first the effect model to be used should be determined. In order to decide the applicable effect model, the homogeneity test was performed on the studies included in meta-analysis. The results showed that there was a significant difference. As a result, it was concluded that there was not a homogeneous distribution, that is, the dataset had heterogeneous characteristics (Q=130.09, p=.00). Accordingly, it was decided to use the random effects model in the study. In order to calculate the overall effect sizes as a part of the meta-analysis, the data of 16 studies were analyzed separately and the Hedges' g value of each study was calculated.

In order to calculate the overall effect size of the studies, the effect sizes of 16 studies were taken as the basis, and as a result, the overall effect size of the study was calculated as d=1.190. It was found that the study had a large effect size based on the effect size classification Hedges' g. The concept of effect size, interpreted by many researchers, is classified in different ways in line with its numerical value. The effect size value of this study was found to be 1.190, which was large based on Cohen's (2007) classification and very high and positive according to Thalheimer and Cook's (2002) classification. Accordingly, it was concluded that using 3D virtual world applications in foreign language education has a positive and large effect on the academic achievement of the students.

In Henderson (2012), a Chinese restaurant was established and used for teaching Mandarin Chinese words and for investigating participants' self-efficacy perceptions. It was reported that the virtual restaurant used for development purposes (Henderson, 2014) and for teaching Mandarin Chinese had a positive effect on the participants. The studies in literature (Canto, 2019; Alhajya, 2018; Shari, 2016; Chiang, 2014) show that 3D virtual world applications have positive effects on the academic achievement of students, which supports the finding of the present study.

Şimşek and Özaslan (2021) examined the effect of student-centered methods on academic achievement in English teaching through meta-analysis and found that the used methods had a positive and large effect value, which is similar to the findings of this study. Derrington and Homewood (2008) conducted a one-year study with students willing to visit other countries to acquire English speaking skills. In the eight-week part of the study, the participants were asked to produce a design in Second Life. During the study, attention was paid to create environments that could attract the attention of students willing to learn a language. An English cafe that Japanese students can use was created and it was found that students spend most of their time there. The students were asked to use the places such as shopping malls, hairdressers, and schools and to engage in dialogues according to where they were. Students willing to to learn English were provided opportunities to practice. As a result, it was found that the cultural sharing of the students who had a learning experience in realistic environments was positive and beneficial. It is observed that a large number of different environments are used and created in virtual worlds (Henderson, 2014; Hsiao, 2017; Lan, 2016).

It was also reported, in some cases, that the use of Second Life and similar 3D virtual world applications in educational processes was not effective. The individual effect sizes of the 16 studies examined in this study revealed that while a significant difference was reported in 11 of the studies, there was no significant difference in five of them. The reason for such a finding may be the selection of method, which was reported by Levak (2016) who compared 3D virtual world application and another teaching technique and reported that there was no significant possibly due to the choice of method.

In addition, in some studies evaluating 3D virtual world applications, it was found that factors such as method, material, time, internet access, and hardware deficiencies had an effect on student achievement and in some cases, they are considered as environmental problems that prevent the planned trainings from being statistically significant (Lan, 2016; Kruk, 2014).

In sum, it was concluded in this study that the use of 3D virtual world applications in foreign language education has a positive effect on academic achievement of the students.

Suggestions

- In this study, the effect of using 3D virtual world applications in foreign language education on student achievement was investigated and the effects of learning were investigated. In future studies, examining the language learning dimensions independently can increase the quality of the education.
- It was found that studies on speaking and writing skills in a foreign language were predominant. The effect of listening and comprehension skills on the academic achievement should be examined in future studies.
- A detailed examination of the environments used in educational practices according to themes can contribute to the planning and implementation of the education to be conducted in the future
- It was found that there were few experimental studies in which 3D virtual world applications were used in foreign language education. However, this study indicated that 3D virtual world applications had a large effect on foreign language education. Therefore, conducting more experimental studies may contribute to the field.

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iojes
www.iojes.net
International Online Journal of Educational Sciences
ISSN: 1309-2707

An Examination of Animated Movies within the Scope of Values Education in Basic

Research Article

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To cite this article: Sen, M., & Yener, Y. (2022). An examination of animated movies within the scope of values education in basic, *International Online Journal of Educational Sciences*, *14*(4), 922-944.

ARTICLE INFO

Article History:

Received: 21.01.2022

Available online: 23.09.2022

ABSTRACT

Nowadays, the values that societies have are tried to be transferred to children in various ways. Motion picture films are seen as an important mass media to transfer the values to children. Animated films which children prefer to watch in movie theaters have importance in this sense because children tend to take the characters whom they watch, like, and take interest in as role models. This study aims to determine which values and how often are included in animated films. For this purpose, ten Turkish-made and twenty foreign-made animated films that were watched the most between the years 2015-2020 were examined and compared in terms of the values they contain. The method of the study is qualitative, the pattern is a case study. Descriptive analysis was used while analyzing the data. As a result, it is detected that Turkish animated films contain more value and mention these values more often compared to foreign-made animated films. In this context, it is recommended that the animated films that will be produced after that should be designed to involve the values more and that different studies examining the animated films within the scope of values education should be done in order to transfer the values to the next generations in a healthier way.

Keywords:
Value education, animated films, cartoons, cinema, basic education.

Introduction

Humans have been spending their lives as social creatures and maintaining their lives as a society since their existence. Societies consider it an assignment to hand down their own norms, values, and rules to the next generations. Value is a very important concept for the welfare, integrity, and continuity of societies. Rokeach (1973) describes the value as "persistent belief in the preference of a particular form of behavior or purpose of existence over its opponents, personally or socially". Nelson (1975) stated that "value is a learned

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DOI: https://doi.org/10.15345/iojes.2022.04.003

product of the environment, and the adoption of certain values is a function of the environment". Values are a set of action standards that are spontaneously formed with people's minds in a natural period (Toku, 2002, s. 108-109). Kuchuradi (2003) states that value understandings underlie people's interpersonal relationships, decisions they make, behavior assessments. In this sense, it can be said that values have important positions in a person's life.

In a globalized world, what is important for nations to have ideal society structures is that they preserve their own values and pass these values on to future generations (Erbil and Bağcı, 2013; Topçuoğlu and Aksan, 2019). Many nations want to bring various values to their citizens. The continuity of values in the Turkish education system is an important issue. In Turkey, it is possible to directly observe the value education which is given to students in courses such as sociology, psychology, citizenship, and human rights education, education of religion and ethics, social studies, and Turkish (Ulusoy ve Dilmaç, 2014). A circular on values education was sent to governorates and schools from The Board of Education in Turkey (2010) (Cihan, 2014). This circular is intended to equip students with the values, love, responsibility, respect, tolerance, sensitivity, self-confidence, empathy, fairness, courage-leadership, being kind, friendship, helping-solidarity, cleanliness, truthfulness, giving importance to family unity, independent and free-thinking, optimism, the development of aesthetic feelings, hospitality, patriotism, doing favors, working hard, sharing, compassion-mercy, greeting, humility, conserving the cultural heritage, self-sacrifice (The Turkish Ministry of National Education, 2012). In the 2017-2018 academic year, the Ministry of National Education (MONE) made a set of changes in the field of values education along with the curriculum change. By scanning the relevant curriculum related to the subject, ten national, spiritual, and universal key values were determined, which were associated with the educational goals that wanted to be transferred to students. (Board of Education, 2017). These ten root values, which are included in all primary education programs under the heading "Our Values", are justice, friendship, honesty, self-control, patience, respect, love, responsibility, patriotism, and helpfulness. (MONE, 2018).

Also, other countries give importance to values as in the Turkish education system. Values education is considered as a character education in some countries. For instance, in the education system of the United States of America, value education is considered in this way. It is aimed to bring students in basic ethical values such as respect, justice, citizenship, responsibility towards oneself and others with the character education in America. (US Department of Education, 2020). In North Carolina, which is one of the eastern provinces of the USA, it is emphasized in the department of character education of the Student Citizenship Act (2001) that values such as courage, common sense, honesty, kindness, ambition, respect, responsibility, self-discipline, respect for school staff, service to others and good citizenship should be included in the curriculum (North Carolina General Assembly, 2001). Values such as respect, responsibility, honesty, kindness, courage, optimism, self-awareness, national and cultural identity, and harmony are wanted to be gained through the process of character and citizenship education in Singapore (Singapore Ministry of Education, 2014). In the Japan Basic Law of Education (2006), it is aimed to bring individuals values such as respect, justice, responsibility, equality of men and women, cooperation, environmental protection, and love for traditions and customs. In the German education system, it is important to teach children and young people the basic values of love, fellowship, loyalty, kindness, and truth. Values education in the Swedish education system is formed within the framework of religion and universal values. Values such as love of homeland and state, kinship, and family are prominent in South Korea. Similarly, in Malaysia, family and respect values are emphasized more. Because the majority of the population in Saudi Arabia is Muslim, ethical and moral values are prioritized in the educational system (Çarboğa, 2019). Under the heading of British values, the values of democracy, the rule of law, individual freedoms, and respect and tolerance for other beliefs are taught compulsorily in the United Kingdom (Tabak, 2019). The fact that various countries include values education in their curricula can be interpreted as a sign of the importance given to this issue.

Also in the age of information and technology, transfer and education of values have become an important matter (Uzun and Özdem, 2020). Values whose most important function is to shape social life are transferred to next generations through education and societies are formed with values (Aydın, 2011; Bobaroğlu, 2002). These values desired to be conveyed to next generations are taught by means of family, social environment, schools, and mass media (Şahin, 2019). Values, identities, rituals, and behaviors which provide the unity of societies are transferred by means of communication instruments. Information transferred through mass media is a product of information providers or culture, beliefs, values, and ideologies. Many values in mass media are consciously conveyed (Avcıoğlu, 2011).

Cinema, which is one of the mass media, is one of the most common tools in the culture industry. Cinema has become an art that finds audiences all over the world and can show them drama, tragedy, love, and hate (Akın and Yakıncı, 2013). Cinema films are a reflection of the culture and society to which they belong (Akcan and Polat, 2016). Cinema is pretty important for children in addition to addressing all segments of society. For parents, cinema has become one of the events which they prefer to make their children happy, spend time with them, reward them and make them socialize (Yazıcı and Aktin, 2018). A child, as a cinema audience, is an individual who stands in a position where a message can be sent, is open to messages, and is ready for communication. They are ready to change themselves by interpreting the new messages they receive through films, by developing manners and behavior for them. Even though they have difficulty in expressing what they see, they can perceive and comprehend. Cinema is a field that can meet the wills and needs of children in the point of satisfying their intellectual, emotional, and artistic sides (Özsoy, 2017). It is an indisputable fact that cinema, which uses many visual and auditory elements, has an impact on children by presenting more colors, sounds, movements, fiction, imagination, and emotions (Yazıcı and Aktin, 2018).

Animated films are leading among the films which are preferred by children in the movie theaters (Doğan & Göker, 2012; Radio and Television Supreme Council, 2006). 0-14 age group forms the basic audience of the animated films which are considered to be the most important entertainment tools for children on the screen and the cinema (Bursa Eskişehir Bilecik Kalkınma Ajansı, 2018). In the simplest terms, animated films, often known as cartoons in the literature, are the impression of graphics that are not essentially moving, as if they are moving in the human mind (Pikov, 2010; Singlethon, 2004). Animated films whose subjects can consist of past events and myths, fictional characters, and events can be used as a spreading tool of reflection and developing the general characteristic and culture of the society (Türker, 2011). These films are especially made in a way that will feed the interests of children, keep them curious while watching and develop their imagination (Aşılıoğlu, 2018). Animated films which can convert abstract values such as love, respect, tolerance into tangible concepts can help children learn these values. Animated films can make children experience experiences that they have not experienced in real life, and can affect their attitudes and behaviors (Aşılıoğlu, 2018; Handayani, Haryono, and Ahmadi; 2020; Tıllman, 2014). Especially for children in their growing age, animated films help them to make sense of that value by presenting values such as tolerance, justice, and love to children through case studies (Kaba, 1992).

The role of animation movies in values education is based upon the relationship between visual editing and motion in structures of the movies. Animated movies, which are visual and auditory communication tools, provide an active learning environment by elucidating complicated situations, visualizing and simplifying the symbols (Alan, 2009). Animated movies benefit educators by facilitating the teaching the upper-level abstract terms that are difficult to explain in words, such as culture and values to students (Kanar, 2019). Animated movies are flawless tools that enable transferring some messages indirectly, and some messages directly in a clear way, and are used to convey complex concepts such as values (McCloud, 1994).

Children will take the characters whom they watch, like, and are interested in as a model and imitate their behaviors because children are looking for a role model whom they emulate themselves during the

identification phase (Parkyıldız, 1999). Nowadays, media heroes take place as actors in the children's world, it can even be claimed that they are more effective role models than parents (Cesur and Paker, 2007). Children can imagine themselves in various adventures by identifying the characters they watch in films (Aşılıoğlu, 2018). This situation makes it to examine the content of what children watch.

The fact that these films are watched by pre-school students and primary students increases the importance of these films even more. Animated films, which are also used as educational materials in basic courses and various subjects at schools, can also be used in value education (Borzekowski, 2018; Daşdemir, Uzoğlu, and Cengiz, 2012; Genç, 2013; Islam, Ahmed, Islam and Shamsuddin, 2014; Kaba, 1992; Kanellidou and Zacharia, 2019; Liu and Elms, 2019; Pandey and Lenka, 2020; Vitasmoro, Chandra and Jatmiko; 2020; Xiao, 2013). In this context, the values which are in Turkish-made and foreign-made animated films need to be examined, know which values and how often they are included in these films.

This research aims to determine what values and how often are included in Turkish and foreign animated films that children prefer to watch the most in Turkish cinemas. With this purpose, answers were sought for the following questions.

1- Containing the most-watched Turkish animated films between 2015-2020;

a. What is the distribution of values?

b. What is the frequency of the values?

2- Containing the most-watched foreign animated films between 2015-2020;

a. What is the distribution of values?

b. What is the frequency of the values?

3- The most-watched Turkish and foreign animated films between 2015-2020;

a. Is there a difference between the distribution of values?

b. Is there a difference between the frequency of the values?

Methodology

Research Model

A case study design from a qualitative research method was used in this study. In qualitative research, it is aimed to realistically set forth the situations of events in their natural environment by using methods such as observation, interview, and document analysis (Yıldırım and Şimşek, 2008). Case design is an approach that put forth case themes or a situation description that collect detailed and in-depth information about multiple limited situations in real life, in a current limited system (a situation), or over a period of time through multiple sources of information (e.g., observation, interview, audio-visual materials and documents, and reports) (Creswell & Creswell, 2018).

Reviewed Documents

The documents examined in this study consist of a total of 210 animated films, 20 Turkish and 190 foreign productions, which were screened in cinemas in Turkey between 1st January 2015 and 1st January 2020 (https://boxofficeturkiye.com/, 2020). In the sample of the study, the criterion sampling method one of the purposive sampling methods was used. The criteria of the study were determined as the most-watched films released in Turkey between the years 2015-2020. The inability to access all Turkish animated films is among the limitations of the research. The animated movies to be examined were accessed through legal channels such as renting and purchasing. Screening of some Turkish-made animated movies in the cinema

was postponed because of Covid-19; therefore, these movies couldn't be accessed through legal channels. For this reason, the study was carried out with ten Turkish-made animated films. Demographic information about the animated films included in the study is presented in Table 1;

Table 1. Demographic information about the animated films

	Name	Movie duration	Year
Turkish animated films	Rafadan Tayfa Dehliz Macerası	1h 29m	2018
	Köstebekgiller: Perili Orman	1h 25m	2015
	Kral Şakir: Oyun Zamanı	1h 28m	2018
	Fırıldak Ailesi	1h 24m	2017
	Köstebekgiller 2 Gölgenin Tılsımı	1h 25m	2016
	Kuklalı Köşk	1h 20	2019
	Pırdino Sürpriz Yumurta	1h 15m	2015
	Canım Kardeşim Benim: Uzaylılar mı Gelmiş?	1h 26m	2016
	Nane İle Limon	1h 15m	2016
	Sagu ve Pagu Büyük Define	1h 20m	2018
Foreign animated films	Maona	1h 47m	2017
	Ice Age: Collision Course	1h 47m	2016
	Frozen II	1h 45m	2019
	Incredibles 2	1h 58m	2018
	Despicable Me 3	1h 29 m	2017
	Minions	1h 31m	2015
	Coco	1h 45m	2018
	Smurfs: The Lost Village	1h 30m	2017
	Cars 3	1h 42m	2017
	The Lion King	1h 58m	2019
	The Good Dinosaur	1h 33m	2016
	Toy Story 4	1h 39m	2019
	How to Train Your Dragon 3	1h 44m	2019
	Ralph Breaks the Internet	1h 52m	2019
	Finding Dory	1h 37m	2016
	The Boss Baby	1h 37m	2017
	Hotel Transylvania 3	1h 37m	2018
	Ferdinand	1h 48m	2017
	Inside Out	1h 35m	2015
	Hotel Transylvania 2	1h 29m	2015

Data Collection and Analysis

The animated movies presented in the study were analyzed descriptively through document review. The criteria used in data analysis were determined in regard to values taking part in the Values Education Directive (2012) and Curriculum (2018). The animated films examined were monitored by taking into account the determined values and were analyzed by two different experts in a period of 6 weeks. Separate tables were formed for each animated movie, and the researchers determined which values and how often they appear in these tables.

Some measures were taken by the researchers to increase the validity and reliability of the study. These measures are stated below.

At first, dialogs that are in the movies watched in the study were written down. Words, sentences, and paragraphs containing the values in the dialogues were watched again in the movie. Gestures, mimics, behaviors, symbols, and pictures expressing values during the films were included in the study by stopping

the film and taking a screenshot. Apart from the direct equivalent of some values as words or visual expressions, in cass of handling as a process, the values handled as a process were also included in the study. Following the examinations, a separate table was formed for each animated film's values, and the values and frequencies of each animated film were determined in this table. The images and expressions gathered from the papers were explicitly quoted in the findings section in order to increase the internal validity, in other words, the persuasiveness of the study. The use of only documents as a data collection instrument may be a factor that limits internal validity. The research design, study group, data collection instruments, analysis of the gathered data, and how the findings were structured are all detailed in the relevant parts to promote external validity. Four randomly selected animated films were reviewed independently by researchers and an independent researcher working on values education in order to increase the research's internal reliability, in other words, consistency. As a consequence of the evaluations, the values concluded by the researchers were compared and attempts were made to assure consistency. Later, other films that were included in the study were evaluated by a single researcher. The research data were suitably discussed in the conclusion section in order to increase the research's external reliability. It was debated among the researchers whether the results and findings section was consistent, and the general agreement was reached.

Ethical Procedures

Since the research subject is document analysis, ethical permission was not required.

Results

In accordance with the purpose of the research, the distribution of the values contained in the Turkish animated films for the first sub-problem and their frequencies are given in Table 2.

Table 2. The value distribution of Turkısh-made animated films

Values	**Animated Films**	*Rafadan Tayfa Dehliz Macerası*	*Köstebekgiller: Perili Orman*	*Kral Şakir: Oyun Zamanı*	*Fırıldak Ailesi*	*Köstebekgiller 2 Gölgenin Tılsımı*	*Kuklalı Köşk*	*Pırdıno Sürpriz Yumurta*	*Canım Kardeşim Uzaylılar mı Gelmiş*	*Nane İle Limon*	*Sagu ve Pagu Büyük Define*	***Total***
Love		+	+	+	+	+	+	+	+	+	+	10
Responsibility		+	+	+	+	+	+	+	+	+	+	10
Respect		+	+	+	+	+	+	+	+	+	+	10
Being kind		+	+	+	+	+	+	+	+	+	+	10
Conserving the cultural heritage		+	+	+	+	+	+	+	+	+	+	10
Friendship		+	+	+	+	-	+	+	+	+	+	9
Helping-solidarity		+	+	+	-	+	+	+	+	+	+	9
Cleanliness		-	+	+	+	+	+	+	+	+	+	9
Giving importance to family unity		+	+	+	+	-	-	+	+	+	+	9
İndependent and free-thinking		+	+	+	+	-	+	+	+	+	+	9
Greeting		+	+	+	-	+	+	+	+	+	+	9
Patience		+	+	+	+	+	+	-	+	+	+	9
Tolerance- sensitivity		+	+	+	-	-	+	+	+	+	+	8
Self-control		+	+	+	-	+	+	-	+	+	+	8

Courage-leadership	+	+	+	+	-	+	-	-	+	+	7
Patriotism	+	+	+	-	+	-	+	-	+	+	7
Doing favors	+	+	+	-	-	-	+	+	+	+	7
Working hard	+	+	+	+	-	+	-	-	+	+	7
Compassion-mercy	+	+	+	-	+	-	+	+	-	+	7
Optimism	+	+	+	-	-	+	-	-	+	+	6
Self-confidence	+	+	+	-	+	+	-	-	-	-	5
Fairness	+	-	+	+	-	+	-	-	+	-	5
Truthfulness-honesty	+	-	+	-	-	+	-	-	+	+	5
The development of aesthetic feelings	+	-	+	+	-	+	-	-	+	-	5
Sharing	+	-	-	-	+	-	+	+	-	+	5
Hospitality	-	+	-	-	+	-	-	+	-	+	4
Self-sacrifice	+	-	+	-	-	-	-	-	+	+	4
Humility	-	+	-	-	-	-	-	-	-	+	2
Empathy	-	-	-	-	-	-	-	+	-	-	1
Total	25	23	25	15	15	20	16	19	23	25	

Considering the values contained in the Turkish animated films presented in Table 2, it is seen that 25 of the 29 values discussed in the study are mostly mentioned in the films named Rafadan Tayfa Dehliz Macerası, Kral Şakir Oyun Zamanı, Sagu, and Pagu Büyük Define. As can be seen in Table 1, it was determined that 15 of the 29 values discussed in the study were mentioned in the animation films of the Fırıldak Ailesi and the Köstebekgiller 2: Gölgenin Tılsımı . Values in all Turkish animated films discussed in the study are love, protecting cultural heritage, responsibility, respect, and being kind. It has been observed that friendship, cooperation, solidarity, cleanliness, independent and free-thinking, greetings and patience in 90% of animated films; in 80% of them tolerance, giving importance to family unity and self-control values; in 70% of them, values of courage-leadership, patriotism, doing a favor, hard work and compassion-compassion; optimism value in 60%; the values of self-confidence, fairness, truth-honesty, development of aesthetic feelings and sharing in 50% of them; the values of hospitality and self-sacrifice in 40%; the value of humility in 20% and the value of empathy in 10% are included. When Table 1 is examined, it is seen that the values of love, owning a cultural heritage, responsibility, respect, and being kind are the values that are most mentioned in all Turkish animated films, on the other hand, the values of humility and empathy are the values that are least discussed.

Figure 1. Galata Tower (conserving the cultural heritage)

Figure 2. Billboard (tolerance-sensitivity)

Figure 3. Protect nature slogan (responsibility)

Figure 4. Hugging of Alien and Mete (love)

Figure 5. Cleaning scene (cleanliness)

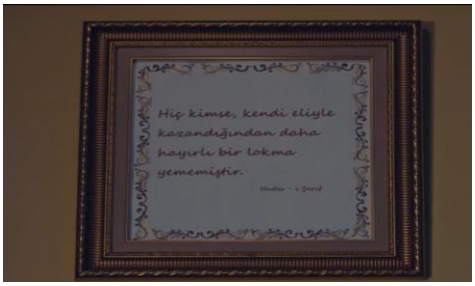
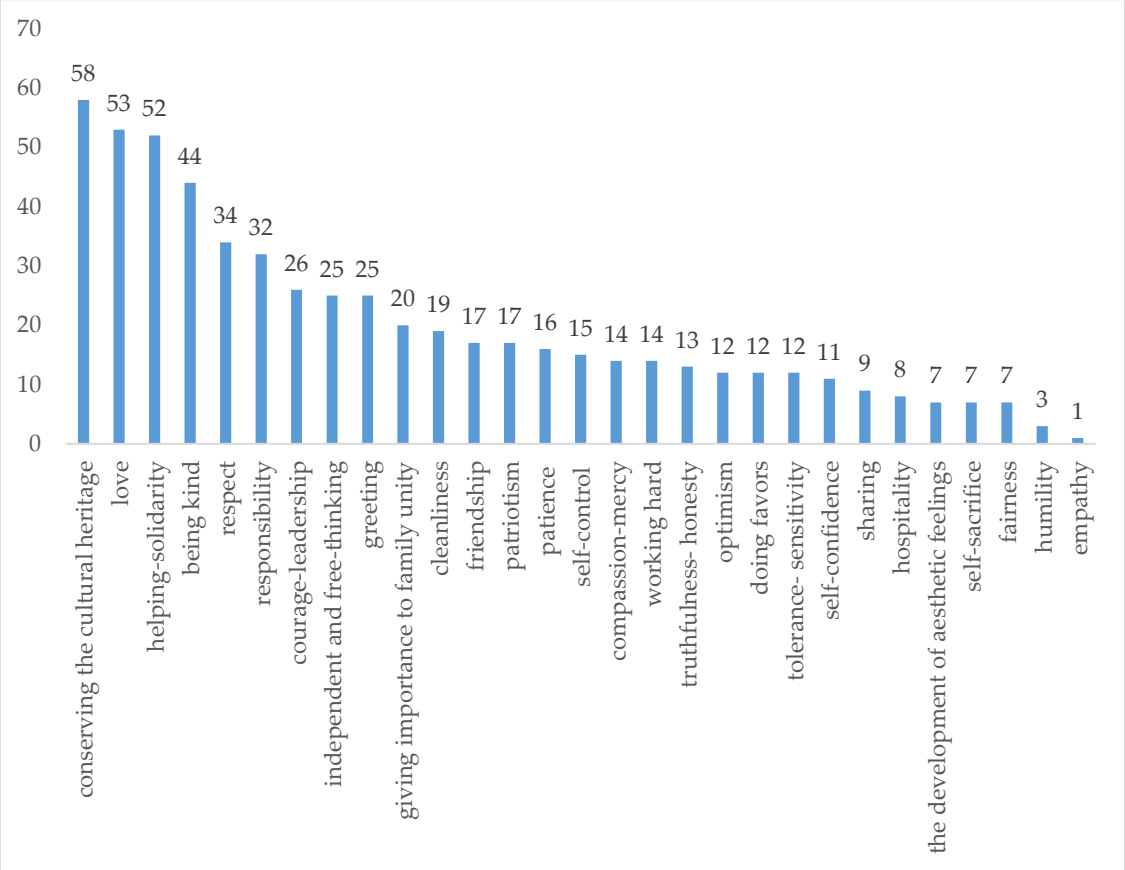


Figure 6. No one has ever eaten a better morsel than what he earned with his own hands (truthfulness-honesty)

In Sagu and Pagu film the expression said by the turtle “How does just complaining help? We must try harder, rise to the challenges and we work tirelessly to restore our world to its former condition.” emphasizes the diligence. In the Pırdino Sürpriz Yumurta film, Tarık says “Pırdino, you are our friend and you will always remain so, never forget us” to Pırdino and they say goodbye and hug each other. It indicates the friendship value. In the Rafadan Tayfa Dehliz Macerası film, while Hayri is sharing his pastry he says “It is called soothing his likely craving, haven’t you ever heard about it?” . It indicates the value of sharing. Hayri's giving food to the mouse in the vestibule is seen as animal love. The flag in the garden of the school emphasizes the patriotic value in the film Kral Şakir Oyun Zamanı. In the film Köstebekgiller 2 Gölgenin Tılsımı, while Gölge’s bag is rummaged, he says "It's a shame, someone else's bag can't be rummaged." This expression is evaluated as the truth-honesty value. In the film Kuklalı Köşk, Örs Usta says, "This house has been consigned to us, when Uncle Müşfik returns, he has to find the house as he left it." This expression denotes the value of responsibility. The sentence "Thank you very much, our brother could have been harmed if you hadn’t been there", which Müge said to the aliens in the film Canım Kardeşim Uzaylılar mı Gelmiş, indicates the value of kindness. In the film called Nane ve Limon Kayıp Zaman Yolcusu, the fact that Kaan does not use his father's computer without permission emphasizes the value of respect. Nane tells Meryem and Kaan, "Don't be late, or your families will be worried about you." This expression indicates the value of responsibility. Although Kaan burned his father's computer, his father said, "It's not important than you, don't upset yourself." This expression denotes tolerance-sensitivity value. In the film Fırıldak Ailesi, the character Tarcan returns to protect his friend when giants attack the village, this emphasizes the importance of friendship. The fact that the villagers get together and share ideas for repairing the damage caused by the giants underscores the importance of togetherness and decency.



Graphic 1. Value frequencies of Turkish animated films

When the frequency of the values contained in the Turkish-made animation films in Graphic 1 is examined, 583 value elements were found in 10 Turkish-made films. In Turkish animated films, an average of 58.3 value items per film is seen. When the data in Chart 1 are examined, it is seen that the values of protecting the cultural heritage (f=58), love (f=53), helping solidarity (f=52), being kind (f=44) are the values with the highest frequency. Being sharing (f=9), hospitality (f=8), being fair (f=7), developing aesthetic feelings (f=7), self-sacrifice (f=7), humility (f=3), empathy (f=1) values in the films were found to have the least frequency.

The findings regarding the value distribution of foreign-made animated films discussed in the research are given in Table 3.

Table 3. The value distribution of foreign-made animated films

Values / **Animated Films**	*Maona*	*Ice Age: Collision Course*	*Frozen II*	*Incredibles 2*	*Despicable Me 3*	*Coco*	*Minions*	*Smurfs: The Lost Village*	*Cars 3*	*The Lion King*	*The Good Dinosaur*	*Toy Story 4*	*How to Train Your Dragon*	*Ralph Breaks the Internet*	*Finding Dory*	*The Boss Baby*	*Hotel Transylvania 3*	*Ferdinand*	*Inside Out*	*Hotel Transylvania 2*	***Total***
Love	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	20
Responsibility	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	+	+	+	19
Helping-solidarity	+	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	-	+	+	-	17
The development of aesthetic feelings	+	+	+	-	+	+	+	+	+	+	+	+	-	+	+	+	+	+	+	-	17
Respect	+	+	+	+	+	+	+	+	+	+	-	-	-	+	+	-	+	+	-	+	15
Courage-leadership	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	-	-	+	-	-	15
Being kind	+	+	-	+	+	+	-	+	+	-	+	+	-	+	+	+	+	+	+	-	15

Self-confidence	+	+	+	+	-	+	+	-	+	+	+	-	+	-	+	+	-	-	-	-	12
Friendship	-	+	+	+	+	-	-	-	+	+	+	+	-	+	-	-	+	+	+	-	12
Giving importance to family unity	+	+	+	+	+	+	-	-	-	+	+	-	-	-	+	+	+	-	+	-	12
Self-control	+	+	+	+	-	+	-	-	+	+	+	+	+	+	+	-	-	-	-	-	12
Independent and free-thinking	+	+	+	+	-	+	-	+	-	+	-	-	+	+	-	+	-	-	+	-	11
Self-sacrifice	+	+	+	-	+	+	-	-	-	-	+	+	+	+	-	-	-	+	+	-	11
Patience	+	+	+	-	+	+	-	-	+	+	+	+	-	+	+	-	-	-	-	-	11
Truthfulness- honesty	-	+	+	+	+	-	-	+	+	-	+	+	-	-	-	-	+	-	+	-	10
Optimism	+	+	+	-	+	+	-	-	+	+	-	-	-	+	-	-	-	-	+	-	9
Greeting	-	+	-	+	-	+	-	+	+	-	-	+	-	-	+	-	-	+	+	-	9
Doing favors	+	+	-	+	-	-	-	+	-	-	-	+	-	-	+	-	+	+	-	-	8
Compassion-mercy	+	-	+	-	-	+	-	-	+	+	+	-	-	-	+	-	+	-	-	-	8
Cleanliness	-	-	+	+	-	-	-	+	-	+	-	+	+	-	-	+	-	-	-	-	7
Tolerance- sensitivity	+	-	+	-	-	-	-	-	-	-	-	-	-	+	-	-	+	+	-	-	5
Hospitality	-	+	-	-	-	+	-	+	+	-	-	-	+	-	-	-	-	-	-	-	5
Working hard	-	-	-	+	-	+	-	+	+	-	-	-	-	-	-	-	-	-	-	-	4
Empathy	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	3
Fairness	-	-	-	+	-	+	-	-	-	+	-	-	-	-	-	-	-	-	-	-	3
Patriotism	-	-	-	+	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	2
Sharing	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	2
Humility	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Conserving the cultural heritage	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
Total	18	20	19	18	13	19	6	14	17	17	14	14	10	14	13	10	11	12	12	4	

In Table 3, when considering the values contained in foreign-made animated films, it was determined that 20 of the 29 values were mentioned in Ice Age 5 films at most, and 4 of the 29 values were mentioned in Hotel Transylvania film at least. The value included in all the foreign-made animated films discussed in the study was determined as the value of love. It is stated the value of responsibility in %95 of the animated films; the values of helping-solidarity and developing aesthetic feelings in %85 of them; the values of respect, courage-leadership, and kindness in %75 of them; self-confidence, friendship, giving importance to family unity, self-control value in %60 of them; the values of being able to think independently and freely self-sacrifice and patience in 55% of them; integrity-honesty value in %50 of them; the values of optimism and greeting %45 of them; the values of doing a favor, compassion-mercy in %40 of them; the values of tolerance-sensitivity, hospitality in %25 of them; the value of diligence in %20; the values of empathy and fairness in %15; the values of patriotism and sharing in %10; the value of humbleness in 5% of them are included. Among the other findings is that the value of protecting cultural heritage is not included in foreign-made animated films. When Table 2 is examined, it is seen that the animated films Ice Age 5, Moana, Frozen 2, and Coco are the animated films that include the most values discussed in the study. It is seen that the animated films named Hotel Transylvania and Minions are the animated films that contain the least place to the values discussed in the study.

Figure 7. All animals cover the crater(helping-solidarity

Figure 8. Scene of Elsa's singing (developing the aesthetic feelings)

Figure 9. Hugging scene of Minions(love)

Figure 10. Friendship island (friendship)

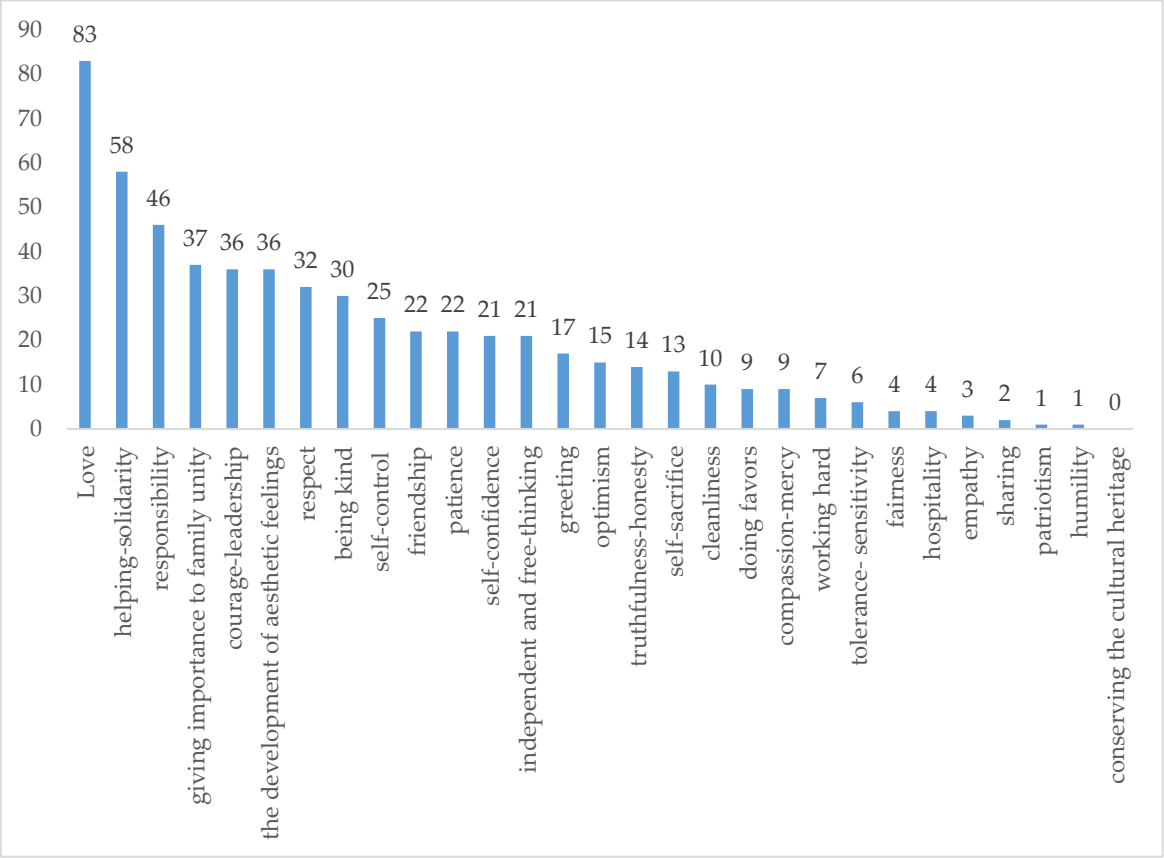
Figure 11. Dori and his family (giving importance to family unity)

Figure 12. Ferdinand's rose guard (Responsibility)

"If laws are unjust, there are laws to change them! Otherwise, it's chaos!." Helen used in The Incredible Family 2 film. This statement emphasizes the value of fairness. In the film Coco, Miguel desires to be a musician even though his family wants him to be a shoemaker and he struggles for it. This emphasizes the value of being able to think independently and freely. In the film Smurfette Lost Village, Smurfette's desire to warn the village in the forbidden forest, which was revealed because of her, about the danger, and that she takes responsibility for her mistake indicates the value of responsibility. In Cars 3, Lightning McQueen "What is important in the race is respect. I respect all these men." after the race. This expression refers to the value of respect. In The Good Dinosaur film "Sometimes you gotta get through your fears to see the beauty on the other side" the father dinosaur said to Arlo. This expression emphasizes the value of courage. In Toy Story 4, Hermione's mother said, "Hermoni honey, I'm going, come give me a hug, I love you." This expression emphasizes the value of love. In How to Train Your Dragon 3 film, after the dragons escaped, Hiccup controlled himself, didn't lose hope, and prepared a rescue plan. This emphasizes the importance of self-control value. Ralph Breaks the Internet: Wreck-it Ralph 2 emphasizes the value of cooperation-solidarity when Ralph decides to go online and find the broken part of the game in order not to make his friends

homeless due to the broken game. In The Baby Boss film, the Baby Boss says to his brother. The path to success is not a straight line. But rather a wild ride, like a ship at the sea. And you're a sea captain, taming a turbulent ocean!" This sentence emphasizes the self-confidence value. In the Inside Out film, Joy tells Sadness "You can't focus on what's going wrong. There's always a way to turn things around." It highlights the optimism value. In the Hotel Transylvania 2 film, the reporter on television says. Do not forget, kids! A real monster always shares" It highlights the value of sharing.

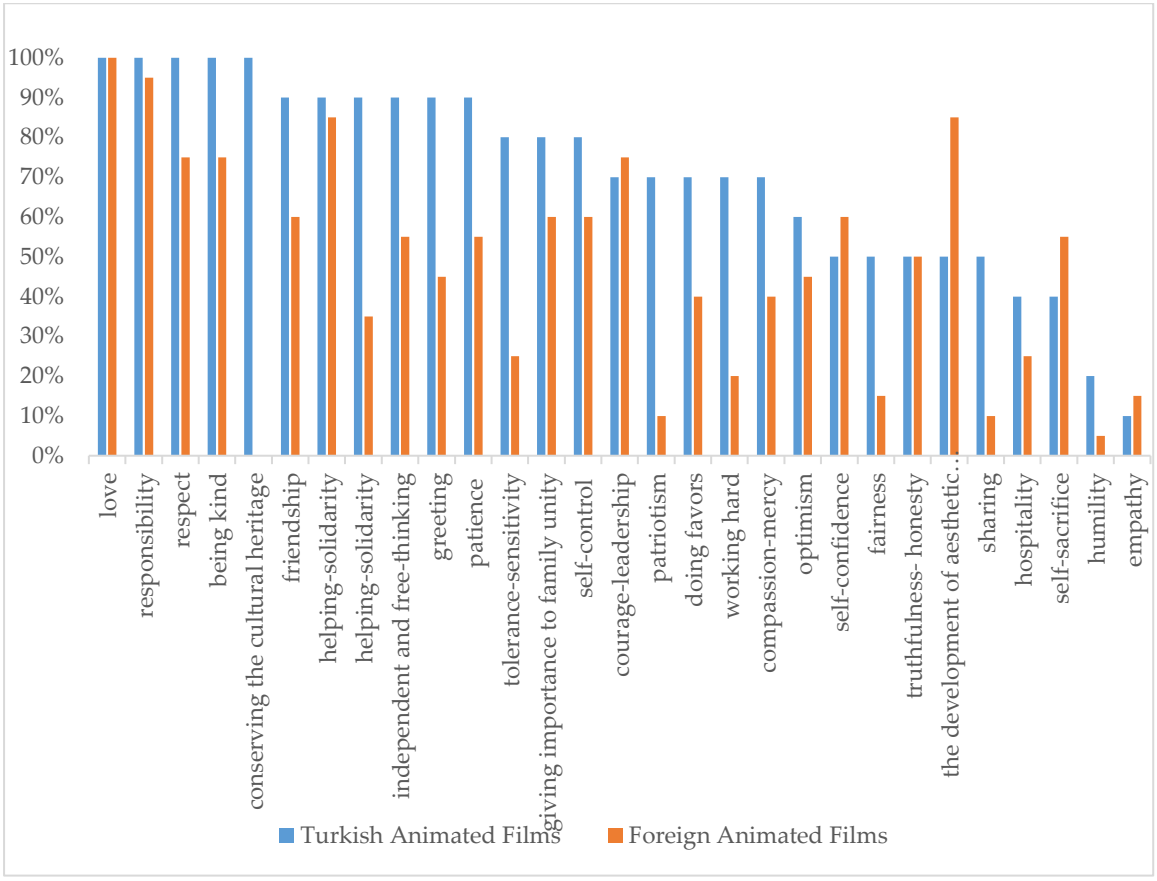
The findings regarding the frequency of values contained in foreign animated films are given in Graphic 2.



Graphic 2. Value frequencies of foreign animated films

When the data in Graphic 2 is examined, a total of 586 elements containing value have been identified in 20 foreign-made animated films. Foreign-made animated films have an average of 29.3 value items per film. According to Graphic 2, it is seen that the value with the highest frequency is the value of love (f=83). The values of cooperation-solidarity (f=58), responsibility (f=46), giving importance to a family unity (f=37), courage leadership (f=36), developing aesthetic feelings (f=36) seen in Chart 2 are among the values that are frequently studied. Doing good (f=9), diligence (f=7), tolerance sensitivity (f=6), fairness (f=4), hospitality (f=4), empathy (f=3), sharing (f= 2), patriotism (f=1), humility (f=1) values are seen to have the least frequency.

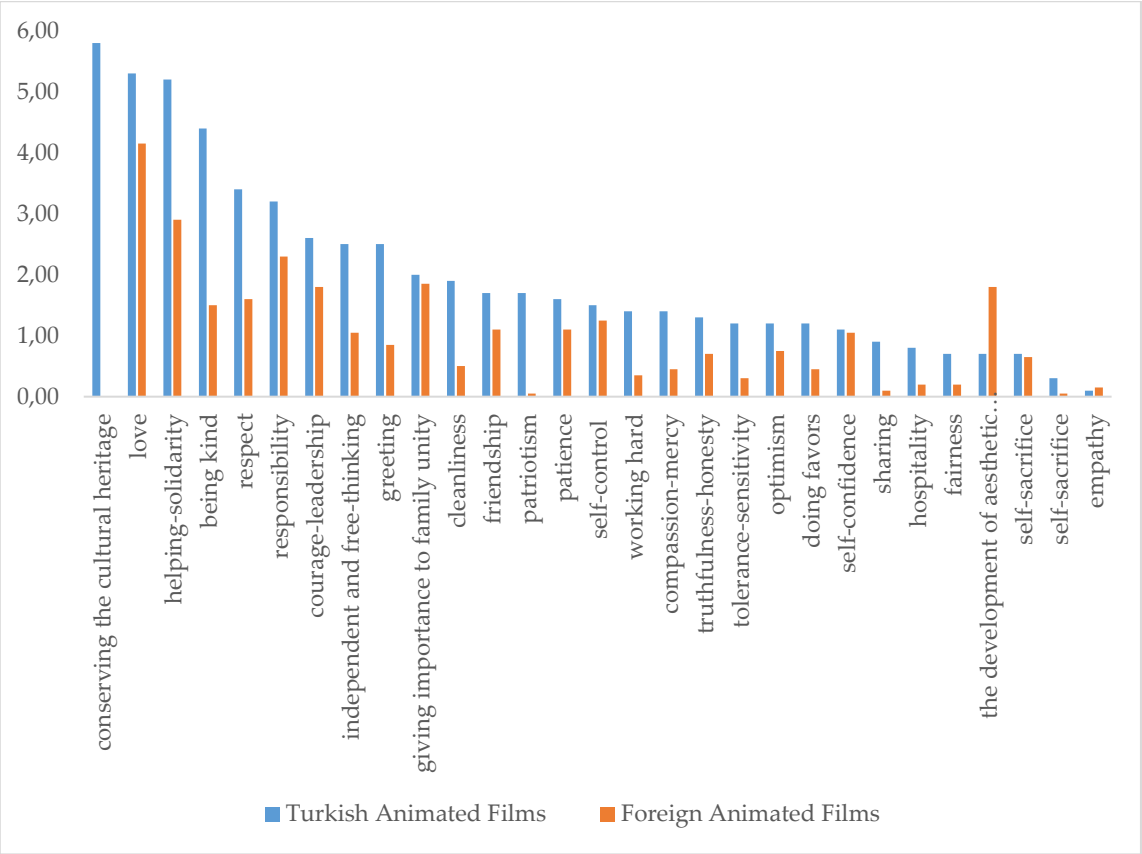
Findings regarding the values contained in Turkish and foreign animated films are given in Graphic 3.



Graphic 3. Comparison of the values contained in Turkish and foreign animated films

When Graphic 3 is examined, it is seen that only the value of love is included in all Turkish and foreign animated films. It has been determined that the values of responsibility, cooperation-solidarity, courage-leadership, truthfulness-honesty, self-confidence, optimism, hospitality, and self-sacrifice are included at close rates to each other in Turkish and foreign animated films. It is seen that while the value of protecting the cultural heritage has been contained in all Turkish-made animated films, this is not included in any of the foreign animated films. According to Graphic 3, it is seen that while the cleanliness value is included in 90% of Turkish films, it is included in 35% of foreign films. It has been determined that the value of being able to think independently and freely is included in 90% of Turkish films and 55% of foreign films. The greeting value is seen in 90% of Turkish films and 45% of foreign films. It has been detected that the tolerance-sensitivity value is in 80% of Turkish films and 25% of foreign films. The patriotism value was found in 70% of Turkish films and 10% of foreign films. Diligence value is seen in 70% of Turkish films and 20% of foreign films. The value of being fair has been found in 50% of Turkish films and 15% of foreign films. The value of developing aesthetic feelings is seen in 85% of foreign films and 50% of Turkish films. The value of sharing is included in 50% of Turkish films and 10% of foreign films. The value of humility is seen in 20% of Turkish films, 5% of foreign films, and empathy value in 10% of Turkish films and 15% of foreign films as the two least common values.

Findings regarding the value frequencies of Turkish and foreign animated films are given in Graphic 4.



Graphic 4. Comparison of Value Frequencies of Turkish and Foreign Animated Films

Graphic 4 shows the average value frequencies per film in Turkish and foreign-made animated films. When examining the results regarding the frequency of the values contained in Turkish and foreign animated films, ten Turkish-produced animated films (f= 583) and twenty foreign-made animated films (f=586) were found to have a value element. On Average 58 value items are seen in Turkish-made animated films and 29 in foreign-made films.

When Graphic 4 is examined, the value of protecting the cultural heritage has the most frequent operand in Turkish films, on the other hand, this value has never been found in foreign-made films. The value of love has also been frequently discussed in Turkish and foreign animated films. Although the value of helping-solidarity is discussed more in Turkish production films than in foreign production films, it is often included in both productions. . Values of kindness, cleanliness, greeting, patriotism, diligence, compassion-mercy, tolerance-sensitivity appear in Turkish animated films more than foreign-made animated films. On the other hand, the value of developing aesthetic feelings is more seen in foreign-made films than in Turkish-made films. The values of responsibility, giving importance to family unity, self-control and self-confidence have been handled closely in Turkish and foreign-made films. The values of empathy, humility, sacrifice, fairness and hospitality are values that have a very low frequency in both Turkish and foreign-made films. It is seen that all values are handled more often in Turkish-made animated films, except for the value of developing aesthetic feelings.

Discussion and Conclusion

When the results of the value distribution of Turkish-made animated films are examined, it is seen that the values of love, responsibility, respect, being kind, and protecting the cultural heritage are included in all animated films. Values such as friendship, solidarity-solidarity, cleanliness, caring for family unity, the ability to think independently and freely, greeting, patience, tolerance, self-control are seen in the vast majority of films. The structure of Turkish society can be linked to the high distribution of values in Turkish-made

animated films. The Turkish is a society characterized by a collective consciousness paying attention to living together and the welfare of society (Aydın 2019; Curkan, 2019). Some values, such as solidarity-solidarity, respect, love, being kind, caring for family unity, greeting, and tolerance, become more prominent as a result of this situation. It's therefore understandable that these principles, which are at the forefront of society, are reflected in the animated films that are made. However, the values of empathy, humility, hospitality, and fairness are low in Turkish-made animated films. Because these qualities are not widely diffused in animated films, they may have difficulty being transferred and consolidated in the future.

In support of the result of the study, Şahin (2019) found that all of the cartoons in the study that were produced in Turkey contained the values of love, respect, responsibility, and national culture. Similarly, Karakuş (2016) has come across cultural heritage elements in every episode of his cartoon Maysa and Bulut. Akinci (2013), in his study, found the value of kindness (being polite) in all Turkish-made cartoons. Sevim (2013) found the values of love and responsibility in Turkish production cartoons in all of the films in his study. According to Sadioglu et al. (2018) in their study, they did not encounter the values of love, responsibility, and respect in most of the sections. These results are in contradiction with the results in this study. In the studies mentioned, it is seen as a point of attention that values such as empathy, modesty, and hospitality are not taken into consideration.

The values of protecting cultural heritage, love, cooperation-solidarity, being kind, respect, and responsibility have been found to be frequently discussed values when the results for the frequency of values contained in Turkish animated films are examined. In terms of the introduction and transfer of cultural heritage items, the fact that the value of protecting cultural heritage is the most often used value is particularly important. It has been determined that the value of protecting cultural heritage is handled visually in most animated films. The use of cultural elements in the transitions between scenes, in the background photos, in the jewelry used, in the game played may have caused the value of protecting the cultural heritage to come to the fore. When the relevant literatüre is reviewed, it is indicated that the values such as love, helpfulness, respect, protecting the cultural heritage, kindness, solidarity have been handled more frequently (Akıncı, 2013; Çetin, 2018; Güven and Akıncı, 2014; Sadioğlu et al., 2018; Şahin, 2019; Şentürk and Keskin, 2019). This situation supports the results of the study.

Sharing, hospitality, fairness, developing aesthetic sensibilities, self-sacrifice, humility, and empathy are values that are rarely seen in Turkish animated films. The low distribution of these values, as well as the fact that they are not dealt with frequently, are seen as significant deficiencies. In general, these qualities are not given enough importance in Turkish animated films. It has been claimed in support of this position that the values specified in similar research are lower or not included at all (Yener, Yılmaz and Şen, 2021; Kılınç, 2013; Sadioğlu et al., 2018; Şahin, 2019; Şentürk and Keskin, 2019).

When the results of value distribution of foreign-made animated films are examined, it is remarkable that some certain values have been highly distributed. Since love, helping-solidarity, respect, kindness values are globally accepted and known, they can be distributed much in foreign-made animated films (Rokeach, 1973, Schwartz, 1992). The high distribution of courage-leadership value may be due to the fact that a heroic story is discussed in most of the films. It is noteworthy that the value of developing aesthetic feelings is included in most of foreign-made animated films. This situation can be explained by the fact that foreign animation production companies are musically and aesthetically evolved, have been making animated films for many years, and are technologically advanced (Pikkov, 2010; Türker, 2011). When the relevant studies are examined, it is seen that honesty, friendship, love, helpfulness, courage, kindness, respect, and responsibility values are encountered (Akıncı, 2013; Anggara, Santosa and Udayana, 2019; Demir, 2019; Dumova, 2007; Gülden, 2015; Korukcu, Güngör and Ardahanlı, 2015; Sevim, 2013; Şahin, 2019; Song and Zhang, 2008; Yener et al., 2021). This supports the result of this study. It is significant that this study involves more values than

the other studies do. The value of developing aesthetic feelings is seen in almost all foreign-made films, but no findings related to this value have been found in other studies.

When the results of the study of the frequency of values contained in foreign-made animated films are examined, it is seen that the value of love is the most frequently handled value. It has been determined that the values of heşping-solidarity, responsibility, giving importance to family unity, developing courage, and aesthetic feelings are values that are often handled in foreign-made animated films. Frequent handling of these values can be associated with their high distribution.

The fact that the value of love is the most handled one can be associated with the personality of the main character in foreign-made animated films. Generally, main characters have loving personalities. This can cause the value of love to come to the forefront. In foreign-made animated films mostly a heroic story takes place. Main characters more often take on saving, protecting, and providing the unity tasks. Hereby the values of courage and responsibility are handled frequently. Another noteworthy point in the study is that music and dances are very often included in foreign-made animated films. It can be said that this situation positively affects the value of developing aesthetic feelings. Although the value of giving importance to family unity is not highly distributed, it is seen as a frequently discussed value. In support of the results of the study, Demir's (2019) study shows that the value of cooperation- solidarity is often included in foreign-made cartoons. In his study, Kanar (2019) stated that the values of responsibility, solidarity, and love are included in the film Cars 1, and these values are conveyed as a behavior rather than expressed verbally. Korukcu et al. (2015) found in their study that the values of helpfulness and responsibility are frequently included in the animated films examined. Akıncı (2013) found that the values of responsibility and cooperation are discussed at high frequency in the foreign-made cartoons he examined in his study. In his study, Kılınç (2013) found that the values of responsibility, helpfulness, and love of animals were included at high frequency in the foreign-made cartoon named "Pocoyo". These findings support the results of the study.

Cleaning, kindness, compassion-mercy, hard work, tolerance-sensitivity, justice, hospitality, empathy, sharing, patriotism, and humility have relatively low frequencies in foreign animated films, according to the current study. It has been observed that the value of protecting cultural heritage is not mentioned at all. According to Demir's (2019) research, patriotism, Turkish culture, and hospitality are not adequately represented in foreign films. Similarly, in Kanar's (2019) study, it was found that the values of patriotism and protecting the cultural heritage were never seen in the film called “Cars 1”. According to Korukcu et al. (2015) found in their study that the values of diligence, empathy, and tolerance were included less in the foreign animated films which are studied. In the study of Kılınç (2013), a value element of justice and empathy was found, and no value was found for national values. These findings support the results of the study.

When the results of the comparison of the value distribution in Turkish and foreign animated films are examined, the values of protecting cultural heritage, cleanliness, greeting, being able to think independently and freely, tolerance-sensitivity, patriotism, sharing, and being fair have a significant difference in the distribution in Turkish animated films compared to foreign animated films. In Turkish animated films, these values are more prominent. It can be said that these values are dominant in the Turkish society structure. This can be the reason of the higher distribution of these values in Turkish animated films. The value of developing aesthetic feelings shows a serious distribution difference in favor of foreign-made animated films compared to Turkish-made animated films. In this respect, it may be claimed that foreign-made animated films place a greater emphasis on aesthetics than Turkish-made animated films. In addition, there are more musical and visual components in foreign-made animated films, which is a significant aspect to consider.

Values showing high and close distribution in Turkish and foreign animated films are values of love, responsibility, being kind, respect, cooperation, solidarity, courage-leadership. The fact that these values are universal values and these values are encountered in almost every society can be shown as the reason for these

values to show the close distribution in animated films. In this context, it can be said that some values are noteworthy in every culture. The values showing similar and low distribution in Turkish-made and foreign-made films are the values of empathy, humbleness, and hospitableness. It is a significant result that these values show the low distribution in both kinds of films. This can cause that these values cannot be conveyed to the audience in both Turkish-made and foreign-made films.

When the results of comparing the distribution of values in Turkish and foreign-made animated films are examined, it is seen that the values in Turkish-made animated films show a more balanced and high distribution. In this context, it can be said that Turkish-made animated films are richer in terms of value distribution. Similar to these results, Demir (2019) found that there is a greater distribution of value in Turkish-made cartoons compared to foreign-made cartoons in his study. When other studies are examined, it is seen that there is no distinction between Turkish and foreign production in animation/cartoons, and more cartoons were examined.

When comparing the frequency of values in Turkish and foreign animated films, it can be concluded that the average frequency of values in Turkish-made animated films is as high as in foreign-made animated films. This demonstrates that the values highlighted in the study are handled more frequently in Turkish-made animated films. When the frequency of values in Turkish and foreign animated films is compared, it is seen that all values, except for the value of developing aesthetic feelings, are more common in Turkish animated films than in foreign animated films. This situation shows parallelism with the difference in value distribution.

The value of love is frequently discussed in both Turkish and foreign-made films. Although Turkish films use the values of love, helping-solidarity, responsibility, courage-leadership more than foreign films, they are commonly used in both. In this context, it may be claimed that in both animated films, certain values are prioritized. Empathy, humility, self-sacrifice, hospitality, fairness, and sharing are values that are rarely seen in Turkish and foreign animated films. The fact that these values have a low distribution and frequency indicates a negative situation. In light of this, it is reasonable to conclude that these values are not adequately included in both animated films. When examining at the related research in the literature, it is clear that when examining the values, there is no separation between Turkish and foreign films, and the frequencies are not individually elicited in the studies that make this distinction (Akıncı, 2013; Kılınç, 2013; Korukcu et al., 2015; Demir, 2019; Kanar, 2019). This is an important difference that distinguishes this study from other studies.

Consequently, it is seen that Turkish animated films show a richer distribution in terms of values. Besides, these values are more often used in Turkish-made films while comparing the foreign-made films. It is a remarkable result that some values are frequently used in both Turkish and foreign animated films, and some values are less used in both Turkish and foreign animated films. This situation is similar in distribution and frequency. Generally, emphasizing one or more values in films may result in the deprivation of many values of children who watch these films. In this sense, it is notable that some values in animated films are more intensified. This may cause some values to be highlighted while others are overlooked. The importance of each of the 29 values mentioned in the study are different. As a result, these values are anticipated to be adequately reflected in animated films. If some values are included in animated films, it is possible that some values will fade into the background and their lack will be seen in the future.

Implications

In the light of the findings obtained as a result of this research, the following suggestions can be offered to animation filmmakers, families, and other researchers;

• The animated films included in this research include the most-watched films released in cinemas between 2015-2020. Similar studies can be done by expanding the year range of animated films and increasing their number.

• In the research, 29 values were included in the study. Since the subject of value is a very extensive subject, different studies can be conducted in which more values are included.

• The fact that Turkish animated films are less than foreign animated films is a major deficiency. It can be suggested to the relevant institutions to increase the number of Turkish animated films.

• Studies can be conducted on the reasons for the values that are lacking in Turkish and foreign animated films. Animated films can be prepared in which these values are used more frequently.

• When reviewing the relevant literature, it was found that the majority of the studies were focused on cartoons. Other studies on value education in animated films are needed. Similar studies on animated films may be recommended to researchers.

• Animated films can be used for values education. Animated films can be made that include the values desired to be acquired as subjects.

Ethics Committee Approval:

Since the research subject is document analysis, ethical permission was not required.

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International Online Journal of Educational Sciences
ISSN: 1309-2707

The Teacher Job Satisfaction Scale – Turkish Form: Psychometric Properties and Construct Validity

Research Article

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To cite this article: Yalin-Ucar, M., & Bagatarhan, T. (2022). The teacher job satisfaction scale – Turkish form: Psychometric properties and construct validity, *International Online Journal of Educational Sciences*, *14* (4), 1049-1060.

ARTICLE INFO

Article History:

Received: 17.02.2022

Available online: 10.10.2022

ABSTRACT

Teachers' job satisfaction is an important concept that affects their job performance. The Teacher Job Satisfaction Scale (TJSS), developed by Pepe, Addimando, and Veronese (2017), consisted of nine items. The construct validity of the TJSS was tested in six countries (Netherlands, United States, Russia, China, Italy, and Palestine), and a three-dimensional structure of the TJSS was confirmed. The purpose of the current study was to investigate the psychometric properties of the Turkish version of TJSS. The data were collected from 514 teachers recruited in state-run primary, middle and high schools located in Turkey (59.5% females). Analyses were performed using AMOS 24 and IBM SPSS 23. Results supported acceptable goodness-of-fit indices for the three-dimensional factor structure [$\chi^2(24) = 2.680$, $p < .001$, RMSEA = 0.057, SRMR = 0.034, CFI = 0.988, GFI = 0.972, TLI = 0.982, and NFI = 0.981]. Multi-group confirmatory factor analysis showed measurement invariance across gender. The Turkish version of the TJJS ($\alpha = 0.887$), and sub-dimensions (satisfaction with co-workers, $\alpha = 0.889$; satisfaction with students, $\alpha = 0.879$; and satisfaction with parents, $\alpha = 0.914$) indicated good or excellent internal consistency reliability. The results provided strong validity and reliability evidence, in line with the previous study, showing that the Turkish version of TJSS is a psychometrically good instrument to evaluate the job satisfaction of teachers.

Keywords:
Teacher job satisfaction scale, job satisfaction, teacher, adaptation, psychometric properties, validity, reliability

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Introduction

Job satisfaction describes the extent to which all the variables required by the job performed are liked. Therefore, job satisfaction is an affective behavior and is treated as a relative feeling of like or dislike. Job satisfaction or satisfaction describes the satisfaction of the individual as a result of the combination of psychological, physiological, and environmental factors (Hoppock, 1935).

Job satisfaction refers to an employee's affective or emotional response to his or her job (Cranny, Smith, & Stone, 1992). Therefore, the individual's positive attitudes towards his job lead to job satisfaction; negative attitudes indicate job dissatisfaction (Armstrong, 2006). For this reason, it is important to understand and verify the concept of job satisfaction, which is among the antecedents of job attitude (Lambert, Hogan, & Griffin, 2007, p. 645). In this context, while attitude indicates the direction, degree, or intensity of emotion of the orientations that emerge as a result of affective state, cognition, behavioral purpose, and behavioral reaction or reactions (Miller, 1993), it also includes the concept of motivation because it leads to the conclusion that the relationship between attitude and motivation will also affect job satisfaction (Singh, Granville, & Dika, 2002; Ceylan, Sağırekmekçi, Tatar, & Bilgin, 2015). Job satisfaction describes how satisfied an employee is with the rewards she/he receives from his/her job, especially in terms of intrinsic motivation (Statt, 2004). For these reasons, it is possible to say that job satisfaction is the sum of people's feelings and beliefs about their current job (Aziri, 2011, p. 77).

Herzberg, Maunser, and Snyderman (1959) stated that when an employee's attitude is understood, that person's motivation to work is best understood. In order to understand this, they formed a dual-factor theory of job satisfaction as a result of their study. The first factor of this theory is the motivating factors (recognition, achievement, the possibility of growth, advancement, responsibility, work itself) related to the personal life of the individual and motivating factors (salary, interpersonal relations, supervisor, interpersonal relations–subordinates, interpersonal relations–peers, supervision– technical, company policy and administration, working conditions, factors in personal life, status, job security) related to non-work factors at work (Herzberg et al., 1959).

Similarly, Smith, Kendall, and Hulin (1969) defined job satisfaction as the emotion or emotional reactions of an employee in all different areas of his job, while Gruneberg (1976) similarly stated that job satisfaction is all of the feelings employees have about their job. Locke (1976) also tried to explain the nature of human's physical and psychological needs and how they could be satisfied through the mind, by emphasizing the importance of the mind and body relationship in his theory of composite job satisfaction. Maslow's (1954) theory of basic needs is the basis of all theories on job satisfaction because especially when the profession is a main source of satisfaction if the main motivations are met in the context of work and career when it comes to professionally related needs such as meeting needs, satisfaction with the profession has a function of the mismatch between personal needs and the perceived potential of the profession to meet the needs (Kuhlen, 2008). 1963; Worf, 1970). If important motives are answered as part of work and career, satisfaction with occupation should be a function of the gap between the needs of people and the occupation's perceived potential for satisfying needs, especially among those for whom occupation is a main source of satisfaction (e.g., men rather than women) and in the case of occupationally relevant needs, such as need achievement.

In summary, job satisfaction is defined as matching one's needs with the perceived potential of the job (Kuhlen, 1963) to meet one's needs, while according to Worf (1970), it is defined as meeting the needs. Thus, based on Maslow's theory, job satisfaction can be defined as 'meeting an employee's desired needs within the framework of physical and psychological variables'.

Within the scope of this study, based on the dual-factor theory of Herzberg et al. (1959), it aimed to adapt the measurement tool, which includes the variables of "colleagues", "parents", and "student", included in the scope of "non-work factors at work", into Turkish. It is thought that the measurement tool consisting of three sub-dimensions will fill a theoretical gap needed in Turkey, with its feature of being developed by providing the equivalence condition with the data obtained from six different countries based on a determined theory. The data of the original measuring instrument were obtained from countries located on different continents, Netherlands, United States, Russia, China, Italy, and Palestine. It is thought that the data obtained are meaningful in terms of their scope and cultural similarity.

In the adaptation of the measurement tool, bias was avoided, and equivalence was tried to be achieved. In this context, since the measurement tool was developed based on data obtained from six different countries, it is thought that the construct bias was reduced in that it covers cultural diversity and therefore included cultural characteristics similar to Turkish society because the amount of cross-cultural overlap of the subject structure of the adapted tool should be evaluated (International Test Commission, 2005; Hambleton, 1996). In addition, the fact that the universal projection of the teaching profession has similar characteristics in every society maintains the structural validity of the adapted measurement tool. For this reason, structural bias has been eliminated as the behaviors in the measurement tool and the dimensions of the measurement tool are similar to the behaviors of Turkish teachers (Van de Vijver & Hambleton, 1996). Again, method bias was eliminated as the instructions of the measurement tool were clear, the answering procedures were similar, the same physical stimulus was obtained from each participant via google forms, the teacher participants were familiar with the structure of the measurement tool, and the answers obtained were not extreme (Van de Vijver & Tanzer, 2004). At the same time, due to the fact that the items of the original measurement tool were clear and understandable, and the number of items was low, its translation into Turkish was one-to-one. For this reason, understanding different or additional features or qualities from the questions (ICT, 2005) was avoided.

Method

This research was carried out using the quantitative method. Descriptive statistics, construct validity, measurement invariance, and reliability analyses were performed to examine the psychometric properties of the Turkish version of TJSS.

Participants

The participants of this study consisted of 514 teachers recruited from state-run primary, middle and high schools located in Turkey. The sample included 208 males (40.5%) and 306 females (59.5%). In this sample, work experience of 7.8% of the participants was between 1-5 years (n = 40), 13.6% of the participants was between 6-10 years (n = 70), 24.9% of the participants was between 11-15 years (n = 128), 20.4% of the participants was 16-20 years (n = 105), 18.9% of the participants was between 21-25 years (n = 97), and 8.4% of the participants was between 26-30 years (n = 43), and 6% of the participants (n = 31) was 30 years and above.

Procedure

The study received human subjects research approval from a University Ethics Board. All the participants were recruited via online survey tools. The purpose of the study was explained, and voluntary participant consent was provided before conducting the data collection instruments to participants. The volunteering of the participants was used as the basis for the data collection process.

Measures

Teacher Job Satisfaction Scale (TJJS-9)

The Teacher Job Satisfaction Scale (Pepe, 2011) is a questionnaire developed for measuring the job satisfaction of individuals specifically working in education. 9 items version of the instrument (TJJS-9) was derived from the original 35-item original Teacher Job Satisfaction Scale. The TJJS-9 included three-item subscales for "satisfaction with co-workers" (e.g., "The extent to which your co-workers encourage you and support you in your work"), "satisfaction with parents" (e.g., "The degree of interest shown by parents in the education of their children"), and "satisfaction with students' behaviors" (e.g., "Your overall level of satisfaction with student discipline in your school"). The TJJS-9 is rated on a five-point Likert-type scale, ranging from "I am highly dissatisfied with this aspect of the school" (1) to "I am highly satisfied with this aspect of the school" (5). Higher scores indicate higher levels of job satisfaction.

Validity and reliability studies of the TJJS-9 were conducted in six international cohorts (Netherlands, United States, Russia China, Italy, and Palestine) (Pepe, Addimanto, & Veronese, 2017). Confirmatory factor analysis was conducted to investigate the construct validity of the three-factor structure of the TJJS-9. The goodness of fit values of TJJS-9 was good ($\chi^2 = 151.2$, df = 24, NFI = 0.99, NNFI = 0.99, CFI = 99, RMSEA = 0.04, SRMR = 0.02).

For convergent validity, correlations between the sub-dimensions of TJJS-9 and the GHQ-12 which is measuring teachers' psychological distress were calculated. The correlations between GHQ-12 and the "Satisfaction with co-workers" (r = -0.179), "Satisfaction with parents" (r = -0.180) and "Satisfaction with students' behaviors" (r = -0.233) sub-dimensions were found negative.

In the reliability studies of the scale in six countries, the Cronbach alpha internal consistency coefficient was varied between 0.79 and 0.88 for the "Satisfaction with co-workers" sub-dimension, between 0.72 and 0.90 for the "Satisfaction with students' behaviors" sub-dimension, and between 0.79 and 0.94 for the "Satisfaction with parents" sub-dimension (Pepe, Addimanto, & Veronese, 2017).

Turkish Translation of the TJJS-9

The translation of TJJS-9 into the Turkish version was done by two individuals who are fluent in both the English and Turkish languages and have professional knowledge of the subject matter. Then another expert who has professional English language competence in the field of educational sciences and psychology compared the translations and modified some of them needed to provide the same meaning as the original version, and cultural compatibility. Finally, the scale items were examined by a Turkish linguist in order to enable language compatibility of this form.

Demographic Questionnaire

The demographic questionnaire was used to collect information about the participant's gender and work experience. Participants' gender was coded as male (1) and female (2). Work experience was recorded as 1-5 years (1), 6-10 years (2), 11-15 years (3), 16-20 years (4), 21-25 years (5), 26-30 years (6), 30 years and above (7).

Statistical Analysis

All analyses were performed using AMOS 24 and IBM SPSS 23. Prior to analysis, assumptions for the factor analysis including univariate and multivariate normality were examined. Skewness and kurtosis values were used for checking the univariate normality of the data. The values of skewness and kurtosis between -1.5 and +1.5 are indicated the normal distribution of data (Tabachnick & Fidell, 2013). (Skewness and kurtosis values are supposed as normal variance when they are between -1.5 and +1.5). Multivariate outliers were identified by using a $p < 0.001$ criteria with Mahalanobis distance (Tabachnick & Fidell, 2013).

Confirmatory factor analysis (CFA) with the maximum likelihood estimation method was used for the construct validity of the three-factor TJJS-9. CFA was calculated for only males, only females, and the total

sample for the Turkish version of TJJS-9. Measurement invariance of the TJJS-9 with respect to gender was tested using Multigroup Confirmatory Factor Analyses (MG-CFA). Four hierarchical measurement invariance models were tested with MG-CFA: Configural, metric, scalar, and strict (Vandenberg & Lance, 2000). For the configural invariance model, no equality restrictions were made on the model. Factor loadings were constrained to be equal across groups for the metric invariance model. Then, both factor loadings and item intercepts were constrained across groups in the scalar invariance model. Lastly, factor loadings, item intercepts, and residual variances were constrained to be equal across groups in the strict invariance model.

Model fit of the single and multigroup CFAs was evaluated with Chi-Square Goodness (χ^2 / degrees of freedom (df)), Root Mean Square Error of Approximation (RMSEA), Standardized Root Mean Square Residual (SRMR), Comparative Fit Index (CFI), Goodness of fit index (GFI), Incremental fit index (IFI), Tucker–Lewis Index (TLI) and, Normed Fit Index (NFI). Absolute fit indices for χ^2 /df value below 5 (Tabachnick & Fidell, 2007); RMSEA and SRMR values below .05; CFI, GFI, IFI, TLI, NFI values greater than .95 (Hu & Bentler, 1999; Schermelleh-Engel, Moosbrugger, & Müller, 2003) constitute a good fit. To assess the goodness-of-fit between nested measurement invariance models, the χ^2 difference test and the difference in the CFI values (ΔCFI ≤ .01) between nested models were used (Chen, 2007; Cheung & Rensvold, 2002).

The reliability of the TJJS-9 total and sub-scale scores was assessed by calculating the internal consistency was estimated by Cronbach's alpha coefficient. George and Mallery (2016) suggest that Cronbach's Alpha value above 0.90 shows excellent, above 0.80 is good, above 0.70 is acceptable, above 0.60 is questionable, above 0.50 is poor, and below 0.50 is unacceptable internal consistency.

Results

The TJJS-9 Turkish version item means, standard deviations, skewness, and kurtosis values were provided in Table 1. Skewness values for the TJJS-9 Turkish version items ranged from -0.95 to -0.20 and kurtosis values from −0.70 to 1.14, suggesting that the items conform to the assumptions of confirmatory factor analysis for this sample.

Table 1. Descriptive statistics for TJSS-9 items

		M	*SD*	Skewness	Kurtosis
Item 1	The quality of your relations with co-workers	4.13	0.830	-0.951	1.146
Item 2	The extent to which your co-workers encourage you and support you in your work	3.97	0.946	-0.852	0.535
Item 3	Your overall satisfaction with your co-workers	4.02	0.893	-0.777	0.584
Item 4	The extent to which students act in a self-disciplined manner	3.61	0.991	-0.562	0.062
Item 5	Your satisfaction with the behavior of students in your school	3.65	0.968	-0.563	0.114
Item 6	Your overall level of satisfaction with student discipline in your school	3.69	1.003	-0.584	0.048
Item 7	The degree of interest shown by parents in the education of their children	3.04	1.138	-0.200	-0.675
Item 8	The extent to which parents are supportive of the school and its programs	3.14	1.172	-0.230	-0.702
Item 9	Your overall level of satisfaction with parents where you work	3.22	1.084	-0.306	-0.517

Construct Validity

Since normality assumptions were met, the maximum-likelihood method was used as an estimation method. The goodness of fit indices was evaluated for one-factor and three-factor models for the Turkish version of TJJS-9. The goodness of fit indices for both models are presented in Table 2.

Table 2. Goodness of fit indices for CFA model of the Turkish version of TJSS-9 (N = 514)

Model	χ^2	*df*	χ^2 / *df*	RMSEA	SRMR	CFI	GFI	IFI	TLI	NFI
One-factor	1276.853	27	47.291	0.300	0.167	0.621	0.607	0.622	0.495	0.617
Three-factors	64.328	24	2.680	0.057	0.034	0.988	0.972	0.988	0.982	0.981

Table 2 shows that the one-factor model displayed a very poor fit with the data, $\chi^2(24) = 47.291$, $p < .001$, RMSEA = 0.300, SRMR = 0.167, CFI = 0.621, GFI = 0.607, IFI = 0.622, TLI = 0.495, and NFI = 0.617. There-factors model displayed satisfactory fit indexes, suggesting that it should be accepted, $\chi^2(24) = 2.680$, $p < .001$, RMSEA = 0.057, SRMR = 0.034, CFI = 0.988, GFI = 0.972, TLI = 0.982, and NFI = 0.981.

As a result, the three-factors model provided equally robust fit indexes, leading us to adopt it as our baseline for assessing multi-group structural invariance. In addition, results indicated that the factor loadings of all items displayed substantial factor saturation (all λ .73-.95), which exceeded the desirable standard of 0.50 (Hair et al., 2010). The p values for factor loadings were under 0.001 in all cases. The relationships among items and factors of the Turkish version of TJSS-9 are presented in Figure 1.

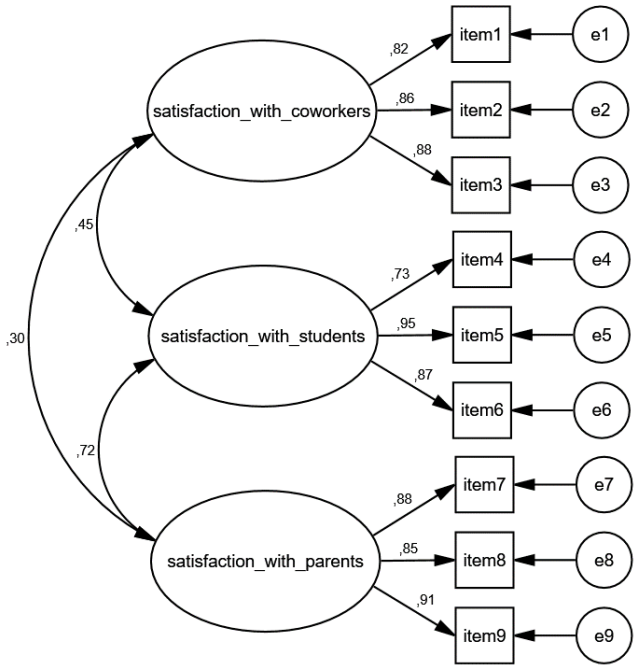

Figure 1. Measurement model of CFA for the Turkish version of TJSS-9.

The baseline model specified relationships among sub-factors. In particular, satisfaction with parents and satisfaction with students displayed statistically significant, strong, and positive correlation ($\varphi 32 = .72$, $p < .001$). However, the satisfaction with co-workers appeared to be less strongly related to satisfaction with students ($\varphi 12 = .45$, $p < .001$), and satisfaction with parents ($\varphi 13 = .30$, $p < .001$).

Measurement Invariance

MG-CFA was performed to evaluate measurement invariance of the Turkish version of the TJSS-9 across gender. Four levels of invariance (configural invariance, metric invariance, scalar invariance, and strict invariance) were tested using a series of increasingly restrictive models (Table 3).

Table 3. Fit statistics for multi-group confirmatory factor analysis by gender

Model	χ^2	*df*	RMSEA	SRMR	CFI	IFI	TLI	NFI	ΔCFI	$\Delta\chi^2$(p)	Δdf
Males	37.326	24	0.052	0.037	0.989	.990	.984	.971	-	-	-
Females	56.454	24	0.067	0.037	0.984	0.984	0.976	0.973	-	-	-
Configural invariance	93.780	48	0.043	0.037	0.986	0.986	0.979	0.972	-	-	-
Metric invariance	101.294	54	0.041	0.036	0.986	0.986	0.981	0.970	0.000	7.514 (0.28)	6
Scalar invariance	105.861	60	0.039	0.036	0.986	0.986	0.983	0.969	0.000	4.567 (0.60)	6
Strict Invariance	122.034	69	0.039	0.041	0.984	0.984	0.983	0.964	0.002	16.173 (0.63)	9

Successively stricter constraints were tested to test for configural, metric, scalar, and strict invariance. The single-sample solutions for the three-factor model based on the female and male subsamples were provided in Table 3. A good model fit was obtained for both subsamples. Configural invariance was supported by fit indices meeting benchmarks for adequate fit (RMSEA = 0.064, SRMR = 0.037, CFI = 0.986, TLI = 0.979, NFI = 0.972). Metric, scalar, and strict invariance could be assumed across gender, as evidenced by a non-significant drop in model fit ($\Delta\chi2$ = n.s., ΔCFI ≤ .01) for the successively stricter models.

Reliability Analysis

The main descriptive statistics and standardized Cronbach' alpha coefficients for the TJSS-9 sub-scale scores are presented in Table 4. According to the results, all the dimensions of TJJS-9 were reliable and displayed normal distribution.

Table 4. Descriptive statistics and internal consistency of the TJSS-9 subscale

	M	***SD***	**Cronbach Alpha**	**Skewness**	**Kurtosis**
All scale	32.480	6.573	0.887	-0.278	-0.029
satisfaction with co-workers	12.124	2.417	0.889	-0.712	0.228
satisfaction with students	10.955	2.657	0.879	-0.599	0.286
satisfaction with parents	9.401	3.135	0.914	-0.238	-0.499

Result and Discussion

This research is an adaptation of the job satisfaction scale. This tool, which was developed depending on external stimuli (satisfaction with co-workers, students and parents) was adapted to Turkish. Valid and reliable results were obtained in this study. There is no job satisfaction scale in Turkey, which is dependent only on external stimuli and includes the triad of colleague, parent, and student. For this reason, it is thought that an important gap has been eliminated by bringing the adapted measurement tool into Turkish. In this context job satisfaction is actually a phenomenon. Because of that job satisfaction, reinforces organizational citizenship behaviors (Swaminathan & Jawahar, 2013; Shragay & Tziner, 2011; Serpian, Bambang, & Nayati, 2016) Job satisfaction is very important for teachers themselves and their students for qualifications and sense

of belonging. Therefore, it is considered important to bring this measurement tool to Turkish literature. The fact that the original measurement tool is multicultural, and that Turkish is also included in this multiculturalism, that this measurement tool is described as a variable that increases its validity and reliability makes this research also valuable. In this study, the validity and reliability of the TJSS in Turkish culture were tested. Thus, this study contributed to the multicultural validity of the scale.

This tool, which includes three of the non-work factors, which is the second of the dual factor theory (Herzberg et al., 1959) of job satisfaction; It is limited to three sub-dimensions consisting of colleagues, students, and parents. It is thought that the descriptive limits of this measurement tool and the relatively few sub-dimensions it contains will increase the validity and reliability of the data to be obtained with this tool. Because, in job satisfaction, parent, student, and colleague variables, apart from personal factors are the primary factors that include both the work and social context of a teacher.

It has been understood from the literature review that job satisfaction should be measured by quantifying the behaviors shown towards psychological, behavioral, affective and environmental conditions (Ghanizadeh and Jalal, 2017). Therefore, it is considered important to bring a valid and reliable Teacher Job Satisfaction Scale to the literature to be used in descriptive studies. As job satisfaction increases, the quality of the product produced also increases (Gafa, 2019). In fact, this concept works like "double requires" in mathematics. The more job satisfaction, the more efficiency/output. Because the concept in question includes both psychological and physical parameters. In this respect, job satisfaction is a concept with a wide spectrum. For this reason, the fact that the scale in question described job satisfaction only for behaviors related to non-work variables was an important factor that increased the validity of the measurement tool.

Therefore, the validity and reliability of the TJSS for the Turkish population was investigated in the current study.

The current study assessed the Findings from confirmatory factor analysis showed that the three-factor model of the Turkish version of the TJSS was confirmed. Satisfactory fit indices were provided. In addition, adequate fit indices were obtained separately for only female and only male groups. This finding is consistent with the findings of the study by Pepe et al. (2017), investigating the reliability of the TJSS in six countries. However, Pepe et al. (2017) did not test the construct validity of the scale only for male and female groups. Therefore, this study has provided an important contribution to the literature.

In the present study, the measurement invariance of the Job Satisfaction Scale across gender was assessed. Findings indicated that configural, metric, scalar, and strict invariance were assumed across gender for the TJSS. Measurement invariance is an important necessity in multiple-group structural equation modeling. It provides to verify that the estimated factors are measuring the same latent construct within each group. Measurement invariance is the statistical indicator of the correlation being the same between the observed and latent variables among the subgroups (Widaman & Reise, 1997). Since measurement invariance shows the validity of the scales, if the measurement invariance was confirmed among the subgroups, these scales can be used to make comparisons among groups. Since the measurement invariance across gender was not tested in the study of Pepe et al. (2017), this study makes an important contribution to the literature.

The current study indicated that the Cronbach's alpha internal consistency coefficient of the Turkish version of the TJSS (α =0.887), "Satisfaction with co-workers" sub-dimension (α = 0.889), "Satisfaction with students sub-dimension" (α = 0.879), and "Satisfaction with parents" sub-dimension (α = 0.914). While Cronbach's alpha value higher than 0.90 indicates excellent and higher than 0.80 is good internal consistency (George and Mallery, 2016). According to George and Mallery (2016), the TJSS, "Satisfaction with co-workers" sub-dimension, and "Satisfaction with students sub-dimension" have good internal consistency, while the "Satisfaction with parents" sub-dimension has excellent internal consistency. The finding regarding

Cronbach's alpha internal consistency is consistent with the findings of the study of Pepe et al. (2017), which showed good or excellent internal consistency for the TJSS and sub-dimensions.

This measurement tool that is adapted to Turkish; Job satisfaction, which will be obtained depending on the variable of a colleague, student, and parent, is also supported by the result of Ball (2003). Accordingly, relations with parents and students were affected, resulting in more intense interaction with parents and a stronger "customer" position (Ball, 2003). Job satisfaction is not only about teacher retention, but also contributes to the well-being of teachers and their students, the overall cohesion of the school, and the evolving status of the teaching profession. International research indicates that the decreasing prestige of the teaching profession together with the unsatisfactory working environment is a source of dissatisfaction and also causes turnover (Ingersoll &Smith, 2004; TemaNord, 2010).

Increasing teacher stress and frustration has been associated with increased workload and a greater emphasis on teacher performance and accountability (Ingersoll, 2017; Zeichner, 2014). For all these reasons, it is necessary to constantly determine teachers' job satisfaction levels, receive feedback and take necessary measures as a result of this feedback.

Limitations

Although the current research provides an important contribution to the literature about the psychometric properties of the TJSS, it also has some limitations. One of the limitations of the study is that the original and translated forms of the scale could not be applied simultaneously in a bilingual group. Future studies can test the validity and reliability of the scale with a bilingual sample. In addition, the concurrent and discriminant validities of the scale could not be tested in the current study. In addition to these, although the internal consistency reliability of the scale was tested, the test-retest reliability could not be tested. It will be useful to evaluate the test-retest reliability of the TJSS in future studies.

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International Online Journal of Educational Sciences

ISSN: 1309-2707

A Teaching Experience of Prospective Elementary Mathematics Teachers in the Framework of the Purdue Model for the Education of Gifted Students

Research Article

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To cite this article: Yilmaz, T. Y., & Gok, M. (2022). A teaching experience of prospective elementary mathematics teachers in the framework of the purdue model for the education of gifted students, *International Online Journal of Educational Sciences*, *14*(4), 957-976.

ARTICLE INFO

Article History:

Received: 28.03.2022

Available online: 23.09.2022

ABSTRACT

Differentiation strategies are used in education; education programs are organized according to individual differences, and education is provided in accordance with these programs to reveal the potential of gifted students. The education and experiences of those in the position of instructors have a crucial role in smoothly executing these processes. In this sense, prospective teachers need to learn the strategies that should be used in the education of gifted students, starting from their undergraduate education, and experience different models that will be used as a framework in the design of education programs. This study analyzes the behaviors of prospective elementary mathematics teachers in the process of experiencing an activity designed within the framework of the Purdue model and their opinions on this experience. A case study, one of the qualitative research methods, was used in the research. The study participants include 25 (16 female and 9 male) prospective teachers studying in a elementary mathematics teaching program at a state university in the Eastern Anatolia region. While the data regarding the teaching experience were recorded with a video and audio recorder in the study, the opinions of the prospective teachers regarding the experience were obtained through a structured interview form and Google Forms. Data on teaching experience were analyzed with the descriptive analysis method, and teacher opinions on this experience were analyzed with content analysis. The results obtained in the study concluded that prospective teachers could benefit from the Purdue Model in designing a student-centered learning environment in the teaching of mathematical concepts for the education of gifted students.

Keywords:
Purdue model, Gifted students, prospective teachers, Pythagorean means

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DOI: https://doi.org/10.15345/iojes.2022.04.005

Introduction

The increasing importance of mathematics in science, technology, and the economy enables this discipline to be determined as one of the basic competencies in information societies (Vassiliou, 2011). However, the existence of individuals with high-level mathematical skills is of great significance for scientifically and industrially developed or developing countries (Taber, 2010). Gifted (or talented) individuals are among the most valuable human resources of countries, as the speed of a country's adaptation to the age of information and technology is an indicator of development and its potential to make a difference in offering new and creative solutions to the problems faced by humanity by using science.

In Turkey, the concepts of "gifted intelligence," "superior-high talent," "superior talent," and "special ability" were gathered under a single roof by the Ministry of National Education [MoNE], and the gifted individuals were defined as those who perform at a higher level than their peers in intelligence, creativity, art, leadership capacity, motivation, or special academic fields (MoNE, 2013). While Sak (2011, p. 216) defines giftedness as "the extraordinary potential that is of fundamental value for human life and possessed in defined talent areas," Gagné (1985) defined it as having and using an extraordinary ability that falls within the 10% of peers in one or more areas such as intelligence, creativity, and social ability. It is seen that most of the definitions of giftedness do not only emphasize intelligence and academic achievement but are considered as a whole with cognitive, social, and affective characteristics of giftedness. This situation leads to the conclusion that the mental and social conditions that increase the motivation of gifted students (GS) and encourage them to learn and think more are equally important for developing their creativity (Fraser-Seeto et al., 2013). In this context, it is necessary to focus on how the lessons can be reorganized to reveal the creativity of GS or which lessons can be associated with giftedness. A more concrete step can be taken in GS's idea by focusing on how the lessons can be reorganized to reveal their creativity or which lessons can be associated with giftedness. For instance, Leikin and Sriraman (2017) suggested that excellence in school mathematics and general giftedness are related, but giftedness in mathematics has different characteristics. Based on this background, a predictor of general giftedness is the achievement level of the individual in mathematics. It is pointed out that more focus should be placed on mathematics courses to reveal the potential of GS (Özdemir, 2018). Just as there is no agreed-upon definition of general giftedness, there is no commonly accepted definition of mathematical giftedness. Mingus and Grassl (1999) proposed that gifted students in mathematics are individuals who have innate mathematical abilities, are willing to work hard, and have a high degree of creativity. It can be argued that one of the most apparent indicators of giftedness is creativity. Since the concepts of giftedness and creativity are intertwined, it is of great importance to support the mathematical creativity of GS. As a matter of fact, Leikin (2011) argues that it is necessary to understand the nature of mathematical giftedness and mathematical creativity from the perspectives of thinking, teaching, and learning and use mathematics teaching in a way that helps realize mathematical giftedness and encourages mathematical creativity. This situation requires revealing the situations related to what has been done and what needs to be done in GS education.

The educational practices of students diagnosed as GS can be divided into two: "separate education" and "co-education." Private schools, private classes, talent classes, and individual teaching can be used within the scope of separate education, and the acceleration and enrichment method can be used within the scope of co-education (Genç, 2016). In Turkey, students diagnosed as GS, according to the results of individual examinations, can receive education in Science and Art Centers [BİLSEM], which is based on the part-time grouping strategy, in parallel with their formal education, or they can participate in educational services offered by various universities. Besides, support training rooms can be opened for GS in their own schools, and in-class integration practices can be organized in their own classrooms by using differentiated teaching strategies. Considering the fact that the teacher is the essential element in a student's school life, the most

important task in the education of GS is undertaken by teachers who support their skills, creative thinking, and individual development. For this reason, it is a must that both the teachers working in the support training rooms and the teachers who do integration practices with GS have been trained on curriculum differentiation and differentiated teaching strategies (Nar & Tortop, 2017). Differentiation is making changes in the content, process, and product elements of the curriculum based on the characteristics of GS and re-designing in accordance with the features of students, such as faster learning, better problem-solving, abstract thinking, and establishing relationships between concepts (Özdemir, 2016). In enrichment, which is a differentiation strategy, it is possible to expand and deepen any subject area (Köksal, 2020). MoNE (2013) recommends that teachers enrich the programs with horizontal or vertical axes, add activities to the curriculum, and carry out deepening studies to support the academic development of GS. In this sense, teachers need to prepare tasks that encourage students' mathematical creativity with these activities. Many models can guide teachers to develop the potential of GS. In this study, the Purdue Three-Stage Model (PM) was used.

PM, which was introduced by Feldhusen and Kolloff (1986) and modeled for university teaching in its early years, was later used in GS education. Research on the model shows that the model increases the thinking skills, problem-solving skills, and self-regulation skills needed to successfully complete independent projects (Kolloff & Feldhusen, 1984). While the model develops critical thinking skills by working on real-life problems, it also allows the application of acceleration and enrichment strategies to GS. The advantages of the model are that it is a flexible model, that is, it can be applied at different levels and both in homogeneous groups formed by the grouping method and in heterogeneous groups with GS who continue their normal education, constraints in teaching time, untrained teachers and lack of materials are some of the obstacles to the model (Moon et al., 2009). General purposes of PM are stated as developing the basic thinking skills of GS, developing their self-concept by providing small group interaction with other GSs, providing opportunities through educational activities to improve their creative abilities, and helping them to be more independent and effective (Moon et al., 2009). Figure 1 shows the stages of PM:

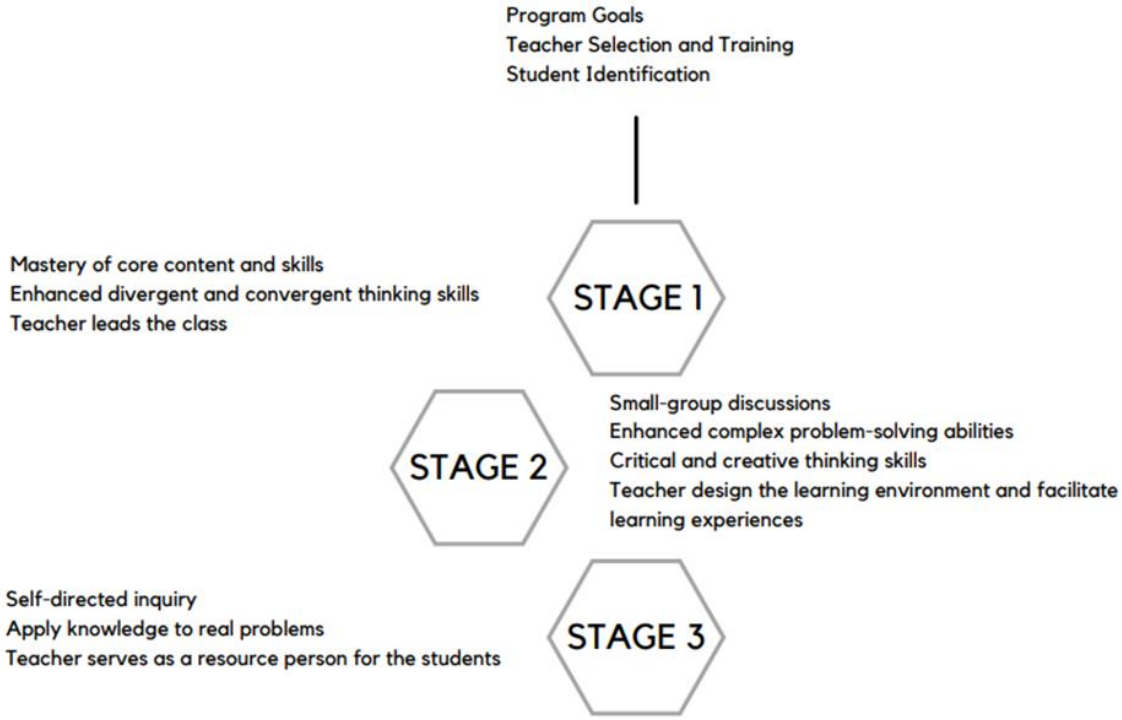

Figure 1. The Purdue Model

Figure 1 indicates that the first stage of the model focuses on the development of basic thinking skills and content knowledge. In Stage 1, which is mainly teacher-centered, the development of convergent and divergent thinking skills is prioritized, and in other stages, activities are carried out to motivate students to

explore the content of the subject more deeply (Moon et al., 2009). In Stage 2, small group work is carried out, focusing on developing creative and critical thinking skills; activities that include questioning, problem-based learning, brainstorming, non-routine creativity, and complex mathematical problem-solving with more than one solution are conducted. Students can be taught analysis, synthesis, and creative problem-solving methods. At this stage, the teacher provides more guidance, supports the operation of the process, and facilitates learning. Stage 2 usually takes longer than Stage 1 (Moon et al., 2009). In Stage 3, students' self-awareness, decision-making, planning, self-regulation, and independent working skills are expected to develop. The knowledge and skills adopted in Stage 1 and Stage 2 are applied to real problems, students work on projects of their own choice, and as a result, different, genuine educational products emerge. The teacher is positioned as the resource person (Kolloff & Feldhusen, 1984). Evaluation in PM is done in different ways, such as product evaluation, self-evaluation, and expert or peer evaluation. (Moon et al., 2009).

The training of teachers who will implement the model in PM is a part of the model, and that training is indicated to encompass the needs and characteristics of GS, teaching strategies and materials, non-traditional teaching, complex problem-solving activities, classroom management during independent study, and differentiated curriculum design (Moon, 2004). On the one hand, this shows that teachers who will train GS need to learn models that they can use as a framework to prepare differentiated learning environments through in-service training; on the other hand, it emphasizes that teacher candidates should take courses to improve teacher competence in their undergraduate education to prepare these learning environments. To that end, prospective teachers must receive training that will enable them to prepare teaching activities for GS in a more qualified way and gain awareness about how they will differentiate in the content, process, and evaluation of GS when they start to teach. In this context, they must have pre-service training and experience how differentiated learning environments are prepared for GS. Hence, in this study, prospective elementary mathematics teachers' (PTs) behaviors in the process of experiencing the teaching of the "Pythagorean Means" topic prepared according to PM within the framework of the "Teaching Mathematics to the Gifted" course and their opinions on this experience are discussed.

In Turkey, the number of studies on GS has increased gradually, especially in recent years, but it is noticed that studies in this field cannot go beyond certain frameworks (Koçak, 2020). These studies are mainly focused on the differentiated education practices examined in the context of variables such as critical thinking, self-efficacy, problem-solving, academic self, creativity, spatial ability, attitude, and achievement. For example, Batdal-Karaduman and Davaslıgil (2020) observed that the differentiated curriculum prepared for GS increased students' achievement, spatial ability in geometry learning, and creative thinking levels. Deringöl and Davaslıgil (2019), on the other hand, found that the differentiated mathematics curriculum they prepared increased the academic self-esteem of GS. Çırak (2021) investigated the effects of the mathematics curriculum enriched with technology-supported activities for GS on their achievements and attitudes towards the course and concluded that the curriculum increased the achievement of GS but did not affect their attitudes towards the lesson. While Bilgiç (2021) found out that differentiated mathematics teaching is an effective strategy in the education of GS, Ceylan (2021) argued that differentiated education improved the achievements of GS, values of collaborative work, responsibility, and being scientific. Although teachers play the most important role in the education of GS, the limited number of studies on teachers and prospective teachers in the literature emphasizes the significance of this research. For example, Nar and Tortop (2017) stated in their research with teachers that the majority of the teachers working in the support training rooms indicated that they had insufficient in-service training and they should receive training that will improve their competencies in preparing a differentiated instructional design for the training of GS. Andrews (2021), on the other hand, pointed out in their research that teachers should be provided with more professional learning and professional development opportunities in the field of GS education and development, and it is necessary to increase teachers' awareness of ways to differentiate their lessons in the most appropriate way to GS. Some

studies deduce that teachers' proficiency in GS has increased thanks to the training provided (Alkan et al., 2017; Şahin, 2012).

Additionally, past studies on PM show the model is generally used to differentiate the curriculum in science and mathematics courses of GS, and some studies examine the effects of activities developed based on this model on the creativity, achievements, and attitudes of GS (Altıntaş, 2014; Altıntaş et al., 2013, Altıntaş and Özdemir, 2012; Çalışkan-Karakulak, 2019; Kadir and Rukman, 2021). For example, Altıntaş (2014) observed a high and significant increase in the achievement and creativity scores of the experimental group of students to whom the differentiation approach with PM was applied. Altıntaş and Özdemir (2012), on the other hand, showed that teaching with PM-based mathematics activity positively affected GS's critical thinking skills and problem-solving attitudes. Kadir and Rukman (2021) proposed that students' high-level mathematical thinking skills, such as analysis, evaluation, and creative thinking, are improved in the lessons in which the acceleration method with PM is used. The point of convergence of these studies is that activities developed based on PM develop students' basic thinking skills, creative thinking skills, and independent learning skills.

Although the education of GS is a fundamental subject in the undergraduate period of PTs, there are limited studies in this field in the literature. However, it is vital for PTs to be aware of how they will prepare differentiated learning environments for GS and with which models they will support it. In this sense, the experiences of PTs on "Pythagorean Means" in the context of curriculum differentiation based on PM within the scope of the "Teaching Mathematics to the Gifted" course and their opinions on this experience will contribute to the literature. To this end, this research aims to examine the behaviors of PTs in different stages of PM, focusing on PTs' discriminative and integrative thinking skills and creative problem-solving skills on Pythagorean means, and to determine PTs' opinions on their experiences with PM. For this purpose, the study seeks answers to the following questions:

- What skills (basic skills, creative problem-solving skills) are exhibited by PTs at different stages of the activity who have experienced an activity designed within the framework of PM?
- What are the opinions of PTs who have experienced an activity designed within the framework of PM?

Methodology

A case study, one of the qualitative research methods, was used in the study, which focused on the behaviors of PTs during the experience of an activity designed within the framework of PM to support GS in heterogeneous classrooms and their opinions on this experience. Merriam (2013) defines a case study as an in-depth description and examination of a limited system. This study analyzes the behaviors exhibited by PTs at different stages of PM in the context of Pythagorean means. Pythagorean means include the Arithmetic Mean (AM), Geometric Mean (GM), and Harmonic Mean (HM). These means are used in one way or another in many situations in everyday life. The research also focuses on which means the prospective teachers prefer in their daily life situations during the activity process presented in the context of PM, what their reasons are for choosing these preferences, and whether there is a change in their awareness of the use of averages in daily life situations during the activity, and how they use it in a project. Besides, after the activity, the opinions of the prospective teachers are collected, and their ideas about this experience are discussed.

Study Group

The purposive sampling method was used to select the participants (Christensen et al., 2015). In this context, 25 prospective teachers (16 females and 9 males) who chose the "Mathematics Teaching to the Gifted" course in the elementary mathematics teaching department at a state university in the Eastern Anatolia Region constitute the participants of the study. Although examinations were carried out within the scope of a course,

the participants were included in the study with their own consent. In the study, participants were coded as S_1, S_2, …, and S_{25}, and the *T* code was given to the course instructor.

Data Collection Tools and Procedure

The study is limited to two data sets. The first of these includes the experience dimension, which includes the process of designing an activity and applying it to PTs. The other consists of PTs' opinions on this experience.

First of all, studies were carried out to design activity in the context of Pythagorean means, which are frequently encountered in daily life and thought to be suitable for PM. In this context, the Pythagorean means activity was designed by two mathematics education experts within the framework of PM, which consists of three stages. The first stage includes tasks for prospective teachers to realize Pythagorean means in daily life situations focused on divisive and unifying thinking skills (Gökdere & Kutlu, 2013). In the second stage, tasks that focused on the creative problem-solving skills of prospective teachers about Pythagorean means and performed in small groups were assigned. The third stage presented a project in which prospective teachers can work independently (Feldhusen & Kolloff, 1986). An expert examined this activity in terms of language, and necessary revisions were made. Then, a pilot application was carried out, and it was examined whether the tasks designed during the activity process were understood and whether they were suitable for the targets determined within the scope of Pythagorean means. In this regard, a data set was excluded in the first stage because it inspected the same skill in a task. In the second stage, the question root in one task and the figure in another task were rearranged. In the third stage, the story of the project in the context of daily life was updated. Additionally, the project enabled the daily life context to be examined in different ways (parallelogram and trapezoid). The tasks in this activity were created to encourage doing mathematics and enable the development of a specific mathematical idea (Smith & Stein, 1998). After these revisions, the Pythagorean means efficiency given in Appendix 1 was developed.

Table 1. Implementation Process

Stage	Task	Task Description	Time
Stage 1	Task 1	Discovering examples of the Pythagorean mean in daily life	30 min
	Task 2	Finding the Pythagorean means in the dataset and choosing the mean that best represents the data	
Stage 2	Task 3	Examining the daily life situation of a group regarding the exam mean scores	50 min
	Task 4	Analyzing a task related to average speed and the situations that occur when conditions change on the task	
	Task 5	Proving the relationships between means (AM≥GM≥HM) with the geometric representation	
	Task 6	Studying an economic situation involving compound interest (GM related)	
	Task 7	Examining a daily life situation related to work and worker (related to HM)	
	Task 8	Examining a daily life context using the relationship between AM and GM (related to AM≥GM)	
Stage 3	Task 9	Developing solutions to daily life situations with Pythagorean averages	One week

The implementation process is limited to approximately 2-course hours for the first two stages and a 1-week project period for the third stage. One of the researchers carried out the application, and the other researcher attended the lessons as a participant-observer. The research data were obtained from the documents prepared by the students regarding recording the activity process with a camera and a voice recorder and their project assignments.

Secondly, the data was obtained from PTs' opinions about the designed activity through Google forms after it was conducted. The form created by the researchers consists of three parts (Appendix 2). The first part collects information about participants' demographics. The second part includes multiple-choice (yes-no) information (such as student-centered and supporting creativity) regarding course design with PM. In the third part, open-ended questions were asked to PTs about PM.

Data Analysis

Descriptive analysis and content analysis were used to analyze the research data. Descriptive analysis was used in the analysis of the video and audio recordings of the event, and content analysis was used in analyzing the data collected through Google Forms. First of all, the data analysis started by transferring the video and audio recordings of the lectures to the digital environment. In the following process, the studies of Moon et al. (2009) in the first stage and Treffinger and Isaksen (2005) in the second and third stages were used in the analysis of prospective teachers' actions in the stages of PM (Table 2).

Table 2. Data Analysis

Stage	Theme	Theme Description	Relevance
Stage 1	Observation	Giving an example of Pythagorean means	Divisive and unifying thinking (Moon et al., 2009)
	Classification	Determining which mean to use in a situation	
	Prediction	Identifying the mean that best describes the data	
	Identifying variables	Realizing that means is a function (Input-Output)	
	Relationships between variables	Explaining what the mean for the data means. Also, making transitions from data to mean and vice versa.	
Stages 2 and 3	Challenge	Identifying the purpose, extracting truth from data, clarifying the problem	Creative problem-solving (Treffinger & Isaksen, 2005).
	Generating ideas	Coming up with ideas for solving the given problem	
	Taking action	Choosing solutions, determining the most effective solution, confirming the structure (solution)	

In this direction, in the first stage, PTs' use of basic skills on Pythagorean means (daily life contexts, classification, prediction, identifying variables, and relationships between variables) was examined, focusing on divisive and unifying thinking skills. In the second and third stages, examinations were made in the context of recognizing the problem situation, generating ideas, and putting forward an action plan, basically focusing on creative problem-solving skills. Each theme was evaluated with 1, 2, and 3 points in this process. 1 point indicates that the theme is not observed or is incorrect, 2 points indicate that it occurs in one dimension (a solution) or incompletely, and 3 points show that it is performed in an entirely appropriate way (such as multiple solutions or creative solutions).

In the analysis of PTs' opinions on their experience with PM, multiple-choice sections were presented with frequency tables, and open-ended questions were decoded by content analysis. Both the multiple-choice section and the open-ended questions were coded independently by two researchers. Then, themes were obtained from these codes by reduction and merging (Saldaña, 2011). For this, first of all, the underlying and unclear concepts of the interview data and the relationships between them were revealed. While determining the themes and sub-themes, both the expressions used by the participants were used, and the names were formed by referring to the previously determined concepts in the literature. The sub-themes of the research were formed by grouping the data with common aspects. Next, the themes were formed by revealing the similarities and differences of these sub-themes and arranging them in a way that would form an

interconnected and meaningful whole. In these analyzes, the interrater reliability coefficient of the study regarding the consensus or disagreement was calculated as 92% (Miles & Huberman, 1994), which confirms that the analysis is reliable. The results were also supported by direct quotations from the PTs' opinions on the themes.

Ethical Considerations in Research

In this study, the contribution level of the researchers was equal. There is no conflict of interest between the authors of the article, and ethics committee approval was obtained for the article (decision dated 25.04.2022 (E.8551). The research followed the principles of publication ethics and journal writing rules.

Results

The activity experience of PTs on Pythagorean means within the framework of PM is given in two sub-titles. The first includes the behavior of the PTs at the stages of the model, and the second includes the participants' opinions on this experience.

PM Stage 1

At the beginning of the first stage, the teacher tried to reveal PTs' observations of Pythagorean means in daily life. He encouraged them to share the situations in which averages were used in this direction. Table 3 presents sample cases presented by PTs in this regard.

Table 3. Analysis of the first observations about the means

Observation	Observation Description	Participant	Mean	Score
O1	Average price of a certain number of items	S_1	AM	3
O2	Exam score average	S_2	AM	3
O3	Average of daily spending in a month	S_3	AM	3
O4	Average speed	S_1	HM	1
O5	Average of data in charts	S_5	AM	3

Table 3 reflects that PTs remember a very limited number of observations about the means. When these observations were examined, it was determined that most of them were related to AM. GM is not mentioned at all, and HM is mistakenly considered to be AM. Below is the dialogue on this topic:

S_1: When measuring the speed of the car… The vehicle sometimes goes up to 100 km/h; sometimes, it slows down to 50 km/h… the average speed is 80 km/h.

T:...Well, what can we call this average?

S_1: Sir, we can both say arithmetic and harmonic. (Laughter)

T:…What do you think about it? … A vehicle travels from city A to B at 40 km/h and from city B to C at 60 km/h. What is the average speed then going from A to C?

S_1: From A to C is 50 km/h. (Some others confirming this)

No PTs objected to this dialogue, and it was observed that most of them thought it might be true. This suggests that PTs have limited experience with AM, are unaware of the situations related to other means, and sometimes think of them as AM. Then, the teacher expressed some daily life situations to PTs from Table 4 and asked them to determine which average it was.

Table 4. Classification of daily life situations related to averages

Situation	Situation Description	Participant	Mean	Score
S1	Exam score average	S_1, S_2, S_9, S_{10}, …	AM	3

S2	Average age of a group	S_2, S_4	AM	3
S3	Average height of a group	S_2, S_4	AM	3
S4	Average shoe size of a group	S_2, S_3, S_{10}	AM	3
S5	Density of a mixture of two liquids of equal volume	S_1, S_3	AM	3
S6	Per capita income	S_3	AM	3
S7	Growth of fungus	S_3, S_{11}	GM	3
S8	Investing money in interest	S_5, S_{12}	GM	3
S9	Population growth	S_{12}	GM	3
S10	Density of a mixture of two liquids of equal mass	S_3	HM	3
S11	Average speed	S_{13}	HM	3

Thanks to the discussions on daily life situations, PTs associated the situations such as exam score average and the average age of a group with AM, growth of fungus, population growth, and calculation of interests with GM, and the density of the mixture of two liquids with equal masses and average speed with HM. After this classification, the introduction of the Pythagorean means started.

The teacher explained that the mean is a function, its rules, and common features. Next, the findings regarding the cases of PTs identifying the variables in a particular data set, noticing the relationships between the variables, and estimating the mean that best explains the data set are given in Table 5.

Table 5. Calculating the means on a given dataset and estimating the mean representing the data

Theme	Task	Participant	AM Score	GM Score	HM Score
Identifying variables	Task 2A	All	3	3	3
	Task 2B	All	3	3	3
Relationships between variables	Task 2A	All	3	3	3
	Task 2B	All	3	3	3
Prediction	Task 2A	All	3	-	-
	Task 2B	S_{20}	-	3	-

All PTs correctly calculated the averages in both datasets given in Task 2. However, they put forward different opinions about the mean age representing the data set for the mean age of the group. Class discussions on this subject are presented below:

S_1: I think it is the arithmetic mean because the exact values are available; the others are fractional values.

S_3: I think it is the geometric mean because it is between two means.

S_5: I also believe it is the arithmetic mean in the first one, and the second one seems like the geometric mean. The reason is that the amount of increase was constant in the first but increased rapidly in the second. It is increasing exponentially.

S_{20}: The first is the arithmetic mean, and the second is the geometric mean since there are no extreme values in the first. The second has extreme values.

This discussion presents that PTs regarding the mean representing both datasets agreed on the AM in the first dataset. However, although different ideas arose in the second data set, after S_{20}'s explanation of the idea that AM was affected by extreme values, the opinion that AM could not be used in this data set became dominant. Since the data set is discontinuous, it was thought that GM or HM could be used after rounding to the nearest integer value. The first stage of this study lasted approximately 30 minutes. Although this stage was planned shorter, the limited information of the participants required a longer time.

PM Stage 2 and 3

The PTs' tried to solve the tasks presented in this chapter in groups of three. The analyzes that emerged under the themes related to the tasks are given in Table 6 during the activity process.

Table 6. Analysis of creative problem situations

Task	Participant and argument	Challenge	Opinion Generation	Taking Action
Task 3	S_{20}: Take *n* as people. If the equations (60n+A)/(n+1)=70, (60n-B)/(n-1)=50, (A+B)/2=9 are solved jointly, n=3.	3	3	3
Task 4	T: … In this mission, if the distance was 240 instead of 120, would the average speed change? S_{20}: Nothing changes.	3	3	3
Task 5	S_3: It can change when the data is between 0 and 1. [Averages calculated for 1/2 and ¼]	3	1	1
	S_{21}: It always is. [AM≥GM≥HM) T: Why? S_{21}: The teacher taught me, but I do not remember. (Laughter)	3	1	1
	S_{20}: That's what I say too. No matter how much data. AM comes out greater. GM is smaller as we take root, and HM is the smallest since we divide the amount of data.	3	2	1
	T: [Proving based on the figure given in Appendix 1, task 5]… From the triangle AHO, the AO length is greater than the AH length. So, it is [AM≥GM]… Now let's focus on triangle ADH… Here length AH is greater than length AD. So, it is always AM≥GM≥HM.	3	3	3
Task 6	S_3: I found 37.8%... We will find the second part by simple interest. [objected]	3	2	1
	S_2: It is compound interest. Ahmet's money is 110 in the 1st year, 132 in the 2nd year, and 211.2 in the 3rd year. We will adapt this to compound interest, but we don't know what the interest is. [Solves from compound interest formula] … The interest rate is 28.3%.	3	3	3
Task 7	S_3: [Using similarity] If a/y=k/c and (y-a)/y=k/x, then (1-a/y)=k/x, 1-k/c=k/x, 1=k/c+ k/x, 1=k(1/x+1/c), and k=1/(1/x+1/c). We need to find 2 times of this. This gives the harmonic mean. [Two solutions generated]	3	3	3
Task 8	S_1: Since the area is fixed, the rectangle shape must be square so that the perimeter is minimal. Then, $a^2=8$ and $a=2\sqrt{2}$. So, the perimeter is $8\sqrt{2}$. [S_{12} and S_5 solved the maximum problems in the derivative and T from the AM≥GM rule.]	3	3	3

It was observed that in-group discussions and interaction intensified in creative problem-solving tasks, especially in challenging tasks. In these processes, the teachers encouraged the in-group interaction of the prospective teachers without giving clues about the solution. They also asked the groups to briefly describe their solution approaches. Each group determined the purpose correctly by reducing the data in these tasks. Although it was observed that they had difficulties in generating ideas for the solution of the problem, one or two groups often presented an appropriate approach. Accordingly, excluding task 5, all other tasks have been resolved. However, in this process, only one solution emerged (2 solutions in task 7 and 3 solutions in task 8), which was approved after discussion for each task, and alternative solutions were not explored. Below is the solution of S_3 and the alternative solution in task 7.

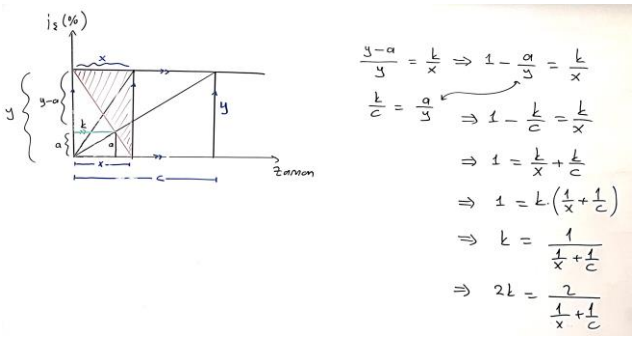

Figure 1. Solutions generated in Task 7

S3: Let's make a guess for the angle. Let's say α,θ. There are two possibilities… we can find from the similarity of the two triangles,... the second possibility we can use the tangent. What is ttan α?... Here, $\tan\alpha = \frac{y}{x}$

S13: Solve it again.

S5: It asks us for the general formula for… We need to find everything in that triangle in terms of x and y.

S3: Do you know what I think we will do? We are going to use the Pythagorean theorem.

S5: Pythagoras? [opposes]

S5: S3, as I just said, let's say x to this, x+c to that part, then we will find them all in terms of x.

S3: Got it. I understood you. Let's start over.

T: Yes, what is your solution?

S3: … the ratio of this to this could be a ratio of that to that, or to that. We can deduce these two ratios.

T: You are going from similarity. Maybe, go ahead.

S3: … write k/c=a/y, okay, this is the first one. Then (y-a)/y=k/x.

S5: We can separate it. $1-\frac{a}{y}=\frac{k}{x}$*. So,* $\frac{a}{y}$ *means* $\frac{k}{c}$ *here. Let's write it down and move it to the other side of the equation.* $1=\frac{k}{x}+\frac{k}{c}$, $1=k(\frac{1}{x}+\frac{1}{c})$*. If we move that [meaning k] to the other side, turn it upside down, and multiply by two, we can find the solution.*

As can be understood from the dialogue, a solution was obtained as a product of group interaction as a result of multiple trials and errors. When the solution is examined, S3 generally applies the solution, S13 is in the monitoring position, and S5, on the one hand, confirms some arguments and, on the other hand, contributes to the solution by developing new strategies. Again, at a certain moment, the teacher examined the group's solution and encouraged them to solve the task. In the solution process, S5's "*...requires the general formula of this*" statement clarifies the purpose of the task. On the other hand, statements such as S13's "solve it again" and S3's "*there are two possibilities*" and "*let's start over*" indicate that they tried many ideas. Besides, linking these ideas to the solution of the task and putting them into action can be regarded as taking action. After these examinations, the use of Pythagorean means by PTs in a project in Task 9 is similarly examined in the following paragraph.

The behavior of PTs under the relevant themes in Task 9 is examined in Figure 2 when the running track is a parallelogram (P) or trapezoidal (T). For example, if the running track was a parallelogram, PTs' understanding and clarification of the purpose of the task in the context of the challenge were evaluated as 1, 2, and 3 points (P-score 1, P-score 2, and P-score 3). Similar investigations were made on other themes as well. The duration of this task is determined as 1 week.

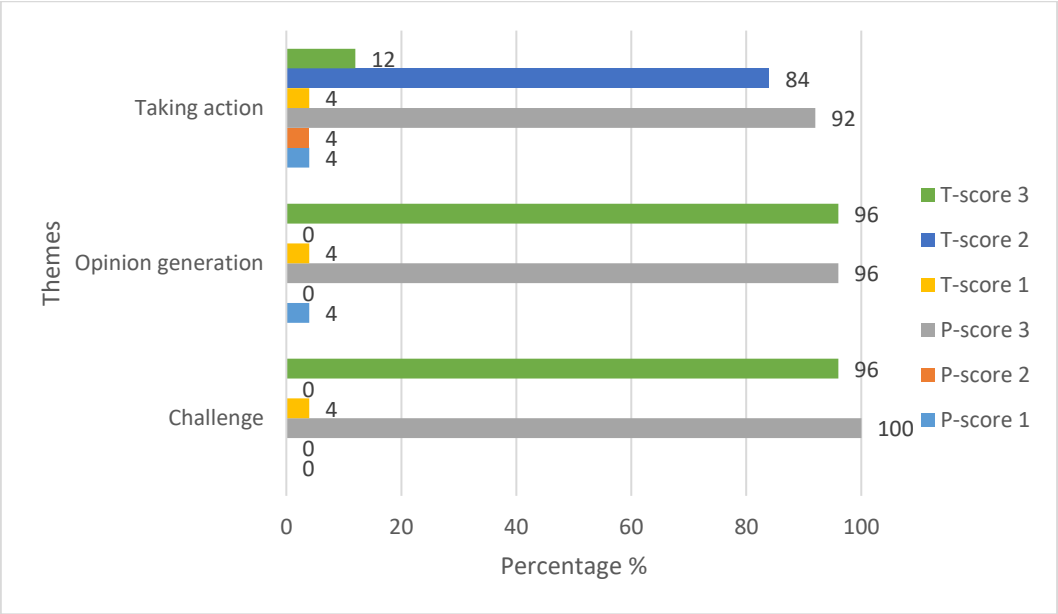

Figure 2. The Analysis of Task 9

It was determined that almost all PTs had developed a suitable solution in terms of the relevant themes when the running track is a parallelogram (P). In the case of trapezoidal (Y), an appropriate approach was generally adopted in the themes of challenge and opinion generation. However, it was found that the PTs had difficulty in drawing the routes of each runner or even could not draw them in the track that was given a trapezoidal shape during the taking action stage. Although the correct result was reached, it was observed that this was done by heart, and no evidence could be shown to confirm the result. Besides, it is understood that a single solution is put forward, and the result is decided chiefly over a specific value (for example, lower base as 14 units and upper base as 2 units in trapezoid) rather than generalization. A suitable example under the themes determined in this project work is given in Figure 3 by the S_{25} coded PT.

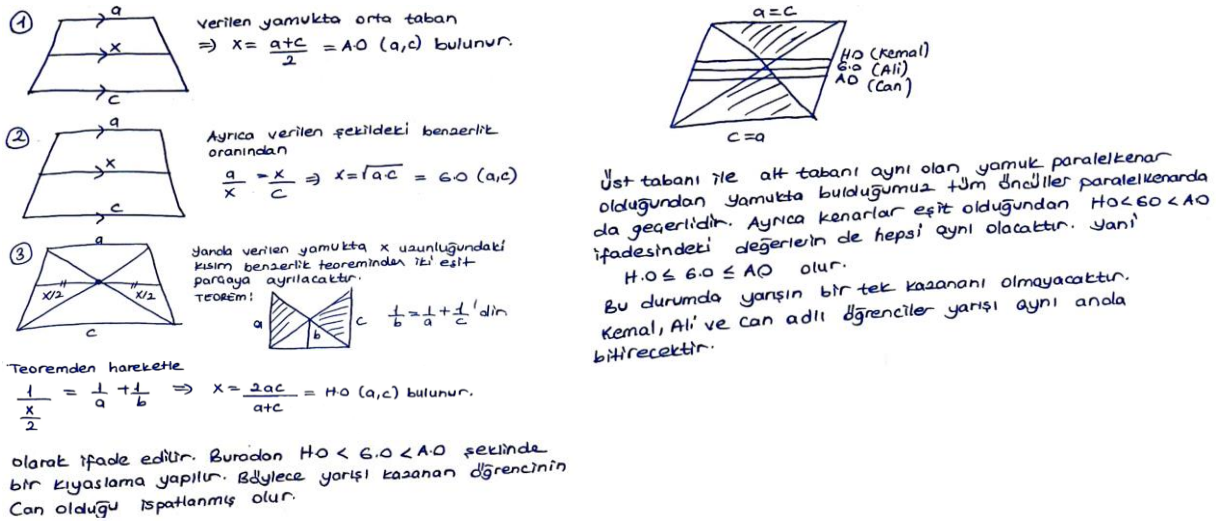

Figure 3. S_{25}'s solution to Task 9

The prospective teacher drew what kind of track the runners would follow on both trapezoidal and parallelogram-shaped tracks and presented evidence to support this drawing. He also revealed the relationship of these tracks with the averages. Considering the information that the race starts and ends at the same time in Task 9, it was pointed out that in the trapezoidal track, the winner is also the one who runs a longer distance and that there is equality among the competitors in the parallelogram-shaped track. In this sense, it is seen that S_{25} successfully applied the challenge process since it is observed that he understands the

purpose of the problem and clarifies the problem. The fact that the prospective teacher presents evidence to support his drawings regarding both the parallelogram and trapezoidal nature of the track and his actions regarding this reveals that the themes of opinion generation and taking action are also carried out appropriately.

The Opinions of Prospective Elementary Mathematics Teachers about PM

The opinions of prospective elementary mathematics teachers regarding their experiences with PM are presented in Table 7:

Table 7. Opinions of prospective teachers about their PM experiences

Theme	Sub-theme	%	f
Basic content knowledge	Understanding the basics	100%	25
	Connection with everyday life	96%	24
	Relationships between concepts	100%	25
	Reinforcement of the topic	92%	23
Teaching approach	Class participation	100%	25
	Student-centered	100%	25
Classroom environment	Group work	96%	24
	Personal study	96%	24
	In-class discussion	100%	25
Creativity	Creative problem situations	96%	24
	Developing creative thinking skills	100%	25
Curriculum	Differentiation of the curriculum	100%	25

As seen in Table 7, most of the PTs think that PM effectively teaches the basics in teaching mathematics to GS. In this context, the model provides the understanding of the basics of the subject, creating a connection between the subject and daily life, establishing a relationship between the concepts, and thus, they are of the opinion that it will be effective in reinforcing the subject. However, their opinions indicated that all of the prospective teachers think that PM is a student-centered teaching approach and that this way, active participation of students in the lesson is supported. Additionally, most PTs believe that the model allows for creating a classroom environment where group work, personal study, and class discussions are carried out. At the same time, most PTs confirm that the model enables students to develop their creative thinking skills by working on the creative problem situations of the GS. On the other hand, all PTs feel that it allows differentiating the mathematics curriculum in mathematics teaching with PM.

The findings regarding the comparison of PTs with PM and traditional mathematics teaching are presented in Table 8:

Table 8. Opinions of PTs on the comparison of PM and traditional teaching

Theme	Sub-theme	Participants	f	%
Teaching approach	Student-centered teaching	S_1, S_2, S_4, S_5, S_6, S_{13}, S_{14}, S_{15}, S_{18}, S_{20}, S_{22}, S_{23}, S_{25}	13	52%
	Project-based teaching	S_2, S_5, S_{16}, S_{20}	4	16%
	Expository teaching	$Ö_3$, S_{10}, S_{12}, S_{23}	4	16%
	Discovery teaching	S_{12}, S_{13}, S_{22}	3	12%
Teacher role	The difference in the teacher role	S_6, S_8, S_{10}, S_{14}, S_{15}, S_{19}, S_{21}, S_{22}, S_{25}	9	36%
Classroom environment	Whole class discussion	S_{11}, S_{22}	2	8%
	Group work	S_6, S_{10}, S_{17}, S_{24}	4	16%

Learning approach	Rote learning	S_8, S_9, S_{13}, S_{17}, S_{11}, S_{18}, S_{24}	7	28%
	Learning by doing	S_{14}, S_{21}	2	8%
Education of the gifted	Suitability for the education of the gifted	S_7, S_8, S_9, S_{17}, S_{19}, S_{24}	6	24%
	Enrichment of objectives	S_{12}, S_{24}	2	8%
	Creative thinking	S_3, S_8, S_9, S_{29}	4	16%
	Relationship with other disciplines	S_{12}, S_{18}	2	8%

Table 8 shows that PM differs from traditional teaching in terms of its teaching and learning approach, teacher role, classroom environment, and usability in the education of gifted students. When evaluated in terms of teaching approach, it was seen that PTs mainly emphasized that PM was a student-centered teaching approach, while some expressed the idea that it was different from teaching by presentation, and some of them were of the opinion that it allowed discovery teaching because students worked on problem situations that would enable them to discover the structure of the subject. For example, S_{13} emphasized that the traditional approach was criticized by the students for not being active and memorizing information, while PM provided meaningful learning, as seen below:

S_{13}: *"While there is no student at the center of learning in traditional mathematics teaching, the purpose of Purdue model is to make the student active in the learning process by putting them in the center. Research has proven that learning in which the student is in the center is more permanent and helps real learning than the traditional approach. While in the traditional approach, the student experiences a learning process based on rote learning, without knowing what he has learned for what reason, without thinking, and with a short life span, in the Purdue model, he learns to learn and reaches information with his own efforts, thus deepening and making sense of the knowledge he has acquired."*

However, some PTs claimed that the model differs from traditional teaching in that it allows for creating projects by emphasizing the third stage of PM. The opinion of S_2, one of those who has this opinion, is presented below:

S_2: "*Thanks to the Purdue model, more activities and project-style applications can be realized in the lessons. The Purdue model is more useful than traditional mathematics teaching. The given projects ensure active participation in the lesson."*

It was observed that some of the PTs felt that teaching with PM is different from traditional teaching in terms of teacher roles. In this context, it was argued that in traditional learning environments, teachers are in the role of authority that defines and transfers information precisely, while in PM, teachers design the learning environment and assume a facilitating role. For example, S_{10} thinks that "…in the Purdue model, the teacher was the guide, in the traditional teaching, the teacher is the manager." and S_6 emphasizes the role of the teacher by saying, "…In traditional mathematics teaching, the teacher writes the subject on the board and explains it, and the student writes it and tries to understand it."

Additionally, it was seen that some of the PTs emphasized the class discussions and group work, especially in the second stage of PM, and stated that the model differs from traditional learning in terms of students' interaction with each other, expressing their ideas and thoughts clearly, learning from each other and developing social skills. For example, S_{11} said, "*There is more class discussion time is more in the Purdue model, but since such a period is not possible in traditional mathematics teaching, the Purdue model is more memorable."* Besides, S_{17} adds, "*... In the Purdue model, a group is formed, and information sharing takes place individually through the sociability of the students and group work*."

It was indicated that PTs, who compared PM with traditional teaching and emphasized the learning approach, asserted that students memorize knowledge in traditional teaching; therefore, permanent learning does not occur, while PM offers students more opportunity to think and, in this model, students learn by doing and experiencing.

PTs teaching mathematics with PM also argued that it is more appropriate to use it in the education of gifted students compared to traditional mathematics teaching in terms of enabling the enrichment of the objectives in the mathematics curriculum, improving the creativity of gifted students, and enabling them to establish relationships with other disciplines. For example, S_7 stated that gifted students are ignored in traditional teaching in terms of their different characteristics as follows:

> S_7: "*Traditional teaching ignores gifted students and ensures that every student receives the same level of education, but this model allows some students to receive a more comprehensive and advanced education.*"

In addition to this, emphasizing the development of creative thinking skills, S_9 compared the two and said, "*The Purdue model improves the creative thinking skills of gifted students. In traditional mathematics teaching, this is somewhat difficult. And it is also not possible. Traditional mathematics teaching is rote-based, and it is somewhat difficult for the student to progress systematically.*"

The findings regarding the opinions of PTs on the role of the teacher in PM are presented in Table 9:

Table 9. Opinions of PTs about the role of the teacher in PM

Theme	Participants	f	%
Designing a learning environment	S_1, S_2, S_3, S_4, S_5, S_6, S_7, S_8, S_{11}, S_{12}, S_{14}, S_{18}, S_{21}, S_{22}, S_{23}, S_{25}	16	%64
Guidance	S_3, S_4, S_5, S_9, S_{12}, S_{13}, S_{14}, S_{15}, S_{16}, S_{19}, S_{21} S_{22}, S_{25}	13	%52
Encouraging interaction	S_2, S_5, S_{12}, S_{20}	4	%16
Strategies to teach content knowledge	S_1, S_2, S_4, S_{10}, S_{11}, S_{13}, S_{16}, S_{17}, S_{21}, S_{23}	10	%40
Motivation	S_3, S_{10}, S_{17}	3	%12

As presented in Table 9, the most emphasized teacher role in PM by PTs was designing and guiding the learning environment. In this context, the majority of PTs highlighted that the teacher designed the learning environment and carried out learning activities at different stages of PM. In the first stage, most of the classroom activities were designed and directed by the teacher; in the second stage, he enabled small group work on a creative problem situation, and in the third stage, he played a role as a resource person in the application of what the students learned to real-life problems. For example, S_{12} expressed his opinion, "*In the first stage, the role of the teacher is to design various educational materials and enrich the learning environment. In the second stage, the teacher should focus on the groups and help the students. In the third stage, the teacher is in the position of a guide.*". However, more than half of the PTs put forward that the teacher was more active in the first stage of PM, the student was more active in the second and third stages, and the teacher supplied and guided the students to apply the knowledge and skills they learned to problem situations.

A few PTs indicated that the teacher encouraged interaction, especially in small group work in the second stage of the model. For example, S_5 suggested that "*The teacher provides students with the opportunity to interact with their peers.*" while S_2 emphasized the class discussion, saying, "*…it allows students to share their thoughts with the class.*" However, PTs also proposed that teachers use different strategies such as explaining the subject, asking questions, providing questioning, giving hints, and giving feedback to learn the basics and skills in PM. It was also observed that PTs stated that teachers motivated students to learn the lesson in this model. For instance, S_{10} says, "*The role of the teacher at different stages of the Purdue model is to make the student active in the lesson and play a more active role, to help them achieve the result by giving hints, give the necessary feedback*

where necessary, provide the students with a better understanding of the subject, motivate them before the lesson, and make the student more willing to participate in the lesson."

When all the findings related to the opinions of PTs are considered and evaluated, the inference is that they think that the model is effective in teaching by taking into account individual differences, understanding the subject well, and producing effective creative solutions to the problems related to the subject. Besides, PTs believe that this project-supported model, in which small group work and classroom discussions are conducted, is a model that differs from traditional teaching in terms of the student and teacher roles.

Conclusion, Discussion, and Suggestions

The results obtained in the study examining the behaviors of PTs in experiencing an activity designed within the framework of PM to support GS in heterogeneous classrooms and their opinions on this experience concluded that prospective teachers could benefit from PM in designing a student-centered learning environment in the teaching of mathematical concepts for the education of GS. The results obtained from prospective teachers' actions at various PM stages are given in the following paragraphs.

In the first stage of the Pythagorean Means activity prepared according to PM, discovering examples of Pythagorean means in daily life, choosing the average that best represents the data by finding the Pythagorean means in the data set, classifying, making estimations, determining the variables and finding the relations between the variables were examined with the focus of divergent thinking skills. The results reported that the prospective teachers had limited observations about the means, which mean covered which situation, and that they had incomplete or incorrect information, especially about GM and HM. However, thanks to the discussions made for PM, it was figured out that PTs were able to correctly associate means with their daily life situations; that is, there was a change in their awareness of the use of averages in daily life situations. This situation supports numerous studies that activities based on PM help students to build the basic knowledge and skill infrastructure and thus increase achievement (Altıntaş, 2009, 2014; Altıntaş et al., 2013; Altıntaş & Özdemir, 2009, 2010; Çalışkan-Karakulak, 2019; Kadir ve Rukman, 2021; Moon et al., 1994). Not surprisingly, this situation was also reflected in the opinions of the vast majority of PTs, and in teaching mathematics to GS, it was confirmed that PM's opinions on understanding the basics of the subject, establishing a connection between the subject and daily life, establishing a relationship between the concepts, and thus, would be effective in reinforcing the subject.

In the second stage, when creative problem-solving skills were examined in terms of recognizing the problem situation, generating ideas, and taking action, it was seen that PTs could solve difficult problem situations through in-group interactions. While different studies support it that the small group interaction and class discussions enabled by PM contribute to both collaborative learning and the development of critical thinking skills (Altıntaş, 2009, 2014; Çalışkan-Karakulak, 2019), PTs expressed this situation as a student-centered approach of the model that allows creating a classroom environment where group work, individual study, and class discussions are made. In this context, they supported the PTs' model with the opinion that it is different from traditional learning in terms of students' interaction with each other, expressing their ideas and thoughts clearly, learning from each other, and developing social skills. Besides, while PTs stated that the model enables students to develop their creative thinking skills by working on the creative problem situations of GS, this result was also reported by many studies (Altıntaş, 2009, 2014; Çalışkan-Karakulak, 2019; Kadir ve Rukman, 2021; Kutlu, 2013; Kolloff & Feldhusen, 1984).

In the third stage, when PTs were asked to develop a solution to the daily life situation with Pythagorean means, they generally showed an appropriate approach to challenging and generating ideas, but difficulties arose in providing evidence confirming the conclusion regarding the solution of the problem situation at the stage of action. The fact that all PTs have completed their project tasks can indicate that they take

responsibility. This situation is in parallel with the results of previous studies (Altıntaş, 2014; Çalışkan-Karakulak, 2019; Kutlu, 2013; Kolloff & Feldhusen, 1984). Additionally, the opinion of PTs that the model allows the creation of projects to be different from traditional teaching supports this situation.

Regarding the role of the teacher in PM, the opinions of PTs on designing a learning environment, guiding, encouraging, and motivating the interaction also overlap with the expected teacher role in PM, which has been argued and concluded by various studies (Altıntaş, 2014; Moon, 2004; Kolloff & Feldhusen, 1984; Moon et al., 2009).

It is clearly seen in both the actions and the opinions of the PTs that this experience has made the prospective teachers aware of offering a differentiated learning environment to the GS. Many studies report that teachers' proficiency in the education of GS increases when the learning environment is designed appropriately (Alkan et al., 2017; Nar & Tortop, 2017; Şahin, 2012). Based on this argument, PM can be used to improve the competencies of individuals in the position of instructors who guide GS.

This study was carried out with PTs who experienced an instructional design in the field of mathematics education in a limited time. However, PM can be presented to teachers in an in-service training program, both theoretically and practically, in longer-term research. Thus, the knowledge and skills of teachers to design activities suitable for PM for GS can be increased. In addition to this, it can be ensured that they develop an understanding of teacher and student behavior at various stages of the model.

In this study, the research activity was designed in the context of Pythagorean means within the framework of PM. However, new activities can be designed on different topics in mathematics based on PM, and applications can be conducted with PTs. It was observed that PTs had difficulties in generating ideas for the solution of the creative problem in the second and third stages of the model, and they generally could not solve the problems in more than one way. In undergraduate education, studies should be carried out with PTs to offer creative solutions to problems and have an original, flexible, and fluent thinking style. Additionally, it can be recommended to use differentiation strategies in heterogeneous classrooms in order for teachers to gain experience and develop students' creativity. It is known that there are studies examining the effects of PM on students' attitudes towards mathematics lessons, persistence, critical and creative thinking skills, and academic achievement. These studies could also be conducted with PTs as well. PM is one of the models that guide teachers on how to make differentiation in programs in regular classes where GS learn with their peers. From this point of view, the potential of the model can be revealed in different groups with experimental studies involving differentiation training in the context of PM to teachers. However, studies comparing PM with other models can be performed to support GS. As a result, this study explores that an event prepared within the framework of PM has developed a positive understanding of many aspects of PTs supporting GS in heterogeneous classrooms.

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iojes
www.iojes.net
International Online Journal of Educational Sciences
ISSN: 1309-2707

The Relationship Between Teachers' Emotional Labor and Digital Burnout: During the COVID-19 Pandemic Process

Research Article

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To cite this article: Bozkurt, B. (2022). The relationship between teachers' emotional labor and digital burnout during the covid-19 pandemic process, *International Online Journal of Educational Sciences*, *14*(4), 977-988.

ARTICLE INFO

Article History:

Received: 10.04.2022

Available online: 23.09.2022

ABSTRACT

In this research, it is aimed to reveal the relationship between the emotional labor exhibited by teachers and the digital burnout they experience in the education and training environment especially in the distance education process. The research was designed in the predict corelational model, which is one of the quantitative research methods. The sample of the study consists of 466 teachers, who were determined by the non-random convenient sampling method in the central districts of Gaziantep. Research data were collected through the "Emotional Labor Scale" and "Digital Burnout Scale" together with personal information. In the research, it was revealed that there was a positive and significant relationship between the emotional labor that teachers exhibited and the digital burnout they experienced, and it was also concluded that emotional labor is a variable that predicts digital burnout. On the other hand, it was seen that teachers have a high level of emotional labor and a low level of digital burnout perception. Considering the result that emotional labor explains digital burnout at a low level, it may be suggested to researchers to conduct studies to investigate different factors that explain digital burnout.

Keywords:
Digital burnout, Emotional labor, Structural equation modeling, Covid-19 pandemic

Introduction

People bring to organizations not only their material assets, but also their spiritual assets. Because humans are creatures that have social, emotional and biological characteristics. When management theories are examined in the historical context, it is a known fact that in the periods when the classical management approach was present, emotions were not considered important, only the material aspect of the human was taken into account, and the individual was seen as a machine. However, over time, as a result of studies such as Hawthorne studies, motivation theories, and needs theories, the fact that informal characteristics of individuals are important in organizations and that the social and emotional aspects of people should be taken

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DOI: https://doi.org/10.15345/iojes.2022.04.006

into account has emerged. In this context, the importance of emotions on working life is now accepted as an undeniable fact.

It can be said that the main element of educational organizations, which are accepted as open social structures and created to achieve certain goals, are teachers. In this context, the most effective task for educational organizations to reach the determined goals falls to the teachers. Teachers also contribute psychologically in schools along with their biological and cultural characteristics. Naturally, emotions and emotion management come into play while managing the education process. In crisis situations, it may be necessary to exhibit more emotional labor while managing the process in the education and training process. Especially the uncertainty experienced during the Covid-19 pandemic, changing routine working conditions, fear of getting sick, social isolation, and more exposure to technology (Hargreaves, 2021; Shah and Meghrajani, 2022; Yenen and Çarkıt, 2021) are more important for teachers. Has led to the necessity of exhibiting more emotional labor. During the Covid-19 pandemic, it has been seen that the lessons are carried out through distance education, communication with students, parents and other stakeholders, professional studies and social relations are carried out by technological methods. On the other hand, it is thought that with the new era that technology has entered our lives, teachers' spending a lot of time and energy with digital tools will also cause them to exhibit more emotional labor.

In the online education process, teachers started to interact more with digital tools, and the habits in the face-to-face education process began to change. This situation can be expected to cause teachers to exhibit more emotional labor. The fact that people have to act while performing their jobs can cause some problems, perhaps the most important of which is burnout (Şat et al., 2016). As a matter of fact, some studies in the literature have revealed that intense emotions in the teaching profession lead to burnout. (Doğan et al., 2016; Poyraz and Sürücüoğlu, 2015). In this context, it is a problem to reveal whether there is a relationship between the emotional labor that teachers exhibit and the digital burnout they experience.

Emotional Labor

Education employees are involved in the institutions they work in with their biological and sociological characteristics, as well as their psychological emotional aspects. Teachers working in schools, which are a psycho -social environment, may give different emotional reactions due to heavy workload, interpersonal relations, situations caused by the difficulty of working conditions, changing social, technological and cultural situations. Especially since the 2000s, technology has entered our lives more and more, as in all service areas, job descriptions, contents and applications in the education world have caused a digital process to intensify. As a result of this situation, teachers had to exhibit different emotional reactions to adapt to the new order.

It can be said that teachers have to exhibit more emotional labor due to intense workload, changing cultural and technological situations. In this direction, the concept of emotional labor has become the subject of academic studies in recent years (Antila et al., 2018; Moran and Çoruk, 2022) The concept of emotional labor is defined for the first time by Hochschild (1983) as individuals' regulation of their emotions in order to meet the organizational expectations specific to the role of their job. He states that the emotional labor exhibited is viewed differently, being superficial acting and deep acting. Ashforth and Humphrey (1993) stated that in addition to these display situations, natural emotions felt as a different emotional labor display dimension. Superficial role-playing is the process of keeping emotional expressions under control and harmonizing them with organizational expectations without changing the individual's real feelings (Grandey, 2003). Deep role playing is the attempt of individuals to feel emotions as they should behave in their relationships (Yürür and Ünlü, 2011). Basım and Beğenirbaş (2012) describe natural emotions as reflecting the emotions that the individual feels as he or she comes from. In the literature, it is seen that various studies have been carried out on the classification of emotional labor, such as frequency of display of emotions, rules, diversity, incompatibility (Morris & Feldman, 1996), emotional effort and emotional conflict (Kruml and Geddes, 2000).

The fact that interpersonal relations are at the forefront in the teaching profession, which is seen as a service area, reveals the fact that emotional labor is needed. Truta (2014) reveals that teachers should be in communication and interaction with people for a longer period of time compared to other professions and exhibit more emotional labor. It can be said that this situation will affect the performance of teachers in fulfilling their duties effectively and efficiently.

Digital Burnout

Individuals who encounter many difficulties in their daily and working life process try to find different solutions to cope with these situations, and when they cannot find a solution, they feel tired, exhausted and exhausted (Örücü et al., 2022). This tiring and energy-losing process can sometimes create a sense of burnout in individuals.

The definition of burnout was first defined by Freudenberger (1974) as "the state of failure, weariness and exhaustion that occurs as a result of excessive use of energy, power and internal resources". These situations that cause burnout may be related to the individuals themselves or may be caused by the environment in which they are located (Gülay, 2019). Circumstances originating from the environment may be due to the structure of the institution, working hours, work conditions, the perception of justice regarding the institution (Akyürek, 2020), as well as health, social and technological developments. Since the beginning of the century we live in, people spend a lot of time with digital tools both in their personal and social lives due to their work and social life. Especially with the Covid-19 pandemic, this period has become longer. It can cause stress, fatigue, depersonalization and loss of interest, as well as physical and mental problems in individuals who spend excessive time with digital tools (Erten & Özdemir, 2020). It can be said that spending a lot of time with digital tools, these tools taking control of a large part of our lives, can cause physical, mental and emotional problems, so digital burnout can be experienced due to the loss of energy power.

It can be said that the increase in digital content, online training, exams, and access to research-related resources in online environments in the education-teaching process may cause education workers to spend more time with digital tools and thus experience digital burnout quickly. Erten and Özdemir (2020) emphasize that the rapid spread and use of technology can cause mental and social problems in individuals.

Teaching is a profession performed in schools with open, social systems. It can be said that teachers' trying to establish relationships with other individuals in digital environments without direct communication and interaction may cause different emotional reactions, and as a result of this situation, they may experience burnout. It is stated that education workers, who need to be in mutual communication with individuals due to their profession, experience intense burnout (Güler and Yöndem, 2021).

Importance of Research

In the literature, studies examining the relationship between emotional labor exhibited by employees and burnout (Atınç, 2019; Barış-Eren, 2021; Bodenheimer and Shuster, 2020; Kadan and Neriman, 2018; Kinman et al., 2011; Tsang et al., 2021; Yılmaz-Daban, 2018) are encountered, However, studies on the relationship between emotional labor and digital burnout in educational institutions are limited in number and scope. In this context, it is expected that the relevant research will both contribute to the literature and guide the education workers who are actively working in providing ideas.

Purpose of the Research

It is seen that teachers have to use technology more intensively both due to the situation required by the age and especially with the Covid-19 pandemic process. Especially during the pandemic process, teachers were exposed to more technology and had to exert more emotional labor. Today, which is called the digital era, they have to use technology more. In this context, the aim of the research is to reveal the relationship

between the emotional labor that teachers exhibit and the digital burnout they experience especially in the distance education process. For this purpose, answers to the following research questions were sought:

- ✓ What is the level of emotional labor and digital burnout perceptions of the teachers participating in the research?
- ✓ Is there a significant relationship between emotional labor exhibited and digital burnout experienced according to teacher perceptions?
- ✓ Is the emotional labor predict digital burnout according to teacher perceptions significantly?

Methodology

Research Design

In the research, it is aimed to determine the relationship between the emotional labor that teachers exhibited while performing their profession, especially in the distance education process, and the digital burnout they experience. For this purpose, the research was carried out according to the predict corelational model. The predict corelational model, it is aimed to reveal the direction and strength of the relationship between two or more variables (Frankel et al., 2012).

Sample of the Study

The population of the research consists of teachers working in the center, districts and villages of Gaziantep. The sample of the study, consists of 467 teachers determined by non-random sampling method among the teachers who see in the village-town, district and city center in terms of both the impossibility of reaching the entire sample and the representativeness of the sample to the population. Convenience sampling, which is one of the non-random sampling methods, is determined by evaluating the appropriate and accessible units in the universe (Oral and Çoban, 2020). There are a total of 24,413 teachers in Gaziantep. According to Büyüköztürk et al. (2020), a sample of 379 people is sufficient in a universe of 20-30 thousand people. In this context, it can be said that the sample size of 466 people in the current research will be sufficient. The personal information of the teachers participating in the research is given in Table 1.

Table 1. Personal information of the teachers participating in the research

		n	**%**
Gender	Female	270	58
	Male	196	42
Marital status	Single	133	29
	Married	333	71
Educational status	Undergraduate	355	76
	Graduate	111	24
School grade	Pre-school	55	12
	Primary school	181	39
	Middle School	156	33
	High school	74	16
Seniority	1-5 years	108	23
	6-10 years	125	27
	11 years and above	233	50
Where the school is located	Village-Town	48	10
	District	102	22
	Provincial center	316	68
	Total	466	100

As can be seen in Table 1, 270 (58%) of the teachers participating in the research were female, 196 (42%) were male, 133 were single (29%), 333 were married (71%), 355 (%) 76 undergraduate, 111 (24%) graduate, 55 (12%) pre-school, 181 (39%) primary school, 156 (33%) secondary school, 74 (16%) high school Employees, 108 (24%) are teachers with 1-5 years of seniority, 125 (24%), 233 (24%) are teachers with 6-10 years of seniority, 233 (24%) are teachers with 11 years and seniority. At the same time, 48 (10%) teachers work in villages or towns, 102 (22%) in districts and 316 (68%) in provincial centers.

Data Collection and Tools

In order to collect data in line with the purpose of the research, a form consisting of three sections was prepared: "Personal information form" containing the demographic information of teachers, "Emotional Labor Scale" to determine the level of emotional labor exhibited by teachers and "Digital Burnout Scale" to determine the levels of digital burnout they experienced. The scale forms were delivered to the participants by the teachers and school principals working in different regions, both in person and via the online form.

Emotional Labor Scale: The Emotional Labor Scale was developed by Diefendorff et al., (2005) and adapted to Turkish by Basım and Beğenirbaş (2012) after validity and reliability studies. The scale consists of three dimensions: surface acting (6 items), deep acting (4 items), and natural emotions (3 items) and a total of 13 items (Ex. *I make an effort to actually feel the emotions I need to show*, *I do my best to feel the emotions I need to show students*…). The scale was designed in a 5 - point likert scale, ranging from never (1) to always (5). In the related adaptation study, the internal consistency coefficient of the scale was determined as .80 for the overall scale. In this study, Cronbach 's alpha values indicating the internal consistency coefficients of the scale were determined as .91 in the superficial acting dimension, .88 in the deep acting dimension, .81 in the natural feelings dimension, and .83 in the overall scale. In addition, as a result of the confirmatory factor analysis performed to determine the construct validity of the scale (RMSEA= .06, $\chi 2$/ df = 3.2, GFI= .94, CFI= .96, NFI= .95, TLI= .95), the three-dimensional structure of the scale was confirmed and the compliance well-being values indicate a good fit (Gürbüz & Şahin, 2018; Kline, 2015).

Digital Burnout Scale: The Digital Burnout Scale, developed by Erten and Özdemir (2020) to determine the digital burnout levels of individuals, consists of three dimensions, digital aging (12 items), digital deprivation (6 items), emotional exhaustion (6 items) and a total of 24 items (Ex. *Either my hand or my body aches as a result of constantly writing and checking messages*…). During the development of the scale, validity and reliability studies were carried out, and it was stated that Cronbach 's alpha values for the overall scale and its dimensions ranged from .94 to .86. The scale was designed as a 5 - point Likert scale, ranging from I strongly disagree (1) to I completely agree (5). In this study, Cronbach's alpha values, which indicate the internal consistency coefficients of the scale, were determined as .93 in the digital attrition dimension, .92 in the digital deprivation dimension, .93 in the emotional exhaustion dimension, and .96 for the overall scale. As a result of the confirmatory factor analysis performed to determine the construct validity of the scale (RMSEA= .07; $\chi 2$/ df = 3.5, GFI= .90, CFI= .93, NFI= .91, TLI= .92), the three-dimensional structure of the scale was confirmed and the compliance well-being values indicate an acceptable fit values (Gürbüz and Şahin, 2018; Kline, 2015).

The data collection process was carried out during the period when the Covid-19 pandemic continued and face-to-face education was restricted. During the data collection phase, general information was provided about the variables in order for the participants to answer the questions accurately, sincerely and sincerely, and it was promised that their personal information would not be used by different individuals or institutions. In addition, it was stated that the sincere and sincere answers they would give would increase the reliability of the research.

Data Analysis

SPSS 22 and AMOS 20 statistical package programs were used in the analysis of the research data. Before starting the data analysis, the normality of the data was tried to be determined, the data entered into the SPSS program were examined in terms of incomplete and incorrect values, and the extreme values were removed. In order to control the normality of the data, the skewness and kurtosis values were examined and it was seen that these values ranged from -1 to .22 both for the overall scales and for the dimensions . According to Tabachnick and Fidell (2007), the range of these values between -1 and +1 is sufficient to accept that the data show a normal distribution. Statistical analyzes such as arithmetic mean and standard deviation were used to determine the perceptions of participant teachers about the emotional labor they exhibit and the digital burnout they felt. While determining the perception levels of emotional labor and digital burnout exhibited by the teachers participating in the research, the arithmetic averages of 1.00-1.79 "strongly disagree", 1.80-2.59 "disagree", 2.60-3.39 "partially agree", 3.40-4.19 "agree", 4.20-5.00 "strongly agree" levels were taken as reference.

After accepting the assumption of normality, the relationship between dependent variable (digital burnout) and independent variable (emotional labor) was determined by Pearson Product Moments Correlation Coefficient (r) analysis. In addition, structural equation modeling (SEM) and path analysis were performed to determine the direct and indirect predictive power of the dependent variable on the independent variable . RMSEA (Root) for goodness values of model fit for path analysis mean square Error of Approximation), RMR (Root mean square Residual), $\chi 2$/ df (Chi-Square Goodness), GFI (Goodness of Fit Index), CFI (Comparative Fit Index), NFI (mormed Fit Index), IFI (Incremental Fit Index) fit indices were used. Chi-square value below 3 is excellent, below 5 is acceptable, RMR and RMSEA values below .80 are acceptable. Below .50 excellent goodness of fit, GFI, CFI, NFI and IFI values above .90 are acceptable. values of .95 and above indicate a range of excellent fit values (Hu & Bentler, 1999; Meydan & Şeşen, 2011; Schumacher & Lomax, 2004). The fact that the said goodness of fit values were within the specified ranges was interpreted as the model being theoretically verified.

Results

The findings regarding the emotional labor that the teachers exhibited and the levels of digital burnout they experienced are given in Table 2.

Table 2. Teachers' perception levels of variables

	n	$\bar{X}$	SD	Skewness	Kurtosis
Surface acting	466	2.68	1.14	0.09	-1.04
Deep acting	466	3,53	1.12	-0.59	-0.47
Natural emotions	466	4.22	0.75	-0.85	0.10
Emotional labor	466	3.30	0.73	0.04	-0.52
Digital aging	466	2.52	1.02	0.32	-0.74
Digital deprivation	466	2.34	1.10	0.59	-0.49
Emotional exhaustion	466	2.59	1.16	0.34	-0.79
Digital burnout	466	2.49	0.98	0.37	-0.54

When the emotional labor and digital perception levels of the teachers participating in the research were examined, it was determined that emotional labor was close to the level of agree ($\bar{X}$=3.30) (high level), and digital burnout was determined to be at the level of strongly disagree ($\bar{X}$=2.49) (low level).

Table 3. Teachers' perception levels of variables and the relationship between them

	1	2
1. Emotional labor	1	
2.Digital burnout	.30 **	1

As seen in Table 3, there are significant relationships between emotional labor and digital digital burnout. When the relationships between the variables are examined, it is seen that there is a positive (r =.30; p< .01) significant relationship between emotional labor and digital burnout. Sönmez and Alacapınar (2015), in predictive and exploratory research, the relationship must be at least .30 in order to be significant. In this context, it can be said that the value obtained in the table serves the purpose of the research and there is a significant relationship.

According to purpose of the research, Figure 1 shows the findings of structural equation modeling (SEM) and path analysis to determine the direct predictive power of the dependent variable on the independent variable.

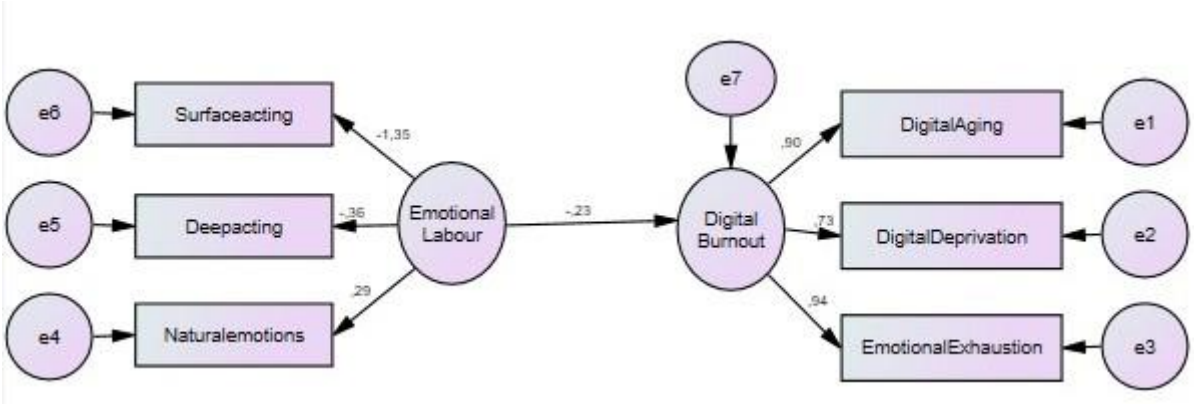

Figure 1. Standardized path analysis on the relationship between teachers' emotional labor and their digital burnout

In the examination of the standardized regression and t values of the model in Figure 1, no discrepancy was observed regarding the paths in the model. According to the standardized values obtained as a result of the path analysis, it is seen that the emotional labor exhibited by the teachers negatively predicted the digital burnout they experienced (t=-5.41; p <.05) . The acceptable and perfect fit indices related to the fit indices obtained as a result of the path analysis and the fit values obtained in the study are given in Table 4.

Table 4. Model goodness of fit indexes

Fit indices	Excellent fit values	Acceptable fit values	In this study	Decision
χ^2 /Df	≤3	≤5	2.99	Acceptable
GFI	≥.90	≥.85	.98	Excellent
RMSEA	≤.05	0.06-0.08	.065	Acceptable
RMR	≤.05	0.06-0.08	.050	Excellent
CFI	≥.97	≥.95	.98	Excellent
NFI	≥.95	≥.90	.97	Excellent
IFI	≥.95	≥.90	.97	Excellent

Table 4, it is seen that the values obtained show perfect fit values (Gürbüz & Şahin, 2018; Kline, 2015; Schumacker & Lomax, 2004; Tabachnick & Fidell, 2007). In other words, it can be said that the theoretical model established is in perfect harmony with the data. The findings regarding the variance in which the emotional labor exhibited by the teachers during the distance education process explains the digital burnout they experience are given in Table 5.

Table 5. Structural equation model standardized path coefficient

Fit Variables			coefficients
Emotional labor	⟶	Digital burnout	.232

* p <0.001; R=-.232; R^2= 0.05

Table 5, it is seen that the emotional labor exhibited by the teachers has the power to predict digital burnout, even if it is at a low level (5%). In other words, it can be stated that the emotional labor of teachers during the distance education process explains 5% of the digital burnout they experience.

Discussion and Conclusion

With the Covid-19 pandemic, which has affected the whole world, it has been observed that the use of technology in the field of education, as in all areas of life, has a very intense effect on our lives. With the impact of the Covid-19 pandemic, the use of technology has increased intensively among education stakeholders for many reasons such as distance education and communication (Pratama et al., 2020; Syarwani and Syahrani, 2022; Whitelaw et al., 2020). However, because the teachers were caught unprepared for this crisis situation caused by the pandemic, they had to experience an intense emotional process both to fight the crisis and to keep up with this change. The face-to-face education environments that teachers are used to have been replaced by environments where digital interaction is predominant. Many teachers have had to exert more intense emotional labor for their students' social-emotional development in the online environment, along with problems such as accessing information tools, secure internet network, coping with power cuts (Adarkwah, 2021). In this context, in this study, it is aimed to examine the relationship between the emotional labor that teachers exhibit and the digital burnout they experience especially in the distance education process.

In the research process, it was concluded that there was a low level of digital burnout perception, although more emotional labor was exhibited according to the perceptions of the participating teachers. Today, which is known as the age of technology, people are interacting more with digital tools both in their business life and in their social life. Thus, teachers can experience face-to-face communication, sharing and interaction at lower levels and may experience problems in the context of social-emotional interaction. It can be said that the low level of digital burnout experienced as a result of the research is a promising result. In support of these findings, Moran and Çoruk (2022) found in their study that the burnout experienced by teachers in return for their emotional labor is at a low level. On the other hand, as a result of the research, it was seen that the teachers' level of superficial role-playing was low while their natural role-playing behavior was high while exhibiting emotional labor. In this case, it has been revealed that they try to display their emotions sincerely and as they feel, rather than fake their emotions and show them differently in the digital teaching process.

As a result of the findings obtained within the scope of the research questions, it was seen that there was a positive relationship between the emotional labor exhibited by the teachers and the digital burnout they experienced. According to this result, it can be said that as the emotional labor of teachers while performing their duties increases, their digital burnout will increase. Supporting the research results, Brotheridge and Grandey (2002) stated that individuals who exhibited higher levels of emotional labor experienced more burnout. Bodenheimer and Shuster (2019) stated that emotional labor exhibited by teachers harms their feelings of expectation, internalization, and is associated with experiencing burnout. In this case, teachers who experience digital burnout are expected to display non-deep, insincere feelings with students and other stakeholders, that is, to display more superficial feelings. Erten and Özdemir (2021) emphasize that digital burnout can cause individuals to experience stress, fatigue, depersonalization, physical and mental problems over time.

As a result of the research, it was revealed that emotional labor is one of the factors explaining the digital burnout experienced by teachers. Nyanjom and Naylor (2020) stated that educators try to display emotions such as empathy, anxiety and sincerity in the online teaching process, and they have difficulties in managing and regulating emotions. Ashforth and Humphrey (1993) state that the person can express himself more easily in the context of meeting and meeting the expectations of his job, but emotional incompatibility can lead to negative consequences such as the alienation of the individual. Moran and Çoruk (2022) state that teachers experience difficulties while performing their profession due to many different reasons. The rapid development and intensive use of technology has begun to be reflected in the education and training process, and this intensive use may cause teachers to experience some problems stemming from digital technology (Erten and Özdemir, 2021). On the other hand, in their research in Polatçı and Özyer (2018), they stated that emotional labor was not a variable explaining burnout. This may be due to the perception difference of the participants involved in the sampling. In this study, it has been revealed that the emotional labor that teachers exhibit in the process of interacting more with digital technology in the education process is a factor that explains digital burnout. However, the emotional labor exhibited was shown to explain digital burnout at a low level (5%).

Limitations and Recommendations

Coincides with the most intense periods of closures in the Covid-19 pandemic, the collection of the majority of the data in the digital environment can be stated as the limitation of the research. On the other hand, it can be suggested that if the excessive use of digital technology by teachers increases, the emotional labor required by teachers will also increase, and the result is that education researchers and policy makers in education should work on the need to take precautions against teacher burnout. In addition, studies can be conducted on the reasons behind the burnout experienced by teachers and the existence of different situations that cause burnout. On the other hand, suggestions can be offered to researchers in the context of limited studies on digital burnout in educational organizations, examining different concepts that may be related to digital burnout, and examining the causes and problems of digital burnout experienced by education workers.

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International Online Journal of Educational Sciences

ISSN: 1309-2707

Investigation of the Effect of Digital Hologram Use on Academic Achievement and Attitude in Primary School Science Teaching*

Research Article

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To cite this article: Karali, Y., & Adiguzel, S. (2022). Investigation of the effect of digital hologram use on academic achievement and attitude in primary school science teaching, *International Online Journal of Educational Sciences*, *14*(4), 989-1005.

ARTICLE INFO

Article History:

Received: 19.04.2022

Available online: 23.09.2022

ABSTRACT

The aim of the research is to determine the effect of teaching using digital hologram technology in primary school science lessons on students' academic success, their attitudes towards science and the permanence of knowledge. For this purpose, hologram technology was designed as a course material and used in the 4th grade science lesson Earth's Crust and Movements of Our Earth. The study group of the research consists of the experimental and control group students determined by convenient sampling method from the 4th grade students studying in the state school in Haliliye district of Şanlıurfa province. Since the groups could not be determined randomly in the study, a quasi-experimental design with pre-test post-test paired control group was used. The implementation process of the research was completed in 5 weeks simultaneously in the experimental and control groups in the 2021-2022 academic year. The data obtained in the research were analyzed in the analysis program and interpreted in tables. In line with the findings, it was concluded that the teaching carried out with digital holograms is effective in increasing the academic success of the students, positively increases the attitude towards science and ensures the permanence of the acquired knowledge.

Keywords:
Science Teaching, Technology Supported Instruction, Digital Hologram, Primary School.

Introduction

Human beings spend time and energy by constantly engaging in various activities throughout their lives. However, it has been in a constant search to spend less time and energy, and this search has brought new inventions with it. While the developments in science and technology are increasing rapidly, each

*This article was prepared within the scope of the master's thesis named "The effect of the use of digital hologram on academic success and attitude in 4th grade science teaching"

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DOI: https://doi.org/10.15345/iojes.2022.04.007

invention has been the source of a new one and has continuously led to the development of technology. In our age, where global interaction is increasing gradually due to the development of technology, it has gained priority and importance for the individuals raised to be open to developments and adapt to new developments and technology. For this reason, individuals need to have the ability to absorb scientific knowledge and interpret it from different perspectives in order to follow and use technological developments. Science education plays an important role in understanding the facts underlying scientific knowledge and transferring them to daily life.

Science is the process of understanding existing information and producing new information in order to make sense of the environment where people live (Hançer, et al., 2003). Human beings have defined this acculturation process as education by adding their scientific knowledge to themselves (Güneş and Karaşah, 2016). The targeted gains in the education process are mostly acquired through the curriculum which is carried out in schools in a planned, programmed and systematic way (Küçükyılmaz, 2016). Science education, on the other hand, is expressed as practices aimed at making students gain skills such as research, examination, experimentation and observation, establishing cause-effect relationships, developing existing skills, and transferring the obtained knowledge to students (Günay Bilaloğlu, 2005, p. 72). With science education, individuals experience the feeling of discovery in all areas of life, not only limited to in-school activities.

The vision of Turkey for information technologies is to continuously support and develop the technology-integrated education system with innovations, and to provide project-based education with a student-centered education approach by using information technologies in every field (MEB, 2013). Technological equipment of teachers is seen as an important factor in order to achieve the targeted success in line with Turkey's education vision. As a matter of fact, it is expected that teachers and teacher candidates will be able to use technology effectively in the skill area determined as digital competence in the science curriculum. Digital competence is expressed in the curriculum as the critical and safe use of technology for daily life, work and communication. It has been emphasized that competence should be supported through skills such as using computers in accessing and evaluating information, producing, transferring and sharing information, as well as participating in various common networks and communicating via the internet (MEB, 2018).

Hologram is a combination of the Greek words holos (whole appearance) and gramma (written, letter). Holograms are called three-dimensional images created by rays coming from a coherent light source (Sudeep, 2013, p. 63). The process of obtaining a three-dimensional image using holographic rays; A hologram is a three-dimensional image obtained using rays (Yıldız, 2020, p. 3). Elmorshidy (2010, p. 104) explained holography as a method used to record light patterns, and hologram as the reproduction of these patterns as three-dimensional images. With its simple definition, it is stated as a way of presenting three-dimensional pictures that you can observe by walking around (Katsioloudis and Jones, 2018, p. 38). Although hologram uses similar technologies with augmented reality and virtual reality applications, it is a completely different system from these technologies. The three-dimensional image formed by the mixture of laser beams, which ensures that the image system sent to the reconstructed rays continues to see even if there is no image (Katsioloudis and Jones, 2018, p. 38), is the three-dimensional photograph of the object (Işık, 2013, p. 213). Three-dimensional images affect people's mental stimuli and enable them to use their knowledge, comprehension and reasoning skills. After these skills are employed, it is easier for people to construct what they see in their minds (Walker, 2013).

It is aimed, with the use of innovative approaches in the future and integrating technology into education, to raise well-equipped individuals who can keep up with the requirements of the age, integrate with science and technology. In addition, it is expected that the technological knowledge levels of individuals studying in technology-supported education environments will increase. Individuals with technological

knowledge can better benefit from today's educational opportunities and benefit from the advancement of technology in education (Türk, 2020). For this reason, using technology-supported materials in today's education system has become a necessity rather than a privilege. It is thought that the teaching to be made by making use of virtual reality, augmented reality and digital holograms, which are increasingly used today, can contribute to the education system and create a different perspective for the future of the education system. Technology makes information more interesting for children, and with education using technology, abstract concepts that children have difficulty in making sense of in their mental schemas can be embodied, thus contributing to their mental knowledge (Kol, 2021).

It is observed that most of the students in primary school have challenges in science lessons. For that reason, the science lesson is perceived as a challenging lesson and students may perceive that they will fail in this lesson if it is not carried out with concrete activities. In this sense, in order to achieve the desired success in the science course, it is necessary to prevent the negative attitudes of the students towards the course. In order to break this negative attitude, it is seen as a necessity to increase students' interest in the lesson by using different methods, techniques and tools in the science lesson (Önen, 2005). In the literature review, different skills of digital holograms such as problem solving, spatial thinking (Okulu and Ünver, 2016), communication, empathy (Kim et al., 2018), visualization (Roslan and Ahmad, 2017) and creative thinking (Alhayki and Shah, 2016) were evaluated. been found to contribute to its development. Considering that today's students live together with technology, it is thought that the use of digital holograms, one of the technology-supported materials in science lessons, will increase the interest in the lesson and contribute to the educational life of the students.

Digital holograms are educational materials that are easy to make, easy to use, and inexpensive. Evidence for saving time, facilitating learning and increasing the permanence of the learned information in the learning-teaching process will popularize the use of holograms in science lessons. In addition, the use of innovative technologies in science teaching will increase students' interaction with technology, and new and technological materials used in teaching environments will attract students' attention and increase their interest and performance in the course. Multi-sensory learning materials will enrich students' perspectives and enable the development of higher-order thinking skills. The contributions it will bring to education, students and teachers make this research important. In this context, the answers to the following questions are investigated in the study:

- Does the use of digital hologram technology increase the academic success of students in science lessons?
- Do courses conducted using digital hologram technology have an effect on students' attitudes towards science courses?
- Does the use of digital hologram technology ensure the permanence of students' knowledge?

Method

This section includes information about the research model, study group, data collection tools, data analysis and experimental application process.

Model of the Research

In this study, a quasi-experimental design with pretest-posttest paired control group, one of the quantitative research methods, was used in order to determine the effect of using digital holograms in science teaching on students' academic achievement, attitudes towards science and permanence of knowledge. According to Oral and Çoban (2020), experimental methods are generally used to evaluate the product or teaching methods. Experimental research allows the application of comparable procedures and the

examination of the effects of the results. For this reason, it is one of the research models in which the most precise interpretations can be reached (Büyüköztürk, et al., 2020). Quasi-experimental design is a method which is commonly used in studies where groups cannot be determined randomly (Cohen, et al., 2002).

In the experimental design used in the research, the independent variable whose effect on the experimental group will be examined is the material used in the conduct of the science course. Teaching was carried out with learning methods and activities carried out using digital holograms in the experimental group, and learning methods and activities in which digital holograms were not used in the control group. No other variable that could affect the measured characteristics on the group was used. The same dependent variables such as academic achievement, attitude towards science and permanence were observed in both groups; Comparisons were made within and between groups using the pre-test, post-test and permanence test scores.

Study Group of the Research

The study group of the research consists of the experimental and control group students determined by convenient sampling method from the 4th grade students studying in the state school in Haliliye district of Şanlıurfa province. Convenience sampling method is explained as the selection of the population that is suitable for practice and easily accessible due to constraints such as labor, time and money (Ocak, 2019; Büyüköztürk, 2020).

Six 4th grade branches were selected as study groups, since 4/A and 4/D branches had similar characteristics according to the pre-test results of the branches that had the Attitude towards Science Scale and Academic Achievement Test applied before starting the application. Groups are randomly assigned, and 4/A branch was determined as the experimental group and 4/D branch as the control group. There were 24 students in the experimental group and 25 students in the control group.

Data Collection Tools

In the study, the data were collected by answering the scales of "The Earth's Crust and the Movements of Our Earth Academic Achievement Test" and "Attitude Towards Science" by the students. In order to measure the academic achievement of the students and to understand whether the learning is permanent or not, the Academic Achievement Test was developed by the researcher for the 4th grade science course Earth's Crust and Movements of Our Earth unit. This test was used as a pre-test, post-test and permanence test in the research.

The academic achievement test consists of 20 multiple-choice questions, all of which have four options. In order to determine the items that should be included in the test, the achievements in the MEB 2018 science curriculum were taken as a basis. The test measures students' academic achievement in the Earth's Crust and Movements of Our Earth unit. The highest score that can be obtained from the test is 20 points. The test was prepared by the researcher, validity and reliability studies were carried out and made ready for application. As a result of the pilot application with 125 participants in total, the mean item difficulty value of the developed academic achievement test was calculated as 0.50, the mean distinctiveness as 0.46 and the reliability coefficient (Cronbach Alpha) as 0.80.

In the study, the 30-item "Attitude Towards Science Scale" developed by Baykul (1990) was used to measure students' attitudes towards science. The Cronbach Alpha reliability coefficient of the scale was found to be 0.94. There are 15 positive and 15 negative statements in the scale. Negative statements were scored by reversing. The highest 150 and the lowest 30 points can be obtained from the scale, and a high score indicates a positive attitude. The same scale was applied to 232 participants by performing a preliminary study by

Güney (2019), and a reliability study was conducted again. In the study, the Cronbach Alpha reliability coefficient of the scale was found to be 0.91.

Analysis of Data

In the first stage of the study, in order to determine the similarity of the groups and to determine the preliminary knowledge of the students about the unit, the achievement test and the attitude scale pre-test were applied to all groups one week before the application and the experimental and control groups were determined. One week after the experimental application, the post-test was administered to the students in the experimental and control groups. Six weeks after the post-test application, the permanence test was applied to the experimental and control group students in order to determine the permanence of the topics covered in the unit.

The collected data were analyzed in the analysis program to test whether there was a significant difference between the experimental and control groups in terms of academic achievement and attitude towards science. Statistical analyzes were interpreted in tables.

In order to apply parametric tests, the normality distributions of the obtained data were examined. Since the number of the study group was less than 50, the Shapiro-Wilk test was used to test the normality of the distribution. Since the data showed a normal distribution, T-Test was used for independent (unrelated) samples in cases where the independent variable was two groups in the analysis, and T-Test was used for dependent (related) samples in the analysis of repeated measurements in which the independent variable was one group. Two-factor ANOVA test was used for mixed measurements in the analysis of two-factor comparisons where the independent variable was two groups and repeated measurements were included.

Experimental Implementation Process

The implementation process of the research was planned as five weeks in accordance with the science curriculum. The studies were carried out with the experimental and control groups for 15 lesson hours in five weeks. At the beginning of the process, AAT and ATSS prepared by the researcher were applied to the experimental group. For the experimental group, hologram videos and daily plans were prepared regarding the achievements of the 4th grade science lesson Earth's Crust and Movements of Our Earth. The lessons conducted throughout the process were supported by digital hologram material. In order to better use the digital hologram material prepared during the lesson, the students in the classroom where the application was made were divided into two groups and the application was carried out by positioning the digital hologram material around it in a U order.

Introductory activities in the preparation stage for the lesson were supported by the textbook. The prior knowledge of the students was checked, and missing information, if any, was corrected. In the development part, the videos prepared in accordance with the unit acquisitions were shown to the students using digital hologram material. During the application, the videos were paused and the students were asked, "What kind of changes do we observe on the Earth during the rotation movement, in which direction is the Earth spinning?" Questions were asked to discover such information. In this way, development activities were completed by question-answer method in both groups. At the end of the application, the lesson was concluded by summarizing the information learned from the videos that were shown to the students using digital hologram material. After the end of the five-week application period, AAT and ATSS were applied again to the experimental group students, and the application process was completed.

In the same way, AAT and ATSS were applied in the control group at the beginning of the five-week period. During the 15-hour period, in accordance with the constructivist approach, the achievements of the 4th grade science lesson Earth's Crust and Movements of Our Earth were covered with textbooks and

activities. At the end of the five-week period, AAT and ATSS were re-applied to the control group students and the application process was completed.

The necessary ethics committee approval was obtained before the research was conducted (İnönü University Social and Human Sciences Scientific Research Ethics Committee / Date: 23.08.2021 / No: 2021/15-9).

Findings

In this section, the findings obtained from the statistical analyzes regarding the data collected as a result of the application are included under the headings.

Findings Related to Academic Success

Before the application, the Earth's Crust and the Movements of Our Earth Academic Achievement Test was applied to the experimental and control group students, and independent (unrelated) samples t-test was applied to determine whether there was a significant difference between the groups' AAT score averages. The findings obtained from the data are given in Table 1.

Table 1. Independent Groups T-Test Results of AAT Pre-Test Scores of Experimental and Control Group Students

Groups	n	$\bar{x}$	S	sd	t	p
Experimental	24	10.62	2.65	47	0.19	.84
Control	25	10.80	3.43			

In Table 1, the arithmetic mean of the AAT pre-test scores of the experimental group students using digital hologram technology is 10.62; The arithmetic mean of the AAT pre-test scores of the control group students who did not use digital hologram technology was determined as 10.80. According to the findings, there was no statistically significant difference between the mean scores of the students in the experimental and control groups from the AAT pre-test ($t=0.19$, $p>0.05$). It can be said that the groups were at a similar level to each other in terms of AAT pre-test scores before the application.

Table 2. Dependent Groups T-Test Results of AAT Pre-Test and Post-Test Scores of Experimental Group Students

Tests	n	$\bar{x}$	S	sd	t	p
Pre-test	24	10.62	2.65	23	6.82	.015
Post-test	24	14.33	2.61			

In Table 2, by looking at the AAT pre-test and post-test scores of the experimental group students and the dependent groups t-test results, the arithmetic mean of the AAT pre-test scores of the experimental group students using digital hologram technology is 10.62, the arithmetic mean of the post-test scores was determined as 14.33. According to the findings, there is a statistically significant difference between the AAT pre-test and post-test mean scores of the students in the experimental group in favor of the post-test ($t=6.82$, $p<0.05$). With this finding, it can be said that the digital hologram technology used in the experimental group was effective in positively increasing the academic achievement in the 4th grade science course Earth's Crust and Movements of Our Earth unit.

Before and after the application, the Earth's Crust and the Movements of Our Earth Academic Achievement Test was applied to the control group students. In order to determine whether there is a significant difference between the pre-test and post-test AAT score averages of the control group students, the dependent (related) samples t-test was applied. The findings obtained from the data are given in Table 3.

Table 3. Dependent Groups T-Test Results of AAT Pre-Test and Post-Test Scores of Control Group Students

Tests	n	$\bar{x}$	S	sd	t	p
Pre-test	25	10.80	3.43	24	3.67	.001
Post-test	25	12.40	2.69			

In Table 3, the arithmetic mean of the AAT pre-test scores of the control group students, who did not use digital hologram technology, was 10.80, by looking at the AAT pre-test and post-test scores of the control group students and the dependent groups t-test results; The arithmetic mean of the post-test scores was determined as 12.40. According to the findings, there is a statistically significant difference in favor of the posttest between the AAT pretest and posttest mean scores of the students in the control group ($t=3.67$, $p<0.05$). With this finding, it can be said that the teaching carried out without using digital hologram technology in the control group was effective in positively increasing the academic achievement in the 4th grade science course Earth's Crust and Movements of Our Earth.

At the end of the application, the Earth's Crust and the Movements of Our Earth Academic Achievement Test was applied to the experimental and control group students. Since the findings obtained from the post-test results do not directly reflect the individual development of the students and the effect of the experimental process on success, the students' AAT post-test scores and AAT pre-test scores were analyzed by applying a two-factor ANOVA test. The findings obtained from the data are given in Table 4.

Table 4. AAT Mean and Standard Deviation Values of Experimental and Control Group Students

Groups	Pre-test			Post-test		
	n	$\bar{X}$	S	n	$\bar{X}$	S
Experimental	24	10.62	2.65	24	14.33	2.61
Control	25	10.80	3.43	25	12.40	2.69

As it can be seen in Table 4, the AAT average score of the experimental group students was 10.62 before the application, while this value was 14.33 after the application. The same mean scores of the control group students were found to be 10.80 and 12.40, respectively. According to this finding, it is seen that there is a positive increase in the academic achievement of both the experimental group students and the control group students.

The findings of the two-factor ANOVA results are given in Table 5 to see whether the academic achievements of the experimental group taught using digital hologram technology and the control group students taught without digital hologram technology differ significantly in their individual development after the application compared to the pre-application.

Table 5. ANOVA Results of AAT Pre-Test and Post-Test Scores of Experimental and Control Group Students

Partial Source of Variance	KT	Sd	KO	F	P	Partial η^2
Between Subjects	657.41	48				
Groups (Experimental-Control)	18.93	1	18.93	1.40	.244	0.03
Error	638.48	47	13.59			
In-subjects	338.22	49				
Measurement (pre-post tests)	172.52	1	172.52	58.55	.000	0.55
Group*Measurement	**27.22**	**1**	**27.22**	**9.23**	**.004**	**0.16**
Error	138.48	47	2.95			
Total	995.62	97				

According to this finding, the academic achievements of the students in the experimental group taught using digital hologram technology and the control group students taught without using digital hologram technology in the unit of Earth's Crust and Movements of Our Earth differed significantly from pre-application to post-application. The joint effect of measurement factors on academic achievement was found to be significant, F (1, 47) = 9.23, $p<0.05$, Partial $\eta^2 = 0.16$. A partial eta-square value of 0.14 and above indicates that it has a great influence (Cevahir, 2020; Karakaş, 2017). The obtained 0.16 eta-square value shows that 16% of the variance is explained by the independent variable (Rosnow and Rosenthal, 2008).

This finding shows that teaching using digital hologram technology and teaching without using digital hologram technology have different effects on increasing the academic achievement of students in the unit of Earth's Crust and Our Earth's Movements. It is understood that the education using digital hologram technology, which contributes more to increasing AAT scores than before the application, is more effective in increasing the academic success of the students in the 4th grade science course Earth's Crust and Movements of Our Earth compared to the teaching conducted without using digital hologram technology.

Findings Regarding Attitude

Before the application, the Attitude Towards Science Scale (ATSS) was applied to the students in the experimental and control groups, and the independent (unrelated) samples t-test was applied to determine whether there was a significant difference between the groups' ATSS score averages. The findings obtained from the data are given in Table 6.

Table 6. Independent Groups T-Test Results of ATSS Pre-Test Scores of Experimental and Control Group Students

Groups	n	$\bar{x}$	S	sd	t	p
Experimental	24	113.75	9.72	47	1.44	.156
Control	25	109.16	12.35			

In Table 6, by looking at the independent groups t-test results of the experimental and control group students' ATSS pre-test scores, the arithmetic mean of the ATSS pre-test scores of the experimental group students using digital hologram technology is 113.75; The arithmetic mean of the ATSS pre-test scores of the control group students who did not use digital hologram technology was determined as 109.16. According to the findings, no statistically significant difference was found between the mean scores of the students in the experimental and control groups from the ATSS pre-test ($t=1.44$, $p>0.05$). It can be said that the groups were at a similar level to each other in terms of ATSS pre-test scores before the application.

Before and after the application, the Attitude Towards Science Scale was applied to the students in the experimental group. In order to determine whether there is a significant difference between the pre-test and post-test ATSS score averages of the experimental group students, the dependent (related) samples t-test was applied. The findings obtained from the data are given in Table 7.

Table 7. Dependent Groups T-Test Results of ATSS Pre-Test and Post-Test Scores of Experimental Group Students

Tests	n	$\bar{x}$	S	sd	t	p
Pre-test	24	113.75	9.72	23	6.97	.000
Post-test	24	132.87	11.40			

In Table 7, the arithmetic mean of the ATSS pre-test scores of the experimental group students using digital hologram technology is 113.75; The arithmetic mean of the post-test scores was determined as 135.87. According to the findings, there is a statistically significant difference in favor of the posttest between the ATSS pretest and posttest mean scores of the students in the experimental group ($t=6.97$, $p<0.05$). With this finding, it can be said that the digital hologram technology used in the experimental group was effective in positively

increasing the attitudes towards science in the 4th grade science lesson Earth's Crust and Movements of Our Earth.

Before and after the application, the Attitude Towards Science Scale was applied to the control group students. In order to determine whether there is a significant difference between the pre-test and post-test AAT score averages of the control group students, the dependent (related) samples t-test was applied. The findings obtained from the data are given in Table 8.

Table 8. Dependent Groups T-Test Results of ATSS Pre-Test and Post-Test Scores of Control Group Students

Tests	n	$\bar{x}$	S	sd	t	p
Pre-test	25	109.16	12.35	24	5.43	.000
Post-test	25	119.48	18.06			

In Table 8, the arithmetic mean of the ATSS pre-test scores of the control group students who did not use digital hologram technology was 109.16; The arithmetic mean of the post-test scores was determined as 119.48. According to the findings, there is a statistically significant difference between the ATSS pretest and posttest mean scores of the students in the control group in favor of the posttest ($t=5.43$, $p<0.05$). With this finding, it can be said that the teaching carried out without using digital hologram technology in the control group was effective in positively increasing the attitudes towards science in the 4th grade science course Earth's Crust and Movements of Our Earth unit.

At the end of the application, the Attitude Towards Science Scale was applied to the students in the experimental and control groups. Since the findings obtained from the post-test results would not directly reflect the effect of the experimental procedure on the students' attitudes towards science, the students' ATSS post-test scores and ATSS pre-test scores were analyzed by applying the two-factor ANOVA test. The findings obtained from the data are given in Table 9.

Table 9. ATSS Mean and Standard Deviation Values of Experimental and Control Group Students

Groups	Pre-test			Post-test		
	n	$\bar{X}$	S	n	$\bar{X}$	S
Experimental	24	113.75	9.72	24	132.87	11.40
Control	25	109.16	12.35	25	119.48	18.06

As it can be seen in Table 9, the average score of the experimental group students was 113.75 before the application, while this value was 132.87 after the application. The same mean scores of the control group students were found to be 109.16 and 119.48, respectively. According to this finding, it is seen that there is a positive increase in the attitudes of both the experimental group students and the control group students towards science.

The findings of the two-factor ANOVA results are given in Table 10 to see whether the attitudes of the students in the experimental group taught by using digital hologram technology and the control group students taught without using digital hologram technology differ significantly after the application compared to before the application.

Table 10. ANOVA Results of ATSS Pre-Test and Post-Test Scores of Experimental and Control Group Students

Partial Source of Variance	KT	Sd	KO	F	P	Partial η^2
Between subjects	15483.06	48				
Groups (Experimental-control)	1980.37	1	1980.37	6.89	.012	0.13
Error	13502.69	47	287.29			
In subjects	8940.91	49				
Measurement- pre test post test	5308.21	1	5308.21	79	.000	0.63
Group*Measurement	**474.66**	**1**	**474.66**	**7.06**	**.011**	**0.13**
Error	3158.03	47	67.19			
Total	24423.97	97				

According to this finding, the attitudes towards science of the experimental group taught using digital hologram technology and the control group taught without using digital hologram technology differed significantly from pre-application to post-application; co-effect was found to be significant, F (1, 47) = 6.89, $p<0.05$, Partial η^2 = 0.13. The partial eta-square value being in the range of 0.06-0.14 indicates that it has an average impact power (Cevahir, 2020; Karakaş, 2017). The obtained 0.13 eta-square value shows that 13% of the variance is explained by the independent variable (Rosnow and Rosenthal, 2008).

This finding shows that teaching using digital hologram technology and teaching without using digital hologram technology have different effects on increasing students' attitudes towards science. It is understood that the education in which digital hologram technology is used, which contributes more to increasing the ATSS scores than before the application, is more effective in increasing the attitudes of the students towards science in the 4th grade science lesson Earth's Crust and Movements of Our Earth unit, compared to the teaching conducted without using digital hologram technology.

Findings Regarding Permanence

At the end of the application and six weeks after the application, the Earth's Crust and the Movements of Our Earth Academic Achievement Test was applied to the experimental group students. In order to determine whether there is a significant difference between the posttest and permanence test AAT score averages of the experimental group students, the dependent (related) samples t-test was applied. The findings obtained from the data are given in Table 11.

Table 11. Dependent Groups T-Test Results of AAT Post-Test and Permanence Test Scores of Experimental Group Students

Tests	n	$\bar{x}$	S	sd	t	p
Post-test	24	14.33	2.61	23	1.93	.065
Permanence	24	13.70	2.42			

In Table 11, the arithmetic mean of the AAT post-test scores of the experimental group students using digital hologram technology is 14.33; The arithmetic mean of the permanence test scores was determined as 13.70. According to the findings, there is no statistically significant difference between the AAT post-test and permanence test mean scores of the students in the experimental group ($t=1.93$, $p>0.05$). With this finding, it can be said that the digital hologram technology used in the experimental group is effective in ensuring that the academic knowledge in the 4th grade science lesson Earth's Crust and Movements of Our Earth is permanent.

At the end of the application and six weeks after the application, the Earth's Crust and the Movements of Our Earth Academic Achievement Test was applied to the control group students. In order to determine whether there is a significant difference between the post-test and permanence test AAT score averages of the control group students, the dependent (related) samples t-test was applied. Findings from the data are given in Table 12.

Table 12. Dependent Groups T-Test Results of AAT Posttest and Permanence Test Scores of Control Group Students

Tests	n	$\bar{x}$	S	sd	t	p
Post test	25	12.40	2.69	24	3.57	.002
Permanence	25	11.24	2.75			

In Table 12, the arithmetic mean of the AAT post-test scores of the control group students who did not use digital hologram technology was 12.40; The arithmetic mean of the permanence test scores was determined as 11.24. According to the findings, there is a statistically significant difference in favor of the posttest between the AAT posttest and permanence test mean scores of the students in the control group ($t=3.57$, $p<0.05$). With this finding, it can be said that the teaching carried out without using digital hologram technology in the control group is not effective in ensuring that the academic knowledge in the 4th grade science course Earth's Crust and Movements of Our Earth unit is permanent.

Six weeks after the application, digital hologram technology is effective in ensuring that the academic knowledge of the experimental group students is permanent; The teaching conducted without using digital hologram technology was ineffective in ensuring the permanence of the academic knowledge of the control group students. For this reason, the two-factor ANOVA test of the effect of teaching using digital hologram technology and teaching without using digital hologram technology on permanence was not included.

Conclusion, Discussion and Recommendations

In the study, it was aimed to determine the effect of teaching using digital hologram technology in primary school science lessons on students' academic success, their attitudes towards science and the permanence of knowledge. For this purpose, hologram technology was designed as a course material and used in the 4th grade science lesson Earth's Crust and Movements of Our Earth.

In the research, it was concluded that the teaching carried out using digital hologram technology is more effective in increasing academic achievement than the teaching carried out without using digital hologram technology. The digital hologram technology used in the experimental group gave the students the opportunity to establish a cause-effect relationship by examining the Earth's movements and landforms in three dimensions. In this way, it is thought that students can structure their cognitive processes more meaningfully. Aslan and Erdoğan (2017) revealed in their studies that visual-based interactive technologies enable to learn information faster, easier and permanently. Similarly, Güntepe (2020, p. 236) reached the conclusions that it helped preschool students to embody abstract concepts and construct scientific knowledge in their minds through realistic three-dimensional images obtained with hologram technology in the teaching of Earth and space science concepts with hologram technology, and the results of this thesis study. Overlaps. In addition, there are various studies in the literature that conclude that digital hologram technology is effective in increasing academic achievement (Barkhaya and Halim, 2016; Kim et al., 2018; Lee, 2019; Mnaathr and Basha, 2013; Orcos and Magreñán, 2018; Sertalp, 2010). Digital holograms, which enable the creation of qualified and student-centered teaching processes, enable students to participate actively in the process (Aina, 2010; Alhayki and Shah, 2016; Olson, 2013) and to connect with real life (Jones et al., 2007; Park, 2014). Similar to the results of research involving innovative technologies (Garzon and Acevedo, 2019; Küçük et al., 2016; Özdemir et al., 2018; Türksoy, 2019; Yılmaz, 2015), the use of different and innovative technologies such as

digital holograms in teaching environments can be integrated into teaching environments. It is thought to be due to facilitating the activities, giving the student the opportunity to do it again, addressing multiple sensory organs and reducing the cognitive load of the student.

In the research, it was concluded that the teaching carried out using digital hologram technology is more effective in increasing the attitude towards science than the teaching carried out without using digital hologram technology. The fact that digital hologram technology is a remarkable material that provides a three-dimensional image that students have not encountered before can be stated as the most important reason for the positive increase in students' attitudes towards the lesson. As a matter of fact, Çevik et al. (2016) stated that three-dimensional hologram technologies create effective and interesting learning processes thanks to the perception of reality created. Türk (2020) developed and applied a scale to measure secondary school students' attitudes towards digital holograms. The conclusion that digital holograms affect students' attitudes towards the lesson in a positive way supports the result of this research. Similarly, there are different studies in the literature that conclude that digital holograms facilitate students' motivation to the lesson and develop positive attitudes towards the lesson in the teaching process (Bai and Black, 2005; Barkhaya and Halim, 2017; Engin, 2020; Güntepe, 2020; Lee, 2013; Lu et al., 2011; Kerawalla et al., 2006; Orcos and Magreñán, 2018; Sertalp, 2010; Walker, 2013). The students were not interviewed within the scope of the research, but during the application process, the students often stated that they found the lessons enjoyable and it was observed that their interest in the lesson increased. Although not requested, it is an indication of interest that students make visual studies on the subject of the lesson and present them to the researcher in the fourth week of the application process. The possible reasons for this situation are that the hologram material prepared offers a different and new experience for the students, that the hologram videos are kept short, not exceeding the attention span of the students, and that they are supported with music. Arıoğlu and Uzun (2008) stated that the use of digital technologies in the teaching process facilitates and enriches teaching and makes the course interesting. Öngöz and Baki (2010) concluded that the use of digital holograms will become widespread in the near future and will become a part of life. In addition, they emphasized that holograms would reduce the difference between distance education and face-to-face education in terms of interaction opportunities and creating a high sense of reality.

As a result of the experimental research, it was seen that the teaching method using digital hologram technology was effective in ensuring the permanence of the students' knowledge, while the teaching carried out without using digital hologram technology was not effective in ensuring the permanence of the students' knowledge. In the process, students are not content with the mere knowledge given by the teacher, but they make sense of the knowledge by reasoning between their old learning and new learning (Chan, 2003). It is thought that the digital hologram material used in the teaching process is suitable for repetition, attracts students' attention, increases motivation, and helps to connect with life thanks to the high perception of reality it provides, which is effective in ensuring the permanence of knowledge. Türksoy (2019) concluded that technological materials integrated with the teaching method ensure permanence in success depending on the process. Again, in line with this result of the research, there are different studies in the literature that concluded that teaching methods supported by innovative technologies provide permanence in knowledge (Güntepe, 2020; Özdemir, 2017; Yılmaz and Batdı, 2016). As a result of the results and literature review, it is thought that digital holograms, which are effective in increasing the academic success of students and ensuring the permanence of the learned information, should be given more space in educational environments.

Suggestions

Based on the findings and results obtained from the research, the following recommendations are included.

1. In the research, it was concluded that digital holograms are effective in increasing the academic success of students. In order to generalize this result, research can be done at different grade levels and in different courses.
2. According to the results obtained from the research, it was seen that digital holograms positively increased the attitude towards science. In this direction, studies can be carried out to investigate the effect on students' attitudes in different courses.
3. It has been seen that digital hologram supported teaching is effective in ensuring the permanence of information. Based on this, it is recommended that teachers include the use of digital holograms in the course in accordance with their curriculum.
4. As a result of the literature review, it has been seen that there are few experimental studies similar to the research conducted. The studies to be carried out on the inclusion of digital holograms in the education and training process should be increased in terms of quality and quantity.
5. It was observed that the most striking aspect of this research was the three-dimensional images used in the material. Based on this, it is suggested that the materials to be developed later should be designed in three dimensions. Digital hologram material can be used to support teaching in primary school science lessons and to eliminate the lack of material.
6. The dependent variables of this study were determined as academic achievement, attitude and permanence of knowledge. Research can be conducted to determine the effect of using digital holograms on students' different skills such as problem solving, spatial thinking, critical thinking, communication, creativity and productivity.
7. In this research, the Earth's Crust and the Movements of Our Earth Academic Achievement Test developed by the researcher and Attitude Towards Science Scale developed by Baykul (1990) were used. In future studies, more comprehensive and detailed results can be obtained by using qualitative data collection tools in addition to these scales.

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iojes
www.iojes.net
International Online Journal of Educational Sciences
ISSN: 1309-2707

Examining Secondary School Students' Listening Anxiety in Terms of Different Variables and Determining the Causes of Anxiety *

Research Article

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To cite this article: Bayraktar-Ozgur, N., & Dogan-Kahtali, B. (2022). Examining secondary school students' listening anxiety in terms of different variables and determining the causes of anxiety, *International Online Journal of Educational Sciences*, *14*(4), 1006-1026.

ARTICLE INFO

Article History:

Received: 09.05.2022

Available online: 10.09.2022

ABSTRACT

This study aims to identify the listening anxiety levels and causes of secondary school students; to detect the differentiation status of anxiety in terms of various variables. An open-ended mixed-method model, which is a way of both quantitative and qualitative research methods, is used in this research. The scale of Listening Anxiety for Secondary School Students and the Frequency of Use of Listening/Monitoring Strategies is utilized to get quantitative data. A structured Interview Form is conducted to get qualitative data. Parametric tests were used to analyze quantitative data, and Content analysis was performed to analyze qualitative data. The study sample consists of 400 students in 5,6,7, and 8th grades in Malatya Yeşilyurt in the second period of the 2019-2020 educational term. Interviews with thirty-two students having high listening anxiety at different class levels and genders constitute the research's qualitative dimension. Findings of the study revealed that secondary school students differed in their listening anxiety based on gender, class level, parental educational status, the time listening materials at home, materials used in listening texts, use of listening strategies. No significant difference in the type of listening material has been identified. This study highlighted that secondary school students' listening concerns are mostly family-related problems, environmental problems, listening materials-related problems, attention deficit-related problems, psychological problems, problems due to lack of listening strategy knowledge.

Keywords:
Listening, listening anxiety, secondary school students

* **Ethics Committee Approval:** This study was found ethically appropriate by the Education Sciences Ethics Committee of İnönü University with the letter dated 2020 and numbered 2020/5-8. This article was produced from the researcher's master's thesis.

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DOI: https://doi.org/10.15345/iojes.2022.04.008

Introduction

The communication process is a building block of human life content. What they know, what they want to learn, and humanity's desire to convey their happiness and sorrow puts the process of communication at the center of life. At the center of the communication process are the language and the possibilities offered by the language. A framework has been drawn to the multifaceted structure of the language with the skill area classification. Skill areas are grouped as comprehension and expression skills. Comprehension skills are listening and reading, whereas the expression skills are speaking and writing. Listening is an activity that is first gained and carried out through the auditory way before the individual is born. It forms the basis for the development of other language skills. According to Y. Doğan(2020), listening has a featured situation among the four basic language skills. It is a key skill in gaining other language skills. "Listening is perhaps the most critical element in language and language learning, for it is the key to speaking, and beyond that, reading and writing" (Grognet & Van Duzer, 2002, p. 1). (2010, p. 17) interprets listening structure from physiological, psychological, sociological, and communication perspectives and defines how listeners behave or should behave in their communication processes.

Ignoring that listening skill is a skill that can be developed based on the idea that it is innate may prevent the individual from being an active listener by using strategic listening ways. This process, in which the student has difficulty being an active listener, may also trigger the formation of negative attitudes towards listening, which may pave the way for the formation of anxiety. "Anxiety is quite possibly the affective factor that most pervasively obstructs the learning process" (Xu, 2011, p. 1709). "Listening anxiety corresponds to the feeling that the content of the oral text cannot be understood" (Yıldız, 2021, p. 33). Listening anxiety may affect the motivation of the individual in the listening process. Anxiety is one of the most important factor that hinder students‟ listening capacity and performance in classroom (Pan, 2016).

Ateş (2018) states that the listener's anxiety level is a factor that affects listening. The high anxiety experienced by the individual during listening will negatively affect concentrating his attention on the listening content and using the individual's energy. According to Çalıcı and Aytan (2020), like anxiety, which can be effective during listening, increases, the desire of the student to take part in listening activities decreases, and it becomes more difficult for the student to achieve the listening goals expressed in the curriculum.

It is believed that the competence for the physical abilities to listen through spiritual and emotional support can be achieved by controlling the listening anxiety. Identifying the causes of listening anxiety will facilitate the control of anxiety. Being able to cope with anxiety depends on knowing the source and type of anxiety (Kemiksiz, 2022: p.32).

The question "Do secondary school students' listening anxiety levels vary in terms of various variables, and what are the situations that cause this anxiety" constitutes the problem sentence of this research. Within the framework of the main problem statement, answers were sought to certain sub-problems:

In terms of secondary school students;

1. Is there a significant difference in listening anxiety levels by gender?

2. Is there a significant difference in listening anxiety levels according to grade levels?

3. Is there a significant difference in listening anxiety levels according to the parent's education level?

4. Is there a significant difference in listening anxiety levels in listening to texts with different tools?

5. Is there a significant difference in listening anxiety levels depending on their listening/watching time to technological devices at home?

6. Is there a significant difference in listening anxiety levels regarding the listening/watching materials they use at home?

7. Is there a relationship between the level of listening anxiety and the use of listening strategies?

8. What are the reasons and possible solutions for listening anxiety?

Methodology

Research Model

The data in this study were interpreted with an explanatory design based on mixed methods. The mixed explanatory method offers the researcher the opportunity to consider quantitative and qualitative data together in understanding and interpreting the problem and sub-problems determined in the research. Associating qualitative data with quantitative data allows the researcher to present an objective basis for the qualitative data obtained. The missing points in the quantitative and qualitative approaches can be mutually completed.

Working Group

Research participants are selected from a secondary school in one of the central districts of a city in the west of Eastern Anatolia and have a group of students with diverse socio-demographic characteristics. First of all, official permission was obtained from the ethics committee and the Provincial Directorate of National Education to carry out studies at the school (Appendix 1). The quantitative aspect of this study was conducted on 400 high school students studying in the second semester of the 2019-2020 academic year at the school. According to the Listening Anxiety Scale for secondary school students, among male and female students from each grade level, a qualitative study was conducted by identifying eight students, four girls, and four boys, with the highest level of anxiety, a total of 32 students. Personal information about the participants who collected the quantitative data for the study is given in Table 1.

Table1. Personal Data of Secondary School Students Participating in the Study

Class Level	**Frequency (f)**	**Percentage (%)**
5th grade	100	25
6th grade	100	25
7th grade	100	25
8th grade	100	25
Total	400	100

Gender	**Frequency (f)**	**Percentage (%)**
Female	197	49,25
Male	203	50,75
Total	400	100

Mother's Educational Status	**Frequency (f)**	**Percentage (%)**
Primary school	44	11
Secondary School	77	19,25
High School	146	36,5
University	109	27,25
Master	24	6
Total	400	100

Father's Educational Status	**Frequency (f)**	**Percentage (%)**
Primary school	19	4,75

Secondary school	42	10,5
High school	102	25,5
University	193	48,25
Master	44	11
Total	400	100

Looking at Table 1, we see that the same number of students in each grade participate in this survey. 49.25% of the students are girls, and 50.75% are boys. 36.5% of the participants' mothers had a high school degree, and 6% of the mothers had a master's degree. 48.25% of the participants' fathers had a university degree, and 4.75% of the fathers had a primary school degree. In addition, of the secondary school students who participated in the interview, 16 were girls, and 16 were boys. Four female and four male students with high anxiety levels were identified at the 5th, 6th, 7th, and 8th-grade levels. Students were coded with a letter and a number between S1 and S32. Accordingly, S1-G means "Student 1 Girl".

Data Collection Process

In this research, Melanlıoğlu's (2013a) Listening Anxiety Scale (LAS) for Secondary School Students and B.Doğan and Erdem's (2017) Frequency of Use of Listening/Monitoring Strategies Scale (FULMSS) were used as quantitative data collection tools. Melanlıoğlu's (2013a) Listening Anxiety Scale for Secondary School Students comprises 37 items whose validity and reliability have been determined and five options for each item. The options are listed as: I'm definitely not worried, I'm a little worried, I'm worried, I'm very worried, I'm extremely worried. The students were asked to mark the one for each item. B.Doğan and Erdem's (2017) Listening/Monitoring Strategies Usage Frequency Scale comprises 19 items whose validity and reliability have been determined. For each item, five factors are included. The factors are listed as never, rarely, sometimes, usually, and always. The students were asked to choose the factor that suits them for each item. A Structured Interview Form comprising 21 open-ended questions was used to get qualitative data.

Table 2. Descriptive Statistics Regarding the Sampling

Scale	N	$\bar{X}$	Median	Mod	BK	ÇK
LAS Total	400	85,89	86	68	.10	.35
FULMSS Total	400	86	62	64	-.19	-.23

Examining Table 2 reveals that the skewness and kurtosis scores for hearing anxiety measures and listening strategies are in the ± 1 range. Therefore, we assumed that the data were normally distributed, taking into account the assumption that the skewness and kurtosis values of the variables must be between +1 and 1 to assume normality (Büyüköztürk et al., 2013). In addition, the internal consistency coefficient (Cronbach alpha) of the listening anxiety scale was .92, and the internal consistency coefficient (Cronbach alpha) of the frequency of use of listening strategies scale was .87. Therefore, it can be stated that the scales used in the research are quite reliable. However, in the qualitative aspect of the research, the interview form comprising 21 open-ended questions prepared by the researcher in line with the expert opinion on determining the causes of students' listening anxiety was used as another data collection tool in the study (Appendix 2).

Data Analysis

Quantitative data obtained from students were analyzed using SPSS 25.00. Since the data showed a normal distribution, parametric tests were utilized in analyzing the findings. While providing information about students, "percentage, frequency, arithmetic mean, and standard deviation (sd)" values were used. A "t-test" was used in paired groups in the data analysis, and a one-way analysis of variance (ANOVA) was used in groups with more than two. Pearson Correlation test was used to determine whether there is a linear relationship between the two numerical measurements. The qualitative data (Interviews) from the students

were first transferred to the Word document by the researchers, following the question number and order separately for each student. The answers given by the students were coded as S-1 and S-32 under the principle of confidentiality. After the data were coded, the emerging concepts were organized under certain headings. The content analysis technique was used in interpreting the data. While performing the content analysis, first, the headlines related to the data were determined, then the sub-headings were created, each of which was coded to cover each other. Headings and subheadings were coded by two researchers about the data obtained after the interviews with the students.

The data were analyzed by taking into account the direct sentences of the randomly identified students and the titles agreed upon by the two researchers. While transferring the sample data obtained from the interview forms, the abbreviation "S" for students, "B" for male students, and "G" for female students was used at the beginning of quotation sentences.

Ethics Committee Approval: This study was found ethically appropriate by the Education Sciences Ethics Committee of İnönü University with the letter dated 2020 and numbered 2020/5-8.

Findings

Findings Related to Listening Anxiety of Secondary School Students

Listening Anxiety Levels by Gender Variable

The first sub-problem of the study is "Does the listening anxiety levels of secondary school students differ significantly according to the gender variable?" The results are given in Table 3.

Table 3. T-Test Results on Whether Students' Listening Anxiety Levels Differ Significantly According to Gender Variable

	Gender	N	$\bar{X}$	SS	sd	T	p	Eta square (η^2)
Listening Anxiety	Female	197	89,02	23,42	398	2,74	.00*	.01
	Male	203	82,86	21,45				

* p≤.05

Table 3 shows that there are statistically significant differences in student listening anxiety by gender (t=-2.74, p<.05). For the mean scores, it is seen that the mean scores of girls ($\bar{X}$=89.02) are higher than the mean scores of boys ($\bar{X}$=82.86). However, the effect size calculated from the test (η2 =.01) shows that this difference is small. Therefore, although there is a small difference, it can be concluded that the anxiety levels of girls are higher than boys.

Listening Anxiety Levels by Grade Level

The second sub-problem of the study is "Do students' listening anxiety levels differ significantly according to the class variable?" The results are given in Table 4.

Table 4. One-Way ANOVA Test Results on Whether Students' Listening Anxiety Levels Differ Significantly According to Grade Variable

	Level	N	$\bar{X}$	SS	F	p
Listening Anxiety	5nd Grade	100	89,58	22,35	1.73	.15
	6nd Grade	100	86,93	23,79		
	7nd Grade	100	82,91	23,48		
	8nd Grade	100	84.16	20.48		
Total		400				

Examining the values in Table 4 reveals that there is no statistically significant difference between the student's grade level and the level of listening anxiety (F=1.73 and p= .15> .05).

Listening Anxiety Levels by Parent Educational Status

The third sub-problem of the study is "Do students' listening anxiety levels differ significantly according to the parent education level variable?" The results are in Table 5.

Table 5. One-Way ANOVA Test Results on Whether Students' Listening Anxiety Levels Differ Significantly According to Mother's Educational Status

	Mother's Educational Status	**N**	**X̄**	**SS**	**sd**	**F**	**p**
Listening Anxiety	Primary school	44	88,15	19,65	4	1.92	.10
	Secondary school	77	89,47	24,74	395		
	High school	146	87,03	21,89	399		
	University	109	82,56	22,78			
	Master	24	78,54	22,58			
Total		400					

Examining the values in Table 5 reveals that there is no statistically significant difference between the student's mother's educational variables and listening anxiety (F=1.92 and p= .10> .05).

Within the third sub-problem of the study, a One-Way ANOVA test was conducted to determine whether there was a significant difference between the father's education levels and the student's listening levels. The results are in Table 6.

Table 6. One-Way ANOVA Test Results on Whether the Listening Anxiety Levels of the Students Differ Significantly According to the Educational Status of the Fathers

	Father's Educational Status	**N**	**X̄**	**SS**	**sd**	**F**	**p**
Listening Anxiety	Primary school	19	99,01	20,50	4	1.78	.13
	Secondary school	42	85,81	24,39	395		
	High school	102	85,95	22,01	399		
	University	193	84,53	23,18			
	Master	44	86,17	19,61			
Total		400					

In Table 6, there is no statistically significant difference between the educational status variables of the student's father and hearing anxiety (F=1.78 and p= .13> .05).

Listening Anxiety Levels in terms of Listening to Texts with Different Tools

The fourth sub-problem of the study is "Do students' listening anxiety levels differ significantly according to the variable of listening to texts with different tools?" For this purpose, a One-Way ANOVA test was conducted. The results are in Table 7.

Table 7. One-Way ANOVA Test Results on Whether Students' Listening Anxiety Levels Differ Significantly According to the Variable of Listening to Texts with Different Tools

	Different Tools	N	X̄	SS	sd	F	p
Listening Anxiety	reading him/herself	30	83,05	27,10	4	.50	.73
	Phone	84	85,01	21,60	395		
	Smart board or projector	243	86,39	22,03	399		
	passing without processing	27	83,82	22,73			
	Other	16	91,81	28,51			
Total		400					

Examining the values in Table 7 reveals that there is no statistically significant difference between the variables of students listening to audio text using various aids and the level of anxiety (F=.50 and p= .73> .05).

Listening Anxiety Levels in Terms of Listening/Watching Time to Technological Devices at Home

The fifth sub-problem of the study is "Do students' listening anxiety levels differ significantly depending on the listening/watching time they spend at home using technological devices?" For this purpose, a One-Way ANOVA test was conducted. The results are in Table 8.

Table 8. One-Way ANOVA Test Results on Whether Students' Listening Anxiety Levels Differ Significantly According to the Variable of Listening/Watching Technological Devices at Home

	Listening/ Watching	N	X̄	SS	Sd	F	p	Difference (Sidak)	Eta square (η^2)
Listening Anxiety	None	104	80,79	21,86	3	3.63	.01*	3>1	.026
	0-1 hour	180	86,68	22,84	396				
	1-2 hour	85	91,31	21,75	399				
	3-5 hour	31	83,57	23,34					
Total		400							

* p≤.05

When the values in Table 8 are evaluated, it is seen that there is a statistically significant difference between the listening/watching time variable at home and the listening anxiety levels of the students (F=3.63 and p<.05). Looking at the average scores, we can see that the group listening and watching for 1-2 hours a day with a score of X̄=91.31 has the highest level of listening anxiety. The students who watch for 0-1 hours a day follow them with a score of X̄= 86.68, and the lowest level of anxiety is in the students who do not listen/watch at all with a score of X̄=80.79. According to the Sidak test performed to find the source of the difference, the difference between the group that listens/watches 1-2 hours a day and the group that doesn't listen/watch at all is in favor of students who listen/watch for 1-2 hours a day. It is reported that the effect size calculated as a result of the test (η2 =.026) is at a small level. Although it is at a small level, it can be said that those who spend 1-2 hours a day at home with technological devices have higher listening anxiety than those who never spend time at home.

Listening Anxiety Levels in terms of Type of Materials Listening/Watching at Home

The sixth sub-problem of the study is "Do students' listening anxiety levels differ significantly according to the type of materials they listen to/watch at home?" In this context, the One-Way ANOVA test was conducted. The results are in Table 9.

Table 9. One-Way ANOVA Test Results on Whether Students' Listening Anxiety Levels Differ Significantly According to the Variable of the Type of Materials Watching/Listening at Home

	Material type	**N**	**X̄**	**SS**	**Source of Variance**	**Sum of Squares**	**Sd**	**Squares Avg.**	**F**	**p**
Listening Anxiety	EBA (course contents)	177	85,16	22,20	between groups	357,5	2	178,7	.348	.70
	Youtube Channels (for fun)	161	87,04	22,04	within groups	203892,2	397	513,6		
	Youtube Channels (for lesson purposes)	62	84,99	25,42	Total	204249,8	399			
Total		400								

Examining the values in Table 9 reveals that there is no statistically significant difference between the type of material a student listens to or watches at home and their listening anxiety levels (F=.348 and p= .70> .05).

Listening Anxiety Levels in Terms of Use of Listening Strategies

The seventh sub-problem of the study is "Is there a significant relationship between students' listening anxiety levels and the use of listening strategies?" In this context, the Pearson Correlation Test was performed. The results are given in Table 10.

Table 10. Pearson Correlation Test Results on Whether There is a Relationship Between Students' Listening Anxiety Levels and the Use of Listening Strategies

	X̄	**SS**	**1**	**2**
Listening Anxiety Levels	85,89	22,63	1	
Use of Listening Strategies	60,84	13,85	.113	1

Examining the values in Table 10 highlights that there is no statistically significant association between students' listening anxiety levels and the use of listening strategies (r=0.113, p>.05).

Student Views on Causes and Solutions for Listening Anxiety

One of the sub-objectives of the research, "What are the reasons for listening anxiety and solutions?" According to the interview data obtained regarding the question, the reasons for secondary school students' anxiety and their views on these reasons were grouped under six themes.

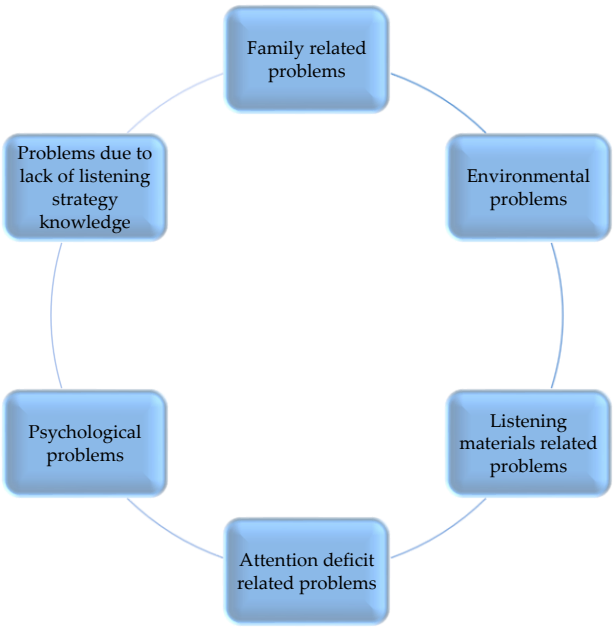

Figure 1. Reasons for listening anxiety according to student opinions

In Figure 1, it is depicted that secondary school students' listening concerns are mostly "family-related, environmental, listening materials-related, attention deficit related and psychological problems, also the problems due to lack of listening strategy knowledge." This section provides the findings obtained from interviews with thirty-two secondary school students under these themes and their interpretations.

Family-Related Problems

When the students' opinions were evaluated, it was noticed that the students cared about being able to talk with their families by making eye contact. The student thinks that their family members do not listen to them when they end eye contact. In the process of listening to and speaking to a family member using electronic devices, the child feels that what they are saying is not important. Students think that family communication problems stem from their speech because family members do not listen to their children for reasons like concentrating on work-related activities or prefer to spend their free time watching television and dealing with other technological devices. Making the student feel he does not have a say in some matters discussed in the family and being interrupted. At the same time, speaking affects the individual's perspective on listening and speaking skills and communication within the family. It has been determined that students with family-related problems are among the first fifteen students with high anxiety levels among the students interviewed. It is seen that the negative approach of the family to the listening process and making feel the insignificance of this process are effective in the formation of high anxiety in the student. The frequency of opinions about family-related problems is given in Table 11.

Table 11. Family-Related Problems

Theme	Frequency
Family-Related Problems	7

In Table 11, it is listed that the number of students who have family-related problems is seven among the interviewed students. Some examples of the views of students who experience anxiety because of family-related problems are:

"I don't think my family is listening to me because I'm not fluent and can bore the other person." (S1-G)

"I don't think my family is listening because they have technological tools in their hands. They ask me again what I told them." (S2-G)

"My parents sometimes interrupt me when I'm talking, and they say, "Okay, I got it." I say, "What did you understand?" They say nothing, so a fight breaks out between us." (S5-B)

Environmental problems

It was also observed that environmental factors were among the reasons for the listening anxiety of the interviewed students. During listening activities, sounds from the environment interfere with the student's listening process. Since the students cannot hear the sound due to the sounds coming from the environment, they state that they move away from the listening process. Among the interviewed students, the frequency of students experiencing environmental problems is given in Table 12.

Table 12. Environmental Problems

Theme	Frequency
Environmental Problems	14

In Table 12, it is reported that the number of students interviewed who have problems arising from the environment is 14. Some examples of the views of students who experience anxiety because of environmental problems are:

"If the environment is noisy, and the speaker is low, I have nothing to do with the text." (S10-G)

"If the speaker does not sound good, if there is noise, I cannot listen well." (S12-G)

"I run into problems with surrounding noise and not being able to hear the speaker's voice fully." (S15-B)

Listening Material-Related Problems

Among the reasons for the listening anxiety of the interviewed students, it identified the problems arising from the listening material. These problems are grouped into three themes. The frequency of opinions gathered around the themes is given in Table 13.

Table 13. Listening Materials Related Problems.

Themes	Frequency
The subject is not interesting	15
Unknown words	8
Lack of visual support for listening texts	28

In Table 13, it is seen that the statements of the students who were interviewed who had problems with the listening material were grouped under the headings that the subject was not interesting, unknown words, and lack of visual support for listening texts. In addition, it was stated in the Table that 15 students experienced listening anxiety because the subject was not interesting, eight students were because of unknown words, and 28 students were due to a lack of visual support for listening scripts.

The non-interestingness of subject (nonsubject)

Some students show that the subject is not interesting as the reason for moving away from the act of listening. When some students realize that the subject they listen to is not related to their interests, it was identified that they are distracted from the listening process. Not being able to focus on what is being listened to, having difficulty in fully understanding what is being said, and not being able to remember the understood parts trigger anxiety in students.

Some examples of the views of the students who experienced anxiety because the subject is not interesting are:

"If the subject interests me, I do not get bored while listening, but if it does not interest me, I get bored and try to get away from it. For example, if football is being discussed, I try to change the subject or my place." (S12-G)

"When I get bored with the subject, I dive into thoughts." (S23-B)

"When I get bored with the subject, I think of different things than I listen to." (S24-B)

Unknown Words

Some students state that they have difficulty making sense of the whole text when faced with words whose meaning is unknown in the listening process. In fact, some students think that the only problem in the listening process is the presence of unknown words in the text they listen to. In addition, some students believe that even a word whose meaning is unknown during listening will cut off the interest in the text.

Some examples of the views of students who experience anxiety because of unknown words are:

"There are some words I don't know. I only encounter this problem when listening to the text." (S3-G)

"The unknown words confuse me when I listen to them at school." (S6-B)

"When the unknown words are mentioned in the text, I am surprised and break away from the text." (S11-G)

Lack of visual support (visual presentation, video, animation, etc.) for listening texts

Approximately 88% of the interviewed students stated that they preferred visual support for listening scripts. Students argue that the presence of visual support about the events described in the listening texts they listen to in the lesson will increase the understanding and recall of the listened text. Some students report that audio texts can remain abstract in their heads, and those visual elements effectively embody the topic heard. Some of the students believe that they will make inferences because they watch some places that they cannot hear while listening.

Some examples of the views of students who experience anxiety because of the lack of visual support for listening scripts are:

"I want visuals in the listening text. Because sometimes I forget what I have set up in my head. I think they will stay in my mind with the images." (S11-G)

"We only listen to the text. It would be more memorable if there were videos, not just listening. Sometimes I miss while listening, if I watched, I could watch the points I missed listening to." (S12-G)

"It would be better if it was visual because when I listen to it, I can't imagine." (S13-B)

Attention deficit related problems

Among the reasons for the listening anxiety of the interviewed students, problems arising from lack of attention were identified. These problems are grouped under two themes. The frequency of opinions gathered around the themes is given in Table 14.

Table 14. Attention Deficit Related Problems.

Themes	Frequency
Focus problem	8
The concentration of the mind in a different direction	19

In Table 14, the problems of the students who had attention deficit problems were grouped under the headings of focusing problems and concentrating the mind in a different direction. In addition, it is seen that

eight students, due to focusing problems, and 19 students, due to mind concentrating in a different direction, have listening anxiety.

Focusing Problem

Some of the students surveyed found it difficult to focus their attention on the listening process during their listening activities. They gave this situation because they think about things independent of the listening process, the objects around them, or the sounds around them.

Some examples of the opinions of students who experience anxiety due to focusing problems are:

"Sometimes I can think of things independent of the text because I have trouble focusing." (S1-G)

"Yes, I encounter problems while listening. My problem is not being able to focus. I can't concentrate on the text, and my mind wanders." (S4-G)

"I have a problem focusing at school while listening to the text." (S5-B)

The concentration of the mind in a different direction

An unremarkable subject has been shown as a reason for the mind to focus in a different direction. Experiences, dreams, and future anxiety cause the mind to move away from the listening focus, creating an environment of anxiety.

Some examples of the views of students who experience anxiety because their minds focus on a different direction are:

"My mind may be elsewhere because I'm thinking about over one thing, or it just didn't grab my attention very much." (S6-B)

"Sometimes I focus in a different direction when looking at another object or event." (S7-B)

"My mind can go in different directions if there is a subject that does not interest me; I listen attentively when there is a subject that interests me." (S12-G)"

Psychological factors

It was observed that psychological factors were among the reasons for the listening anxiety of the interviewed students. Psychological factors can be expressed as feelings, thoughts, and self-efficacy perceptions about the listening process. The psychological factors gathered under four themes, in general, are given in Table 15.

Table 15. Psychological Factors.

Themes	Frequency
Not thinking that a good listener	10
The prejudice that the heard subject cannot be understood	10
Fear of making mistakes	20
Inability to concentrate on the listening process in an unhappy mood	28

In Table 15, the issues of interviewed students due to psychological factors were grouped under the headings as follows: "not thinking that they are good listeners," "prejudice that the listening topic cannot be understood," "fear of making mistakes," and "inability to concentrate on the listening process in an unhappy mood." In the table, we can see that there are ten students who feel uneasy because they are not good listeners, ten students who have prejudices, who don't understand the topic of listening, 20 students who are afraid to

make mistakes, and 28 students who think that they feel unhappy and unable to concentrate on the listening process.

Not thinking that a good listener

It is seen that the students who can list the characteristics of a good listener have self-criticism that they do not have these characteristics. The self-criticism of the students focuses on the inability to pay attention, boredom in the listening process, and lack of vocabulary. It is noticed that some students are also hesitant to evaluate themselves as being good listeners.

Some examples of the views of students who experience anxiety because they do not think they are good listeners are:

"A good listener visualizes the event and understands it in detail. I consider myself a normal listener, not a good listener." (S5-B)

"Vocabulary memory should be extensive, he should keep in mind the events in the text, he should have a visual memory. I don't think I have these qualities." (S11-G)

"Good listener should not interrupt, listen well, make eye contact, and not engage in other work. I don't know, I may not have these. I don't want to evaluate myself." (S19-G)

The prejudice that the heard subject cannot be understood

It was observed that before the listening process begins, some students have conditioned themselves about not being able to understand what they will listen to. Students were afraid that they would not understand the listening text correctly; they were worried about not understanding what would be said in the lesson and not being able to make sense of what a person was saying while listening. They had reflected this perception in their social and academic lives. Some students reported that the anxiety they felt from the fear of not understanding before listening continued while listening.

Some examples of the views of students who have anxiety because of the prejudice that the subject heard cannot be understood are:

"I worry I will not understand the text correctly. I get anxious while listening to the text because I think I might miss something." (S1-G)

"I am worried that I will not understand what is being said during the lecture." (S5-B)

"I get anxious when I listen to someone because it creates a fear of understanding." (S9-G)

Fear of making mistakes

It is seen that the students worry about answering the questions at the end of the listening process. Some students reported experiencing mental confusion while trying to understand what they heard in the text because they were pondering their post-listening questions.

Some examples of the views of students who experience anxiety because of the fear of making mistakes are:

"The thought of not being able to answer questions in class worries me." (S4-G)

"I'm worried. I'm worried that I'll give the wrong answer." (S18-G)

"I feel anxious for not being able to answer questions about what I've heard worries me." (S26-G)

Inability to concentrate on the listening process in an unhappy mood

It was noticed that most of the interviewed students when they experienced a negative event, reflected the emotional effects of this event on the listening process. Some students report that it is difficult to focus on what they hear when they are unhappy. Some students have stated that they cannot stay away from difficult processes by focusing on different negatives rather than the negatives they are experiencing.

Some examples of students' opinions experienced anxiety because of the inability to concentrate on the listening process in an unhappy mood are:

"Due to my unhappiness, I cannot focus too much on the listening activity. I can't forget what makes me unhappy." (S2-G)

"When I am unhappy, I feel bad. I am in a bad situation. I don't want to listen to anyone." (S6-B)

"When I experience an unhappy event, I get sad, but I try not to let it show. I look like I'm listening." (S11-G)

Listening strategy knowledge based problems

It turns out that some of the reasons for students' anxiety about listening are based on their knowledge of listening strategies. These factors, gathered under four themes, are given in Table 16.

Table 16. Listening Strategy Knowledge Based Problems

Themes	Frequency
Lack of mental preparation	20
Problems when using note-taking strategy	29
Questions asked during listening	9
Concerns about post-listening questions	13

In Table 16, listening strategy knowledge-based problems are grouped under the headings of lack of mental preparation, problems when using note-taking strategy, questions asked during listening, and concerns about post-listening questions. It is seen that 20 students have listening anxiety due to lack of mental preparation, 29 students because of problems when using note-taking strategy, nine students because of questions asked during listening, and 13 students because of concerns about post-listening questions.

Lack of mental preparation

It was determined that approximately 63% of the interviewed students were content with only physical preparation and ignored the mental preparation within the framework of the mental and physical preparations that should be made before listening. Therefore, it can be interpreted that conducting the pre-listening preparation focusing on sitting arrangement and material preparation and not spending time on mental studies triggers anxiety in the listening process.

Some examples of the views of students who experience anxiety due to a lack of mental preparation are:

"I put my book and notebook in front of me. If there's a mess on my desk, I fix it." (S3-G)

"I fix the way I sit in a queue or on a couch." (S5-B)

"I take a pen and paper to take notes, and I sit back." (S8-B)

Problems when using note-taking strategy

It was determined that some students did not find it necessary to take notes, which is one of the listening process strategies. Students who do not find it necessary to take notes while listening argues that what is heard will be remembered without being written. Students who could not hear some parts during the note-taking process stated they were worried that something important was definitely missed, and instead of trying to

complete the missing part later, they could not hear the next parts by making negative projections that a question would come about the missed part.

Here are some examples of student opinions that were worried about the problems during the use of the note-taking strategies:

"I get anxious when I can't hear parts of the text because it creates a fear of understanding." (S9-G)

"Missing some parts while listening to them makes me anxious because I think I will be asked questions from that part." (S11-G)

"When I missed a place while listening, I think that was important and missed it." (S15-B)

Questions asked during listening

When the recording was interrupted at some point in the text, and a question was asked while listening, some students reported that they got excited, distracted from focusing on the text, and were worried, leading to difficulty understanding the text.

Here are some examples of opinions from students who experienced anxiety because of the questions asked while listening:

"One gets excited when a question comes up. He suddenly forgets what he is trying to say, which is more worrisome." (S5-B)

"I get anxious when asked a question because I get bored when asked frequently." (S6-B)

"The questions worry me because I am confused." (S11-G)

"I worry when I'm asked a question because I can't understand the text when it's cut off." (S14-B)

Worry about post-listening questions

It is seen that some students are worried when asking questions that will measure the level of understanding of the text after the listening text. It turns out that the idea of not being able to answer when asked after listening also raised concerns that the question might not be understood if the text was not fully understood.

"The questions asked after listening can be stressful because it worries me as I have a bit of a hard time understanding the listening texts." (S2-G)

"After listening to the text, when I don't understand the text, it becomes anxiety when I move on to the questions." (S13-B)

"I am worried because of questions asked after the listening." (S26-G)

Discussion and Conclusion

There was a statistically significant difference in the listening anxiety of the secondary school students in the study according to the gender variable. It has been determined that the average anxiety level of female students is higher than the average anxiety level of male students. However, the effect size calculated from the test showed that this difference is insignificant. Uçgun (2016) explored listening anxiety according to the gender variable and found that reading and listening anxiety differed according to the gender variable. Consequently, female students had higher reading and listening anxiety levels than male students. According to Kılınç (2018), the listening anxiety of female students learning Turkish as a foreign language is higher than male students. Various studies have identified that the general anxiety level of female students higher than that of male students (Girgin, 1990; Varol, 1990; Alisinanoğlu & Ulutaş, 2000). It is argued that female students

have an intense emotional structure compared to male students. As a result of engaging their emotions in the listening process, they distract their thoughts from the focus of listening and cause listening anxiety.

However, contrary to the results of this study, some studies do not have a significant relationship between listening anxiety and gender (Selam, 2019; Ateş, 2018).

It was evaluated that there was no statistically significant difference between the grade levels and listening anxiety levels of the secondary school students who took part in the study. On average, it was found that the 5th-grade students had the highest level of anxiety; the anxiety level of 6th-grade students was higher than that of 7th and 8th-grade students. It has been reported that the anxiety level of 8th-grade students is higher than that of 7th-grade students, but there were no significant differences. Selam (2019) also stated that there was no statistically significant difference between the listening anxiety of secondary school students and their grade level. As indicated by Ateş (2018), the grade level had a significant effect on the listening anxiety of the students. The listening anxiety of the 5th-grade students was identified as significantly higher than that of the 6th and 8th-grade students. Fifth graders may feel uneasy about the new environment after graduating from elementary school. The high level of listening anxiety in these students may be due to the fact that in Turkish middle school classes, after listening to both visual and auditory texts in elementary school, they are trying to understand the Turkish lesson texts based solely on hearing.

According to the results of this study, it was found that there was no statistically significant difference between the educational status of the students' parents and their listening anxiety levels. In line with our findings, Ceyran (2016) concluded no significant relationship exists between children's listening skills and their parents' education level. Ateş (2018) stated that students' listening anxiety did not differ according to the educational status of their fathers but that listening anxiety was related to the educational status of the students' mothers. Uçgun (2016), on the other hand, determined that there was a significant difference between the students' listening anxiety and the education level of their parents. It is argued that the educational status of the parents does not trigger listening anxiety since many specialists in the society do not have an awareness of the fact that listening is an area of skill that can be developed, and the effort to raise awareness of the need for the development of this skill to be planned, and the fact that the listening skill has been discussed in detail in the curriculum in the recent past.

It was concluded that there was no statistically significant difference between the variable of students listening to the listening texts with different tools and their listening anxiety levels. Furthermore, there is no significant difference between the student listening to the listening text from the teacher or listening on a smartboard, projector, and mobile phone tools. However, Melanlıoğlu (2013b) stated that the means of listening to the text is important in teachers' listening education and that the teachers usually read the texts themselves; although getting support from technological equipment will increase the quality of education, teachers rarely do it. Furthermore, it is reported that a significant part of the listening texts at the end of each theme in Turkish textbooks did not make a difference in the point of listening with different tools since they had aural intensity. However, this assumption is believed to make a significant difference if the listening texts appeal not only to the sense of hearing but also to the sense of sight.

Our results showed a statistically significant difference between the variable of listening/watching devices, such as television, computer, and tablet at home and the listening anxiety levels of the students. When the average anxiety scores are examined, it is observed that the group (listens/watches 1 to 2 hours a day)'s listening anxiety level has the highest score. The second group of students who listened/watched non to 1 hour a day was the second, and the students who did not listen at all had the lowest score. Some students stated that their time at home during the distance education process increased, and they could not create self-control in using technological devices. The increase in their time on television, computers, and tablets triggered attention deficit. Kocaman and Ersoy (2021) found that during the distance education process, students were

not able to get efficiency from online courses and experienced feelings of anxiety and stress. It has been highlighted that students' exposure to multiple daily stimuli affects their attention and perception level, making it difficult to focus on the listening process and triggering anxiety.

It is demonstrated that there was no statistically significant difference between the variable of the type of listening/watching materials at home and the listening anxiety levels of the students taking part in the research. The effect of watching EBA course content, entertaining YouTube channels with educational content, or other YouTube channels on listening anxiety has not been explored. This situation is thought to be because the listening activities carried out during the day in class or extracurricular subjects were not carried out with metacognitive awareness. Kılınç (2021) found a positive and moderately significant relationship between students' listening metacognitive awareness and their listening comprehension skills.

According to research findings, it is revealed that there is no statistically significant relationship between students' listening anxiety levels and the use of listening strategies. Movahed (2014) making use of metacognitive strategies can improve students' listening performance, metacognitive awareness and listening anxiety. Harmankaya (2016) stated that the listening activities of metacognitive strategy education in the conducted courses according to the Turkish curriculum were not effective in students' listening anxiety. Li (2022) our study reports the high correlations between listening strategy and language listening anxiety. It is asserted that the inability to detect a significant difference between the level of listening anxiety and the use of listening strategies is due to the ignorance of listening strategies. Kurudayıoğlu and Kiraz (2020) argued that students need to automate when using listening strategies. This was possible by learning and internalizing the basic strategies required to be implemented in the listening process.

In this study, the reasons for listening anxiety were gathered under six main themes (family-related problems, environmental problems, listening materials-related problems, attention deficit-related problems, psychological problems, and problems due to lack of listening strategy knowledge) from the interviews conducted with the secondary school students.

Seven of the students who had problems arising from their families thought their families did not listen to them while they were talking. Students complained that family members did not make eye contact with them while talking, which did not create a feeling of listening. It has been reported that the thought that the family listeners' interest in technological tools devalues what they said while they were speaking, damaging their self-efficacy perceptions regarding their speaking skills. Considering that the family is a role model in the growth of an individual, it has been asserted that the negative effects of these behaviors observed in the family on speaking skills trigger listening anxiety by preventing them from being effective listeners. Cihangir Çankaya (2015) stated that the first step of families' social support to their children is effective listening. However, children can create negative emotions toward listening when families have difficulty being listeners for a long time and get distracted by external stimuli or react to them negatively while listening.

It has been determined that the sounds from the environment during the listening activity worry students with environmental problems. All fourteen students who had environmental problems stated that the sounds coming from the environment disturbed them during the listening process. The fact that the surrounding noise prevents the speaker's voice from being heard fully affects the understanding of the text negatively. It can also be deduced that the inability to understand the text and the distraction of the mind from the listening focus trigger listening anxiety. According to Başkan and Deniz (2015), one of the listening problems in the classroom is environmental factors, and the noise in the classroom negatively affects students' listening in the classroom.

Fifteen students who had issues with listening materials said the problem was that the topic was not interesting. It has been noticed that uninteresting subject distracts the students from focusing on the listening

process. This situation caused them to get bored and worried during the listening process. Aşılıoğlu (2009) states that students are not attracted to the problems that are not tied to their lives, that meet the needs of their age, and that they are unable to create the need to listen; he argues that students should be interested in the subject to be active listeners.

Eight students stated they had difficulty listening to the text because of unknown words. They state that while trying to find the meaning of the words whose meaning is unknown in the text, they stray from the main topic described in the listening passage, and this situation makes them uneasy and increases their anxiety. Yalçın (2012) argues that an effective listener who does not know the words of the listening material will have a hard time understanding the topic.

Twenty-eight of the students stated that the lack of visual support for the listening text negatively affected the listening process. It can be said that the fact that the listening texts at the end of each topic in the Turkish course textbooks are primarily auditory in nature spurred these students' concerns.

It is expected that the audio heard in the coursebook will be completed with the visuals related to the listening texts. However, this situation is not considered sufficient by the students, and they expressed that they want to listen to the text not only auditorily but also in visual and auditory combinations. It has been concluded that the text appealing to the listening/watching skills will cause a better and permanent understanding of the listening text. Moreover, it has been demonstrated that listening to texts that appeal only to the sense of hearing increases the anxiety in students. Karasakaloğlu and Bulut (2012) stated that if the studies on listening carried out in schools are limited to listening texts only, they will be insufficient in developing the skill. In addition, they emphasized that the materials that appeal to both the eye and the ear, which are created by supporting the listening texts with pictures and photographs, might be more beneficial.

Eight of the students included in the study who had attention deficit disorder declared that they had difficulty focusing in the listening process. They stated that the students had problems concentrating on the text while listening, the fact that the topic was not interesting or the mood during the listening process influenced this situation. Nineteen of the students stated that they thought about other things while listening and focused on the topic in their head instead of understanding what they were listening to. It has been determined that the mind's concentration on different thoughts by moving away from the listening focus causes anxiety by taking students out of the context of the text. In a listening-based activity, when the topic is out of the listener's interest and the listening time increases, it is found that the listener has difficulty concentrating their attention on the topic and finds it more attractive to deal with other things rather than what is told (Aşıklıoğlu, 2009). Underwood (1989) and Chen (2005) argued that successful listening depends on many factors and is adversely affected by reasons such as lack of prior knowledge about the content of the listening material, lack of attention, and lack of motivation (as cited in Melanlıoğlu, 2016).

Ten of the students who had problems due to psychological factors stated that they were not good listeners. Students said they think this way because they think their vocabulary is not enough to understand and interpret what is heard. It has been observed that the prejudice formed before listening affects the entire listening process, increasing the student's anxiety level. It was determined that ten students who thought they would not understand what to hear before starting began listening activities with prejudice. It is identified that prejudice before a listening activity increases the student's anxiety level by addressing the entire listening process. Twenty of the students stated that they were afraid of making mistakes in the studies to be carried out during and after listening. Due to the prejudice that they will not understand the listening text and the problems in the comprehension of the text as a result of the lack of concentration of attention created fear of making mistakes throughout the listening process. Twenty-eight of the students expressed they could not focus on the subject they were listening to in an unhappy mood and could not make sense of what was said due to this situation. It is observed that the students include their emotions arising from the negative situations

that they experience in their lifestreams into the listening process. Considering that the physical, mental, social, and psychological dimensions of listening are intertwined, as normal, a problem that will arise in one of these dimensions will affect other dimensions. Karadüz (2010) reported that listening is affected by many affective elements along with cognitive elements; when positive affective readiness is achieved, more attentive, motivated, and permanent listening is achieved. But listening in a sad and stressful mood will be unproductive.

Twenty of the students who have problems related to listening strategy knowledge think that the physical preparation required before listening is sufficient, and no activities related to mental preparation are needed. Twenty-nine of the students expressed that they had problems using the note-taking strategy. The feeling of being unable to complete the missing parts in the text while taking notes worries the student. Nine of the students became anxious by getting away from the listening process because of the questions posed during listening. Thirteen of them are distracted from the listening process due to the question-answer activity after listening. It was determined that question studies triggered the fear of making mistakes and caused anxiety. It is considered that a lack of knowledge of listening strategies and the purpose of using these strategies triggers listening anxiety. Uğur (2019) found that teaching listening strategies increased students' listening self-efficacy perceptions and listening success.

It is observed that the focal point of the issues that cause anxiety during listening is the prejudice of not being able to understand the listened subject and the continuation of the state of inability to make sense of it after listening. It can be asserted that the problems experienced in the transition to the understanding dimension in the listening process cause anxiety and reduce listening efficiency.

Ethics Committee Approval: This study was found ethically appropriate by the Education Sciences Ethics Committee of İnönü University with the letter dated 2020 and numbered 2020/5-8.

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International Online Journal of Educational Sciences

ISSN: 1309-2707

Investigation of Reading Fluency, Writing Fluency, and Vocabulary Levels of Students Learning Turkish as a Foreign Language and the Relationship Between Those Skills

Research Article

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To cite this article: Basturk, S., & Bilge, H. (2022). Investigation of reading fluency, writing fluency, and vocabulary levels of students learning Turkish as a foreign language and he relationship between those skills, *International Online Journal of Educational Sciences*, *14*(4), 1027-1042.

ARTICLE INFO

Article History:

Received: 19.05.2022

Available online: 07.10.2022

ABSTRACT

The aim of this study was to investigate the levels of reading fluency (in three different text types: narrative, informative, hard-to-read rare Turkish words list), writing fluency, and productive vocabulary (two different text types: narrative and informative) of C2-level Turkish learners. The relationships between these skills were also examined as well. In the study, survey and correlational methods were used. The participants were 23 C2-level Turkish as a foreign language learners from ULUTÖMER of Bursa Uludağ University. The results indicated that participants were affected highly by text types in reading fluency. The speeds changed from 92 to 58 words in one minute and all speed measures from three different types of texts were significantly different from each other. The accuracies changed between 93%-86% and participants read listed words significantly lower than the other two text types. They wrote 147 syllables correctly in one minute with 90% accuracy. Vocabulary coefficients were .63 and .64, which indicates that the first 100 words the participants wrote consisted of approximately 63-64 different words. Vocabulary coefficients were not correlated to writing and reading fluencies. However, writing fluency and reading fluency variables were almost always highly and positively correlated to each other. Hence, the reading fluency and the writing fluency in C2-level Turkish as a foreign language learners seem to require common processes and/or information.

Keywords:
Turkish as a foreign language, reading fluency, writing fluency, vocabulary, lexical diversity

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DOI: https://doi.org/10.15345/iojes.2022.04.009

Introduction

Both in L1, L2 and foreign language learning (FLL), the ultimate goal of the reading skill is comprehension. However, it is commonly acknowledged that reading comprehension is a complicated process and requires many different knowledge and skills (Birch, 2007; Caldwell, 2008). It is widely accepted that the text type effects the reading performance (Duke & Roberts, 2010; Kanık Uysal & Bilge, 2019; Snow, 2002). Similarly, the aim of writing skill is to convey thoughts and information. Writers have many obstacles to handle with before they succeed in conveying the meaning (Alamargot & Fayol, 2013). In reading and writing, automaticity is an important element for grasping and conveying the meaning because it frees the cognitive capacity for upper-level processes (Chenoweth & Hayes, 2001; Laberge & Samuels, 1974; Rasinski, 2010). It is because automaticity is mostly related to fluency, and reading and writing fluencies are thought to be quite important in reaching the goals of reading and writing.

Moreover, vocabulary learning is an essential part in FLL (Chen, 2021). Previous studies showed that specific receptive vocabulary thresholds could be used for proficiency levels in FLL (Bulundu, 2022; Milton & Alexiou, 2009). Furthermore, it was found that rich vocabulary made the skills of listening, speaking, reading and writing easier to perform in FLL (Aksoy, 2020; Bandini, Bandini, & Ranciaro Neto, 2017; Stæhr, 2008). Hence, vocabulary is critical sub-skill in FLL and vocabulary knowledge may represent the proficiency of a foreign language learner.

Based on the aforementioned studies, automaticity in reading and writing may depend on the vocabulary of a language learner. Additionally, reading performance may change depending on text type as well. Although there are some studies aimed to find whether there was a correlation between vocabulary and reading/writing in Turkish as a foreign language (TFL) (Aksoy, 2020; Karakoç, 2016), these correlations were not about fluencies and the effect of text types were disregarded. To our knowledge, this is the first study aimed to investigate these skills in TFL context. There seems to be no study which aim to discover the relationship between reading fluency in different text types, writing fluency, and productive vocabulary in different written texts types in TFL learners. Therefore, this study fundamentally aims to seek answers to the following questions:

-What is the proficiency level of C2 Turkish as a foreign language learners' in reading fluency (in three types of texts), writing fluency, and vocabulary (in two different written texts)?

-Is there any correlation between reading fluency (three different text types), writing fluency, and productive vocabulary (in two different written texts) of students learning TFL?

Automaticity

Daily practices or mental processes are either controlled or automatic (Clore & Ketelaar, 2014; Moors & Houver, 2007). Automatic processes and/or practices require little attention, which leads the person to make other practices at the same time (Laberge & Samuels, 1974). Automaticity is linked to different fields in psychology (Moors & Houver, 2007) including language skills (Bilge & Kalenderoğlu, 2022). One must be automatic in a specific language skill to convey or comprehend the meaning easily (Wolfe-Quintero, Inagaki, & Kim, 1998). When automaticity is used for a language skill, mostly speed comes into play (Biancarosa & Shanley, 2016). Hence, automaticity in FLL skills is crucial for the quality of skills such as reading and writing. Foreign language learners need to be automatic for both conveying and grasping the meaning, which means that they need to be fast and accurate in reading and writing.

Reading Fluency

Reading in a foreign language is a difficult task for a language learner. It is because the aim is comprehending the text and the reader should read automatically (Birch, 2007; Kuhn & Stahl, 2013).

Automaticity is mostly associated with reading fluency, which accepts reading fluency as consisting of accuracy and rate. However, prosody is included to the definition due to criticisms on this kind of definition (Dowhower, 1991; National Reading Panel, 2000; Rasinski, 2004). Thus, reading fluency consists of accuracy, rate, and prosody.

Reading fluency in FLL requires time and explicit instruction (Taguchi et al., 2021). Learners first learn to read accurately, next fast, and then prosodically (Mathson, Allington, & Solic, 2006). These elements are important in getting the meaning of the text. For instance, previous studies demonstrated that in Chinese as an L2, (speed and accuracy) was correlated to reading comprehension (Shen & Jiang, 2013). However, reading and comprehension depend on the difficulty of the text (Best, Floyd, & McNamara, 2004; Caldwell, 2008; Duke & Roberts, 2010; Kanık Uysal & Bilge, 2019; Saenz & Fuchs, 2002). Therefore, the effects of different text types are crucially important to investigate in FLL.

Writing Fluency

Writing fluency is defined as the ease, rate, and accuracy in writing (Hestad, 2014; Housen & Kuiken, 2009). Fluency in writing is a critical barrier in that a writer should write his/her ideas before (s)he forgets (Chenoweth & Hayes, 2001). Non-fluent writers focus not on the ideas, but on the other dimensions of writing such as punctuations, word choice, etc. This kind of challenge in writing result in inconsistencies and low-level of quality of the written text. Especially in a foreign language, writing fluency gets much more importance because writing in a foreign language may be accepted as the hardest skill compared to others.

Writing fluency is about the rate and length of the written text. The speed of writer indicates a specific level of the writer. As the writer gets more proficient in writing, (s)he produces texts faster than non-fluent writers (Wolfe-Quintero et al., 1998).

Vocabulary

Vocabulary is one of the most essential knowledge in FLL. Research showed that levels of proficiency (i.e., A1, A2, etc.) were correlated to the size of vocabulary. Milton and Alexiou (2009), for instance, stated that learners should know about 3000 words to pass the B1 level from A2. For low-level learners, 2000 word knowledge is suggested (Stæhr, 2008). Similarly, Nation (2006) asserts that foreign language learners need to know 8000-9000 word families for comprehending a written text.

It was also found in some other studies that vocabulary was correlated to and predicted the reading and writing skills of foreign language learners (Aksoy, 2020; Karakoç, 2016; Stæhr, 2008; Tömen, 2016). Thus, in order to obtain high levels of proficiency in FLL, vocabulary has an indispensable role.

Methodology

Research Method

This is a survey and correlational study, (Fraenkel, Wallen, & Hyun, 2012) in which we aimed to examine the proficiency level of participants in reading fluency (using three different text types), writing fluency, and productive vocabularies (in narrative and informative text). Additionally, it was also aimed to investigate the relationships between these skills. Survey studies are useful for discovering the "picture" of the population while the correlational analysis reveals the findings that show whether there are significant correlations between two or more variables.

Participants

The participants were the learners of TFL in the TÖMER center of Bursa Uludağ University. Students were at C2 level and there were totally 24 students in the center. Out of 24 students, 23 students comprised the participants of the study. Although all students took part in the study, one student was excluded due to his

misunderstandings in the writing fluency period. Participants were from 16 different countries and they were aged between 17-29 with the average of 21,5. 15 of the participants were female (65,2%) and 8 were male (34,8%).

Data Collection Tools and Data Collection Process

The data was collected in September/October, 2021. The data collection details are given below.

Reading Fluency

The data related to the reading fluency skills of participants was collected using three different types of texts. Firstly, we used a narrative book called "Yunus Emre Türkçenin Sesi [Yunus Emre the Voice of Turkish]) (The Yunus Emre Institute, 2020). This book includes a fictional story about the famous Sufi Yunus Emre. Since the passage was too long, we included the first five paragraphs of the fictional story written on an A4 paper without the title of the book. Consequently, the participants were given a narrative passage consisted of 229 words in total.

Secondly, we used a scientific article which was published in a peer-reviewed journal. The article was about improving the reading skills of children who were poor in reading (Kanık Uysal & Akyol, 2019). Thus, it was a scientific article related to the field of education. For the purpose of this study, we only included the half of the first paragraph in the Introduction section. All resources were excluded because including the references might confuse the readers, which might eventually lead some readers to read the references and some others to skip them. Therefore, the passage was printed as a text without additional information. The passage consisted of 233 words in total.

Lastly, we prepared a list that consisted of technical and hard-to-read rare Turkish word/word groups. These words were chosen from a glossary that European Union prepared in which some technical terms were translated from English to Turkish or vice versa (Uysal, Tanrısever, & Düzel, 2003). 100 words were chosen in total and listed one after another randomly.

In the data collection process, the participants were taken to a class one by one. They saw the texts for the first time and they were not allowed to hear when one of them read it. The narrative text was given first, the informative text was given second, and finally the term list was given. The participants were asked to read each of the texts for one minute. All the measurements were made using one minute read-alouds.

Reading fluency in three different text types were measured separately, using the reading rate and reading accuracy. Prosody was not included because assessing it might lead to problems resulting in biased scores. Prosody can be assessed using a scale that needs relatively subjective judgements (Zutell & Rasinski, 1991). For instance, Bilge and Kalenderoğlu (2022) reported that they could not be able to use the prosody scale in that the rater reliability could not met. Hence, we only measured the rate and accuracy.

Reading fluency measurements is an emergent field in the context of Turkish language. This situation brings some hard decisions to measure the reading errors. For the purpose of this study, we followed the Rasinski's (2004) method. Omissions, insertions, mispronunciations, substitutions were counted as errors. Repetitions and self-corrections were not counted as errors (Goodman, 1964; Rasinski, 2004). Since some participants were not able to produce some specific sounds in Turkish, they were not counted as errors. In order to distinguish the lack of ability to produce a sound and an error, we checked the participants whether they consistently failed to produce them during their reading. If they produced a specific sound at any time even for once, we regarded any of the deviation from the text as an error for that specific sound.

Assessing rate and accuracy is relatively reliable because it requires counting errors. In the reading fluency field, it is common that only one researcher assesses the rate and accuracy (Bilge & Kalenderoğlu, 2022; Rasinski et al., 2005, 2017; Yıldırım, Rasinski, & Kaya, 2017) and there is no need for a second rater for reliability

because of the nature of the measurement in reading fluency. Therefore, only one researcher counted the errors and measured the rates and accuracies of the participants.

Writing Fluency

Writing fluency is possible to measure using different proportions of the writing such as the quality of the flow, coherence, etc. In this study, we measured the writing fluency as the pure writing speed which was suggested to be measured separately from the other properties of writing (Wolfe-Quintero et al., 1998). Thus, we used the same method and tools that Bilge and Kalenderoğlu (2022) used. In this manner, the participants were given 5 initial sentences to choose from. All the sentences were a prologue to a story which participants were expected to complete as they wished. For instance, participants might choose and complete the following sentence: Finally, summer vacation came. We got the report cards and we were going home…Participants were, also, free to not to select any of the sentences. They were allowed to start a new text in any type.

The students were given one minute to think about what they would write and then five minutes for the writing process. They were asked to write as quickly as possible, without considering the coherence of the text. They were expected to write words accurately. They were not allowed to use an eraser to correct and rewrite their erroneous words. All the measurements were proportioned to one-minute only.

For the measurements, we did not include the incomprehensible ones, but just accepted the spellings of the words. Hence, we counted the misused idioms as "correct" because only the correct spellings were checked. The words in which even one dot of any letter was forgotten or misused was counted as "incorrect". However, if the root of the words was accurate, we did not consider if the endings were lacking or wrong because they required more information apart from the information of the word. However, the derivational affixes were considered in that they produced new words.

For the fluency of the writing, we calculated three different variables; the total syllables, speed, accuracy. In Turkish, syllables are measured just counting the vowels. Totality of the syllables were calculated counting all the vowel sounds regardless of the fact that whether they were written correctly. Speed was counted as distracting syllables in misspelled words from the total syllables. Accuracy was the proportion of the speed to total syllables. Hence, all the measurements were based on the syllable count which was more sensitive than counting the words due to the differences of syllable numbers between words.

Similar to the reading fluency studies, writing fluency could be measured using one rater (Bilge & Kalenderoğlu, 2022; Stæhr, 2008) because it consists of just counting syllable numbers, where the measurement does not depend on subjective calculations. Hence, only the first author counted the number of syllables.

Vocabulary

We measured and assessed the productive vocabulary. The participants were given blank papers and asked to write two different texts: Informative and narrative. For the informative text, they wrote on a topic about one of the undergraduate courses that they took. For the narrative text, they wrote a text about one or more of famous historical event(s) of their country. These topics were chosen in that these were relatively easy to write and participants might produce more different words than an unfamiliar topic. The participants were told to write at least 200 words for each text. They were given approximately one class-hour time period to write.

For the measurement, the vocabulary coefficient was calculated (Karadağ, 2018). Vocabulary coefficient considers the proportion of different words in the first 100 words. It has values between 0-1 in which 0 indicates that all words are the same and 1 indicates that all words are different. Thus first 100 words were entered to the Simple Concordance Program. All the words that the participants wrote were included even if they were misspelled. The words that were not Turkish, the numbers, the words that could not be detected

due to writing style was excluded. Idioms and proverbs were counted as one word because that were related to one meaning.

As a result, all the participants had two different vocabulary coefficients: Vocabulary in informative text and vocabulary in narrative text.

Data Analysis

The data was analyzed using the SPSS. Since this study had both a survey and correlational design, we used descriptive statistics, repeated measures One-Way ANOVA, Friedman test, Wilcoxon signed rank test, and Pearson and Spearman-Brown correlations. Initially, we investigated the descriptive statistics of the participants to see the central tendencies of the measurements (Gravetter & Wallnau, 2017). Secondly, we checked the extreme values and normality assumptions in order to find whether the assumptions of Pearson correlational analysis were met (Can, 2017).

For the Friedman test, we compared the reading fluency variables between the three types of texts. Since there were significant results, we used the Wilcoxon signed rank test to discover in which text types the significant differences existed. For the vocabulary coefficients in narrative and informative text, we did not conduct any analysis to compare text types in that the results showed that the means of the vocabulary coefficients in these two texts was almost the same (see Table 1).

For the correlational analysis, we checked the extreme values and detected extreme values in three of the eleven variables. In one of these three variables, one extreme value was removed and the assumptions of Pearson correlation were met. In two of these three variables, it was necessary to remove more than one participant. Due to the limited number of participants, we decided to conduct the Spearman Brown correlational analysis using all participants' data. In interpreting the results of the correlational analysis, we used the Cohen's (1988) criteria which accepts r⩾.10 as small, r⩾.30 as moderate, and r⩾.50 as high correlation.

Findings

This section reveals the findings of the study.

First, the descriptive statistics of the participants are given in the Table 1.

Table 1. Descriptive statistics of the variables

		n	*M*	*sd*	Min	Max
Writing Fluency	T.s.	23	162.4	30.9	106	225
	Wf-s	23	146.9	34.7	95	210
	Wf-a	23	90.4	11.5	61.3	100
Vocabulary	V-n.	23	.63	.08	.46	.75
	V-i.	23	.64	.07	.53	.77
Reading Fluency	Rf-ns	23	92	24.1	43	139
	Rf-na	23	92.6	4.9	79.6	99.1
	Rf-is	23	80.2	26	38	130
	Rf-ia	23	91.2	7.3	77.6	99.1
	Rf-ts	23	58.4	17.3	25	80
	Rf-ta	23	85.6	9.7	59.5	97.6

Ts: Total syllables **Wf-s:** Speed in writing fluency **Wf-a:** Accuracy in writing fluency
V-n: Vocabulary coefficient in narrative text **V-i:** Vocabulary coefficient in informative text
Rf-ns: Speed in narrative text **Rf-na:** Accuracy in narrative text
Rf-is: Speed in informative text **Rf-ia:** Accuracy in informative text
Rf-ts: Speed in list of terms **Rf-ta:** Accuracy in list of terms

According to Table 1, the participants wrote 162.4 syllables in one minute. When we removed the syllables in misspelled words from the total syllables, the speed in writing fluency was 146.9 which indicated that the students misspelled 15.5 syllables per minute. The proportion of speed to total was 90%.

Vocabulary coefficients were quite similar to each other. The participants used 63 different words when they wrote the narrative text and 64 words when they wrote the informative text.

Reading fluency variables differed according to the type of texts. Participants read 92 words with 92.6% accuracy in the narrative text in one minute. They read 80.2 words with 91.2% accuracy in the informative text, and 58.4 words with 85.6% in the list of terms. In order to investigate whether these differences were significant, we conducted the One Way Anova (Repeated Measures) for speed (Table 2) and the Friedman test for accuracy (Table 3).

Table 2. The results of repeated measures ANOVA for the reading rate

Reading Rate	***n***	***M***	***df***	***F***	***p***	***Significant differences***
Narrative	23	91.96	2	136.241	.00*	N-I, N-T,
Informative	23	80.22				I-T
List of Terms	23	58.39				

**p<.05*

As shown in Table 2, the participants read the different types of texts with a significantly different speed [$F_{(2\text{-}44)}$=136.241, p<.05). Accordingly, they read the narrative text in a fastest fashion, while the informative text was slower and the list of terms was the slowest. Partial eta-square indicated that the rate difference between the texts were 86.1% which was explained by the text type (and/or text difficulty). Thus, the text difficulty greatly impacted the Turkish foreign language learners even they were at C2 level.

Table 3 shows the findings of the differences between accuracy in reading.

Table 3. The results of Friedman Test for reading accuracy

Reading Accuracy	***n***	***M***	***df***	***χ2***	***p***	***Significant differences***
Narrative	23	92.61	2	20.689	.00*	N-T,
Informative	23	91.24				I-T
List of Terms	23	85.6				

**p<.05*

As shown in Table 3, there were significant differences between the accuracies of different types of texts ($\chi2_{(2,N=23)}$=20.689, p<.05). The Wilcoxon signed-rank test conducted to discover the significance of differences indicated that accuracy in the list of terms was significantly lower than the other text types. Thus, participants were similar in accuracy between the narrative and informative text. However, they had much more reading errors in the list of terms proportionally.

Table 4 show the findings of the Pearson and Spearman-Brown correlational analysis. The descriptive statistics are given in the appendix.

Table 4. The results of the Pearson and Spearman-Brown correlational analysis between reading fluency, writing fluency, and vocabulary

		Writing Fluency			Vocabulary		Reading Fluency					
		T.S.	S.	A.	Nar.	Inf.	R-N	A-N	R-I	A-I	R-T	A-T
Writing Fluency	T.S.	1										
	S	.83**	1									
	A	.22^{s}	.60**^{s}	1								
Vocabulary	N	.23	.16	.1^{s}	1							
	I	.11	.06	-.08^{s}	.49*	1						

Reading Fluency	R-N	.52*	.78**	.72**s	-.03	.01	1					
	A-N	.37	.65**	.61**s	-.05	-.18	.81**	1				
	R-I	.68**	.83**	.54**s	.05	.10	.95**	.71**	1			
	A-I	.55**	.65**	.4s	.06	-.05	.76**	.67**	.79**	1		
	R-T	.58**	.75**	.56**s	.00	-.05	.93**	.74**	.95**	.81**	1	
	A-T	.55**s	.69**s	.31s	.28s	.13s	.63**s	.70**s	.76**s	.82**s	.78**s	1

*p<.05 **p<.01 *s: Spearman-Brown* **T.S.**: Total syllable **S.**: Writing speed **A.**: Writing accuracy
N.: Vocabulary in narrative text **I.**: Vocabulary in informative text **R-N:** Rate in narrative text
A-N: Accuracy in narrative text **R-I**: Rate in informative text **A-I:** Accuracy in informative text
R-T: Rate in list of terms **A-T:** Accuracy in list of terms

Table 4 indicated that total syllable in writing fluency (misspelled words included) was highly correlated to speed in writing fluency but not to accuracy in writing. It was found that the coefficient was 68.9%. This can be interpreted as foreign language learners were homogenous in accuracy proportions regardless of their total writing speed. The students who wrote more in total were similar in accuracy with the students who wrote less. However, writing speed (misspelled words excluded) was highly and positively correlated to accuracy in writing. It was found that the coefficient was 36%. Thus, when misspelled words were excluded, the students who wrote more correctly-spelled words proportionally wrote faster. Hence, although the students who wrote more in total were similar to who wrote slower in accuracy, the accurate writers were better in speed.

None of the writing fluency variables were significantly correlated to the vocabulary variables. The students with high- and- low-success in writing fluency were similar in the productive vocabulary in the narrative and informative text.

Foreign language learners' total syllables were significantly, positively and highly (Cohen, 1988) correlated to all the reading fluency variables, except accuracy in the narrative text. This indicates that TFL learners who produced more written text (misspelled words included) in one minute read more fluently in all types of texts. It was found that the coefficients were 27%, 46%, 30%, 34% for the correlations between T.S. and R-N, R-I, A-I, and R-T respectively. For the speed in writing, all the reading fluency variables were highly correlated and these r values were higher than those with total syllables in writing. It was found that the coefficients were between 42% and 69%. Accuracy in writing was significantly, positively, and highly correlated to most of the reading fluency variables. The vocabulary variables were not significantly correlated to any of the reading fluency variables.

In the reading fluency, the best correlations were between the reading rates. The reading rates were correlated to each other at the highest level and positively. It was found that the coefficients were 90% and 86%. This indicates that the faster readers read the texts with different difficulties faster all the time. The rates in three types of texts were positively and highly correlated to the accuracies. It was found that the coefficients were between 50.4% and 65.6%. Thus, the faster the student read, the better their accuracy got. Lastly, the accuracies were highly and positively correlated to each other, which indicated that the students who had higher accuracy in a text tended to have higher accuracy in another.

Conclusion and Discussion

The present study aimed to investigate the proficiency level and the relationships between the reading fluency, writing fluency and vocabulary skills of TFL learners at C2 level.

The findings indicated that participants totally wrote 162 syllables, at 146,9 speed, and with 90,4% accuracy in writing fluency in one minute. In this study, we measured the writing fluency using syllables. Assuming that the words in Turkish language mostly consist of 2-3 syllables, we can infer that C2-level Turkish

foreign language learners wrote between 54-81 words totally. The speed was between 74-49 words. This hypothetical word counts show that the learners wrote about one word per one second. Although there was no similar result for any kind of comparison for TFL learners, we can say that this speed was a sign of fluency in writing. However, about 10% loss in correct spelling was not a trivial problem. It seems that the C2-level TFL learners still made serious spelling errors in writing.

Regardless of the text type, the TFL learners produced quite similar results in vocabulary. The lexical diversity in the first 100 words in their written text was .63 and .64, indicating that the first 100 words consisted of using 63-64 words. On a topic that they were familiar with, C2-level TFL learners produced different words with a quite similar vocabulary coefficient in the narrative and informative text.

Although it is for the American students', when compared to the widely used reading speed criteria (Akyol, Yıldırım, Ateş, Çetinkaya, & Rasinski, 2014), students read narrative text in the lower bound of sixth graders, informative text in the fifth graders level, and list of terms in the three graders' level. The effect of the text type (and the difficulty of text) was obvious. The more difficult the text was, the slower the foreign language learners read. The TFL learners read the narrative text in the fastest fashion, while the informative text was slower and the list of terms was the slowest. The difference was significant for every text type.

For the accuracy, according to Rasinski's (2010) criteria, the participants read the narrative text at the instructional level which means that they might need help when they read that text. They read the informative text at the frustration level but it was quite close to the instructional level (91,2%). Nevertheless, this level points out that the informative text was hard for them to read even with some assistance. Lastly, they read the list of terms with 85,6% accuracy which indicates that they read the list of terms (consisting of hard-to-read rare Turkish technical words) with difficulty. According to the Friedman test, they read the list of terms significantly lower than the informative and narrative text.

In the relevant literature, the text type and text difficulty is accepted to effect reading and reading comprehension (Duke & Roberts, 2010; Kanık Uysal & Bilge, 2019; Snow, 2002; Yıldırım, Yıldız, Ateş, & Rasinski, 2010). When we consider that reading fluency is correlated to reading comprehension (Acquavita, 2012; Başaran, 2013; Bilge & Kalenderoğlu, 2022; Rasinski, 2004; Rasinski, Samuels, Hiebert, Petscher, & Feller, 2011), we can infer that as the difficulty of text increases, the level of comprehension may decrease. Since these TFL learners were in Turkey to acquire post graduate degrees such Ph.D., they will encounter informative texts which are full of technical terms. If they cannot read fluently, the comprehension may not be accomplished, which results in low level of academic success. Hence, it may be useful to implement explicit teaching of text types to TFL learners, as suggested by many scholars (Caldwell, 2008; Duke & Roberts, 2010; Hyon, 2002; Kirk & Pearson, 1996; Park, 2009) for both L1 and foreign language learners.

The writing fluency components were almost always significantly, highly, and positively correlated to all reading fluency levels. However, the speed in writing fluency always had the highest r value which points out that the speed in writing was the best variable among the writing fluency variables at C2-level Turkish foreign language learners. The fastest writers were, the better readers became in all types of texts. The previous studies in the relevant literature indicate that reading and writing in foreign language was correlated to each other (Carson, Carrell, Silberstein, Kroll, & Kuehn, 1990; Kwah, 1988; Pimsarn, 1986). Some studies showed that the relationship between reading and writing differed as the proficiency changed. Agustín Llach (2010), for example, found that there was no relationship between reading and writing for low-proficient learners while there was relationship between the low-mid proficient learners. Hence, it seems that reading-writing are correlated to each other in foreign language learning. However, the correlations may change depending on the proficiency of learners.

The vocabulary coefficients in both narrative and informative texts that the participants produced were never correlated to any of the writing and reading fluency variables. This is a challenging result in that the studies conducted with foreign learners indicated that vocabulary was correlated to reading and writing skills (Aksoy, 2020; Karakoç, 2016; Kılıç, 2019; Qian, 1999; Stæhr, 2008). However, this lack of correlation may be explained by two facts; the measurement style of vocabulary in this study and the proficiency of foreign language learners. In other studies, vocabulary was mostly measured by tests. In this study, we did not aim to predict the size of the vocabulary of participants. Rather, we measured the different words they produced in the first 100 words in their written work, which indicated the lexical diversity. Hence, we can conclude that vocabulary coefficient was not correlated to the reading and writing fluencies in Turkish as foreign language learners. Furthermore, as the participants got more proficient in Turkish, the correlations between vocabulary and reading and writing might vanish. For instance, Tömen (2016) found that lexical diversity predicted the writing scores of freshman year students while the prediction disappeared in the data of fourth grade students in the university. This may be interpreted as the proficiency effects the presumptive correlations between vocabulary and literacy skills.

Ethics Committee Approval:

The authors have to provide and submit an "Ethics Committee Approval" document while submitting their manuscript to IOJES journal. This document should be obtained from the related Ethical Committees of the universities. It is a requirement by ULAKBIM TR DİZİN for the journals waiting for possible inclusion in the TR DİZİN. All qualitative or quantitative studies which included data collection from participants by questionnaire, interview, focus group study, observation, and experiment must have the Ethics Committee Approval document. Ethics Committee Approval is not required for review articles. Ethics Committee Approval information (the title of the ethics committee, date, and number) must be stated clearly in the method section as well as on the last page of the manuscript.

Appendix

Table 5. Descriptive statistics of correlational analysis

	n	$\bar{x}$	*sd*		*n*	$\bar{x}$	*sd*		*n*	$\bar{x}$	*sd*
Wfts	23	162.4	30.9	**V-n**	23	.63	.08	**Rf i-s**	23	80.2	25.9
Wfs	23	146.9	34.7	**Rf n-s**	23	92	24.1	**Rf t-s**	23	58.4	17.3
Wfts	23	162.4	30.9	**V-n**	22	.63	.08	**Rf i-s**	23	80.2	25.9
Wfa	23	90.4	11.5	**Rfn-a**	22	93.2	4.1	**Rf t-a**	23	85.6	9.6
Wfts	23	162.4	30.9	**V-n**	23	.63	.08	**Rf i-a**	23	91.2	7.3
V-n	23	.63	.08	**Rf i-s**	23	80.2	25.9	**Rf t-s**	23	58.4	17.3
Wfts	23	162.4	30.9	**V-n**	23	.63	.08	**Rf i-a**	23	91.2	7.3
V-i	23	.64	.07	**Rf i-a**	23	91.2	7.3	**Rf t-a**	23	85.6	9.6
Wfts	23	162.4	30.9	**V-n**	23	.63	.08	**Rf t-s**	23	58.4	17.3
Rf n-s	23	92	24.1	**Rf t-s**	23	58.4	17.3	**Rf t-a**	23	85.6	9.6
Wfts	22	162.7	31.6	**V-n**	23	.63	.08	**Wfa**	23	90.4	11.5
Rfn-a	22	93.2	4.1	**Rf t-a**	23	85.6	9.7	**Rfn-a**	23	92.6	4.9
Wfts	23	162.4	30.9	**V-i**	23	.64	.07	**Wfa**	23	90.4	11.5
Rf i-s	23	80.2	25.9	**Rf n-s**	23	92	24.1	**Rf i-s**	23	80.2	25.9
Wfts	23	162.4	30.9	**V-i**	22	.65	.07	**Wfa**	23	90.4	11.5
Rf i-a	23	91.2	7.3	**Rfn-a**	22	93.2	4.1	**Rf i-a**	23	91.2	7.3
Wfts	23	162.4	30.9	**V-i**	23	.64	.07	**Wfa**	23	90.4	11.5
Rf t-s	23	58.4	17.3	**Rf i-s**	23	80.2	25.9	**Rf t-s**	23	58.4	17.3
Wfts	23	162.4	30.9	**V-i**	23	.64	.07	**Wfa**	23	90.4	11.5
Rf t-a	23	85.6	9.7	**Rf i-a**	23	91.2	7.3	**Rf t-a**	23	85.6	9.7
Wfs	23	146.9	34.7	**V-i**	23	.64	.07	**V-n**	23	.63	.08
Wfa	23	90.4	11.5	**Rf t-s**	23	58.4	17.3	**V-i**	23	.64	.07
Wfs	23	146.9	34.7	**V-i**	23	.64	.07	**Rfn-a**	22	93.2	4.1
V-n	23	.63	.08	**Rf t-a**	23	85.6	9.7	**Rf i-s**	22	82.1	24.8
Wfs	23	146.9	34.7	**Rf n-s**	22	94.2	22.3	**Rfn-a**	23	92.6	4.9
V-i	23	.64	.07	**Rfn-a**	22	93.2	4.1	**Rf i-a**	23	91.2	7.3
Wfs	23	146.9	34.7	**Rf n-s**	23	92	24.1	**Rfn-a**	22	93.2	4.1

Rf n-s	23	92	24.1	**Rf i-s**	23	80.2	25.9	**Rf t-s**	22	59.7	16.6
Wfs	22	149.3	33.5	**Rf n-s**	23	92	24.1	**Rfn-a**	22	93.2	4.1
Rfn-a	22	93.2	4.1	**Rf i-a**	23	91.2	7.3	**Rf t-a**	23	85.6	9.6
Wfs	23	146.9	34.7	**Rf n-s**	23	92	24.1	**Rf i-s**	23	80.2	25.9
Rf i-s	23	80.2	25.9	**Rf t-s**	23	58.4	17.3	**Rf i-a**	23	91.2	7.3
Wfs	23	146.9	34.7	**Rf n-s**	23	92	24.1	**Wfa**	23	90.4	11.5
Rf i-a	23	91.2	7.3	**Rf t-a**	23	85.6	9.6	**V-i**	23	.64	.07
Wfs	23	146.9	34.7	**Wfa**	23	90.4	11.5	**Wfa**	23	90.4	11.5
Rf t-s	23	58.4	17.3	**V-n**	23	.63	.08	**Rf n-s**	23	92	24.1
Wfs	23	146.9	34.7								
Rf t-a	23	85.6	9.7								

Wfth: Writing fluency- total syllable **Wfs:** Writing fluency-speed
Wfa: Writing fluency-accuracy **V-n**: Vocabulary-narrative
V-i: Vocabulary-informative **Rf n-s**: Reading fluency narrative-speed
Rfn-a: Reading fluency narrative-accuracy **Rf i-s**: Reading fluency informative-speed
Rf i-a: Reading fluency informative-accuracy
Rf t-s: Reading fluency list of terms-speed
Rf t-a: Reading fluency list of terms-accuracy

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iojes
www.iojes.net
International Online Journal of Educational Sciences
ISSN: 1309-2707

Analysis of Conducted Post-Graduate Theses About Problem-solving in Physics and Mathematics Education: Turkey Sample

Research Article

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To cite this article: Aksan-Kilicaslan, E., & Eryilmaz-Toksoy, S. (2022). Analysis of conducted post-graduate theses about problem-solving in physics and mathematics education: Turkey sample, *International Online Journal of Educational Sciences*, *12*(4), 1043-1057.

ARTICLE INFO

Article History:

Received: 02.06.2022

Available online: 21.10.2022

ABSTRACT

In this study, it was aimed to analyze the trends of theses carried out on problem-solving, which is a common subject of study in Physics and Mathematics Education. After the year 2000, the thesis conducted in 32 physics education and 312 mathematics education were analyzed according to the type, year of publication, method used, variables used, participant/sample level, subject considered. It was determined that problem-solving theses are more involved in mathematics education, most theses are at the master's level, and usually the experimental method is used. The effect of a teaching method, strategy teaching, or problem-solving activities on students' problem-solving skills, performance, and attitude to problem-solving were investigated. It was determined that theses related to problem-solving in physics education are mostly completed in mechanics, while those in mathematics education are mostly completed in numbers and algebra learning. While there was a variety of theses in mathematics education as a sample level, theses in physics education were studied with students at the high school and undergraduate levels. It is important to present information about researches conducted in a particular field at different time intervals in terms of demonstrating the accumulation in that field of study. Because researchers are expected to update, change the information in the literature or add different information to the literature than existing information.

Keywords:
physics, mathematics, problem-solving, document analyze

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DOI: https://doi.org/10.15345/iojes.2022.04.010

Introduction

Mathematics is often included in science (Çetin, 2013; Karaer, 2006; Umay, 2007; Turşucu, Spandaw & De Vries, 2020). Physics is also a branch of science in which mathematics is intensely involved (Furner & Kumar, 2007; Kızılcık, 2019; Orton & Roper, 2000; Turşucu et al., 2020). Physics speaking the language of mathematics (Jua, 2018) is a course where students' achievement level is generally low (Aycan & Yumuşak, 2003; Maries & Singh, 2018). A situation that has an effect on this failure is the lack of mathematical knowledge of students (Boz, 2019; Bütüner & Uzun, 2011; Karakuyu, 2008). Hamed et al., (2015) classified the mathematical skills required when solving physics problems and determined that many mathematical skills are required to solve physics problems. Students should use mathematical knowledge in the process of solving physics problems (Authors, 2014; İnce, Çağırgan Gülten & Kırbaşlar 2012; Niss, 2017; Ogunleye, 2009).

Problem-solving is one of the main research topics of mathematics education (Carotenuto et al., 2021). Chang, Chang, and Tseng (2010) determined in their content analysis that problem-solving also has an important place in science education research. Problem-solving is included in most of the topics related to the physics course. There are many studies in the literature on problem-solving in physics education. In this case, it can be said that one of the common areas of study of physics and mathematics education is problem-solving. By determining what the general trends of researches conducted on problem-solving in both disciplines are subsequent research for the two branches can be better shaped.

When the literature is examined, it is seen that there are studies to determine the tendencies of the researches carried out in physics education according to various variables (Bağ, Kara & Uşak, 2002; Çakmak, 2016; Gülçiçek, Göksu, Önder, Oktay, Eraslan, Eryılmaz & Güneş, 2014; Gürel & Körhasan ,2018; Gürel, Ölmeztürk, Durmaz, Abul, Özün, Irak, Subaşı & Baydar, 2017; Gürel, Sak, Ünal, Özbek, Candaş & Şen , 2017; Kanlı, Eryılmaz & Güneş ,2013; Sağlam Arslan ve Paliç, 2011; Soslu ,2013; Önder, Oktay, Eraslan, Gülçiçek, Göksu, Ültay & Ültay, 2014;Yılmaz, 2019). Likewise, it is noteworthy that there are studies in the literature to determine the trends of research carried out in mathematics education (Birgin & Gündüz , 2018;Tatar, Kağızmanlı & Akkaya ,2013; Tatar & Tatar, 2008; Ulutaş & Ubuz, 2008; Yalçınkaya & Özkan, 2012; Yaşar & Papatğa , 2015).

Researches on determining the trends of studies related to physics education and mathematics education were carried out at certain intervals. In mathematics education, Kanbolat Balta (2019) examined only post-graduate theses related to problem-solving at the primary school level. However, such a study on problem-solving in physics education could not be found in the literature review. Ünsal & Moğol (2007) presented research on problem-solving in physics education. However, in these studies, the authors did not examine the studies according to some variables, they indicated aspects of the studies that they considered important. İnce (2018) presented the studies related to physics problem-solving chronically. She indicated the method and student level in studies. It is not known how the studies on problem-solving are distributed according to variables such as year, type, sample level, method, subject and variable. For this reason, it can be said that researches aimed at determining the general trends of problem-solving studies in physics and mathematics education are incomplete.

It is important to present information about researches conducted in a particular field at different time intervals in terms of demonstrating the accumulation in that field of study (Bağ, Kara & Uşak, 2002). Because researchers are expected to update, change the information in the literature or add different information to the literature than existing information (Çakmak, 2016). The aim of this study is to summarize the post-graduate theses conducted in the field of physics and mathematics education according to certain variables. In this way, it is believed that it will contribute to those who plan to work on problem-solving, researchers looking for a new research topic and the related field.

In today's education understanding; an education profile that questions, researches, thinks critically, develops mathematical literacy skills, can make sense of mathematical concepts and apply it to daily life, solve problems, and values mathematics based on all of these. Therefore, it is seen that researches based on problem solving are becoming more important day by day. It is thought that this research will contribute to the researchers in terms of providing a general perspective and a general framework. In line with the purposes of the research, it is aimed to provide researchers with an idea about the orientations of these studies, the issues that are thought to be incomplete, need to be studied, and should be taken in a wider framework, as well as the subjects and purposes. Thus, it is thought that it will contribute to those who plan to work on problem solving, researchers looking for new research topics and the related field. The main problem of the research is "How are the general trends of theses conducted in physics and mathematics education related to problem-solving in Turkey after 2000?'' Sub-problems are as follows:

- How are theses distributed by year?
- How are theses distributed according to the types they use?
- How are theses distributed according to the methods they use?
- How are participants/samples distributed in theses?
- How are variables distributed in theses?
- What subjects were theses conducted on?

Limitations of the Research

1. This study is limited because it examines postgraduate theses on problem solving in the field of physics and mathematics education.
2. This study is limited due to the examination of postgraduate theses on problem solving in the context of year, genre, method, variables and subject type.
3. The data of this study are limited to those obtained from YOKTEZ software.

Method

Research Model

The method of this research is descriptive content analysis. Descriptive content analysis; They are systematic studies that include the studies on a particular subject and the evaluation of trends and research results in a descriptive dimension (Çalık & Sözbilir, 2014). The data in this research are post-graduate theses on problem-solving in physics and mathematics education prepared by different authors.

Data Collection Process

By using the advanced search option, the words ''physics'' and ''problem-solving'' were searched for after the year 2000 with the 'all' option through the higher education institution thesis database (Turkey). 65 theses were reached. Each thesis was given a number. The publication year, type, method used, study group / sample, physics subject, variables (dependent, independent, relational / descriptive) information of each numbered thesis were processed in specific columns in the created Excel file. Later, the words "physics" and "problem-solving" were searched with the " all " option. 71 records were reached. A total of 80 theses were reached by reaching 15 theses that were not reached in the previous search. Among these theses, 47 theses were excluded from analysis.

Those theses are as follows: Theses using inventory as a data collection tool developed by Heppner and Petersen (1982) to determine the individual's perceptions of the ability to solve daily life problems. Theses that are related to other areas (medical, nursing, geodesy, architecture, computer engineering, physics engineering, psychology, philosophy) Theses that do not include problem-solving as a variable. 32 theses determined to be carried out on problem-solving in physics education were analyzed. In the same way, using the advanced

scanning option, the words "mathematics" and "problem-solving" were searched with " all " option and 600 theses were found. 312 theses determined to be carried out on problem-solving in mathematics education were subjected to analysis. Theses excluded from analysis are theses related to STEM, modeling, mathematical power, cognition strategies, multiple intelligence theory and related to other fields (chemistry, science, history, architecture, engineering). The data collection process is summarized as Figure 1

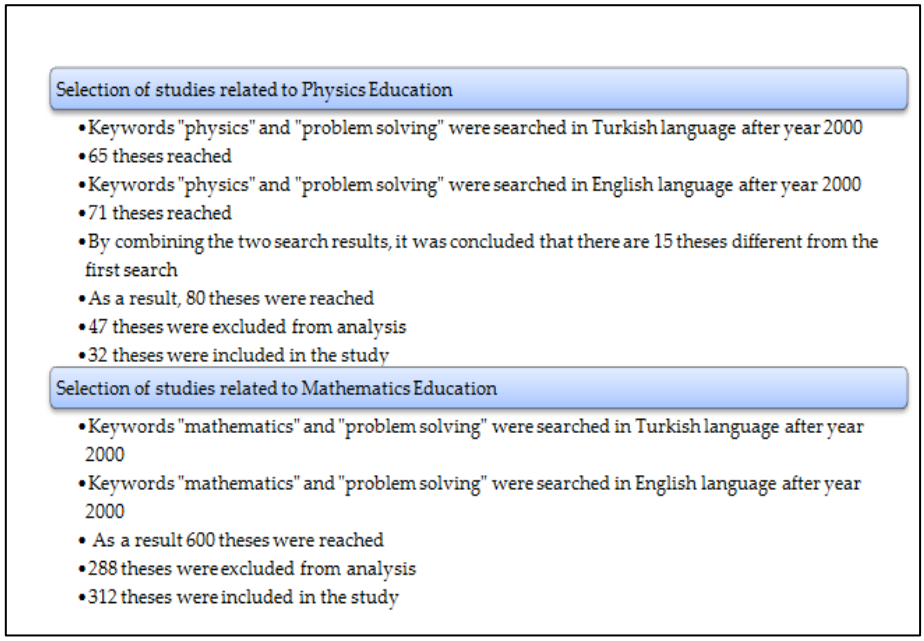

Figure 1. The data collection process is summarized

Data Analysis Process

For data analysis, researches conducted by researchers related to document analysis were examined and criteria were determined showing how theses should be examined. In this study, which uses descriptive analysis, the type of thesis, the publication year, methods and variables used in the study of these were discussed.

Later, researchers shared tasks, created a column for each criterion in the excel file, studied theses one by one and encoded them according to the criteria. After two researchers finished coding, each researcher encoded 30 theses encoded by the other researcher to ensure compatibility between encoders. Compatibility between encoders was calculated to be 100%. (Miles and Huberman's formula (Reliability Coefficient = Number of Consensus/ (Number of Consensus + Number of Disagreements) (Baltacı, 2017).

Results and Discussion

The findings obtained as a result of the analysis carried out in this section are presented by frequency and visualization according to the research problems.

1. Change of Theses in Physics and Mathematics Education on Problem-solving by Year

The change of the number of theses reached as a result of the research by year is seen in Figure1.

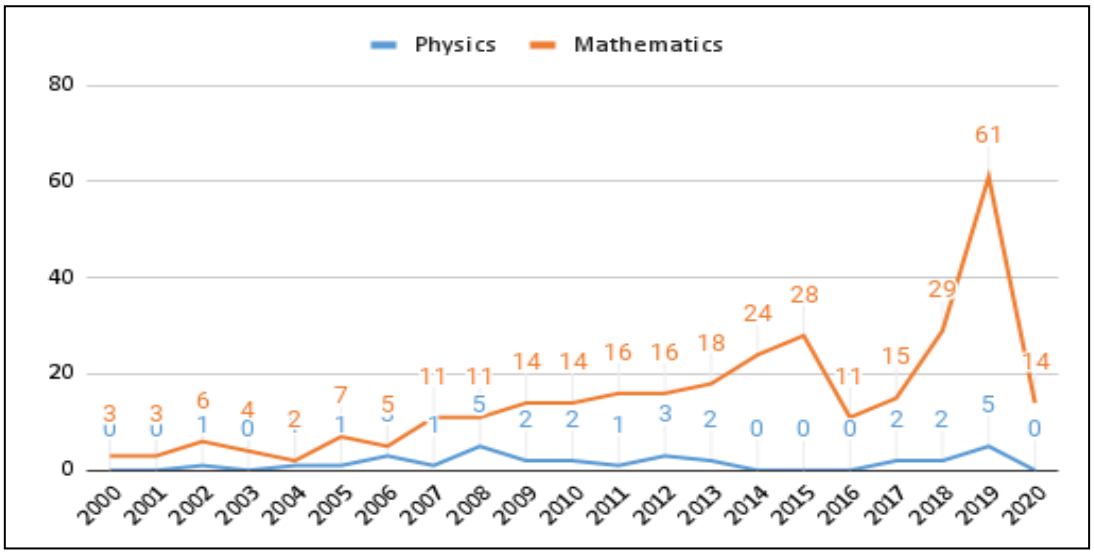

Figure 2. Change in the number of theses conducted in physics and mathematics education by year

When Figure 2 is examined, it is seen that the number of theses related to problem-solving in physics education varies between 0-5 according to the years of completion. While there were no post-graduate theses conducted in many years, it was seen that most theses were conducted in 2008 and 2019. It was seen that the number of theses on problem-solving in mathematics education varies between 3-61 according to the years of completion. It was seen that there was an increase in the number of theses completed between 2006 - 2015 and 2016 - 2019, while the most theses were completed in 2019.

2. Distribution of Theses in Physics and Mathematics Education Related to Problem-solving by Types

The distribution of theses reached as a result of the research by type is shown in Figure 2.

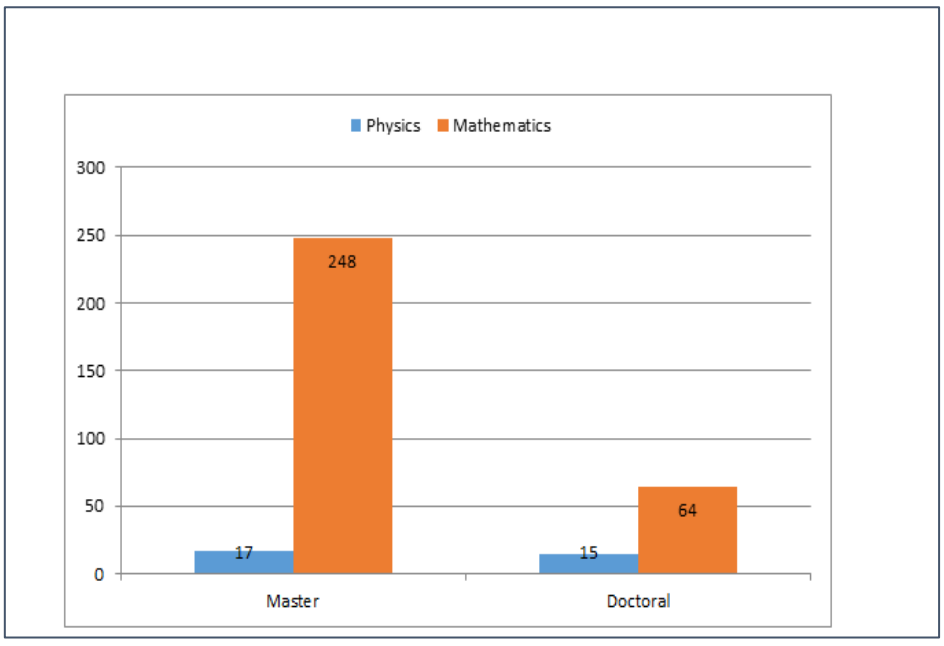

Figure 3. Distribution of theses conducted in physics and mathematics education by type

In the study of Figure 3, 17 (53%) theses related to problem-solving in physics education are at the master's level and 15 (47%) are at the doctoral level. 248 (79%) theses related to problem-solving in mathematics education are at the master's degree level, and 64 (21%) are at the doctoral level.

3. Distribution of Methods Used in Theses Conducted Physics and Mathematics Education Related to Problem-solving

The distribution of methods used in theses conducted in physics education related to problem-solving reached in the research is seen in Figure 3.

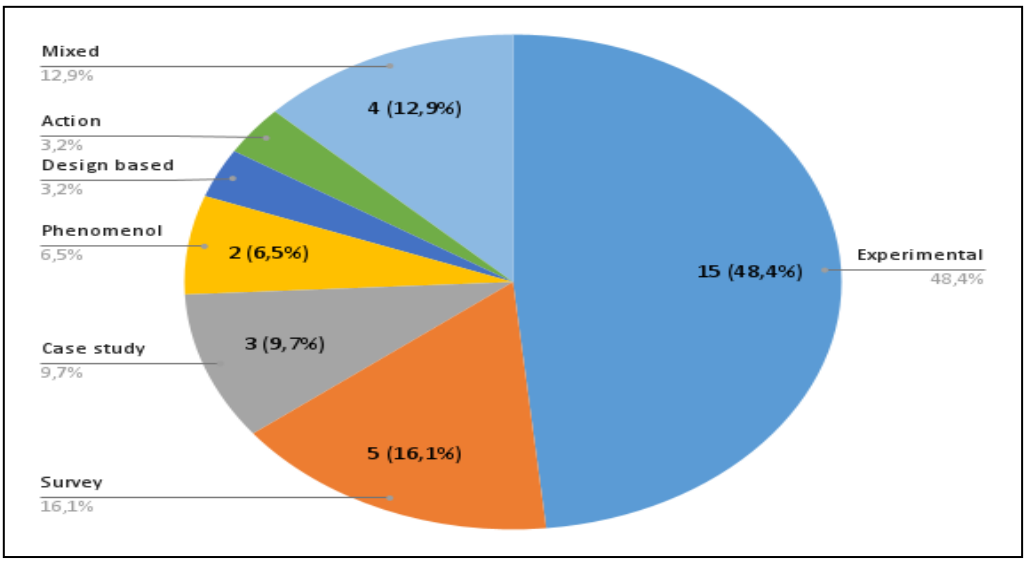

Figure 4. Distribution of methods used in theses conducted in physics education

As shown in Figure 4, about half (48%) of the theses related to problem-solving in physics education were conducted by using an experimental method. After the experimental method, the most preferred methods in theses respectively were survey (16%), mixed (13%) and case study (10%). Action research and design-based research were used by one researcher.

The distribution of the methods used in theses conducted in mathematics education with problem-solving reached in the research is shown in Figure 4.

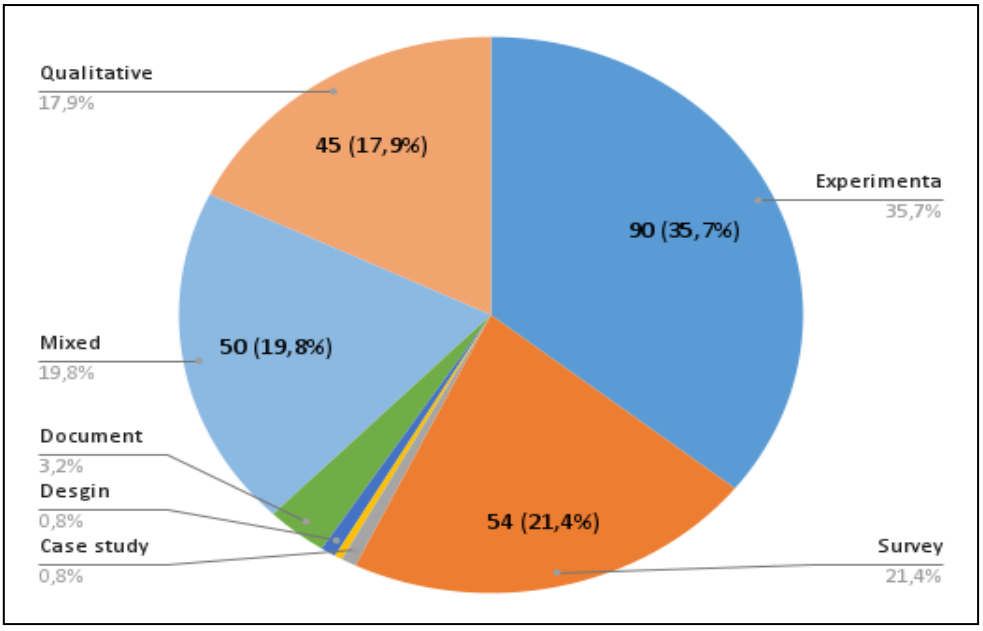

Figure 5. Distribution of methods used in theses conducted in mathematics education

When Figure 5 is examined, most of the theses conducted on problem-solving in mathematics education are respectively experimental (36%), survey (21%), mixed (20%) and qualitative (18%) research methods. Document Analysis, design-based research, and case studies were used less.

4. Change of Data Collected Sample/Participants in Theses Conducted in Physics and Mathematics Education Related to Problem-solving

In the theses reached in the research, the change in the levels of the sample/participants collected in the data is seen in Figure 6.

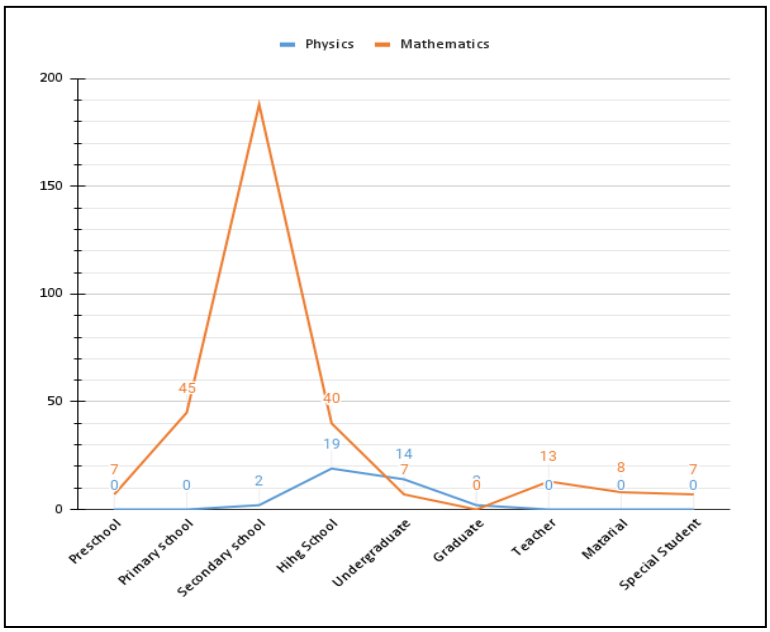

Figure 6. Sample change in theses conducted in physics and mathematics education

As seen in Figure 6, data was collected from a maximum of high school (19) and undergraduate (14) students in theses related to problem-solving in physics education. Data was collected from secondary school students in 2 theses and from graduate students in other 2 theses. In mathematics education, data was collected mostly from secondary school (188), primary School (45) and high school (40) students. Following these, teacher (13), material (8), undergraduate student (7), special student (7), preschool students (7) formed samples of other theses.

5. Distribution of Variables Discussed in Theses Conducted in Physics and Mathematics Education Related to Problem-solving in Turkey

The distribution of dependent variables discussed in the theses reached as a result of the research is shown in Figure 7.

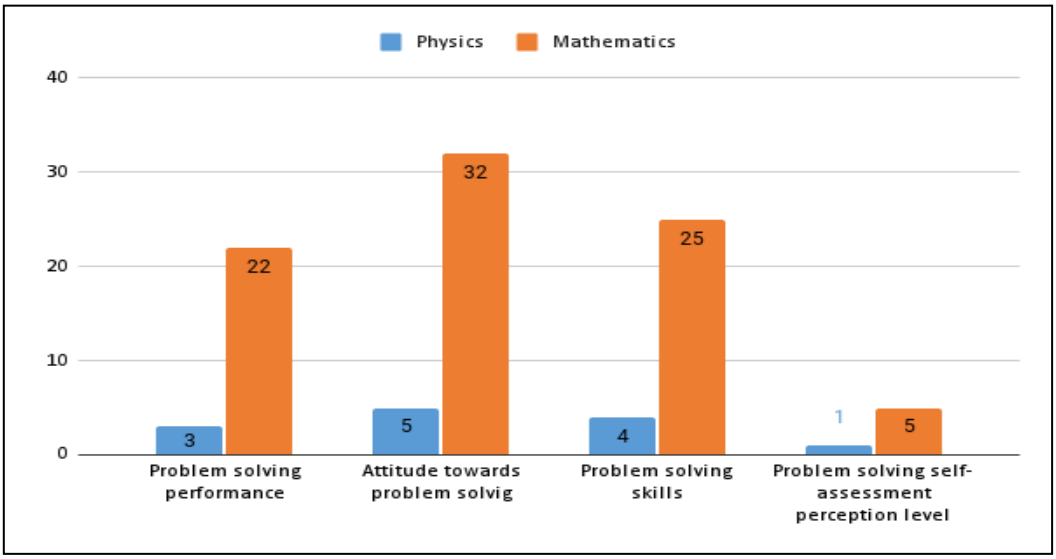

Figure 7. Status of dependent variables discussed in theses conducted in physics and mathematics education

In Figure 7, the following variables were mostly examined in theses conducted in physics and mathematics education: attitude towards problem-solving (mathematics 32, physics 5), problem-solving skills (mathematics 25, physics 4), problem-solving performance (mathematics 22, physics 3), problem-solving self-assessment perception level (mathematics 22, physics 3).

The ranking of the number of theses conducted according to these variables in physics and mathematics education is the same. The distribution of the independent variables discussed in the theses reached in the research is shown in Figure 8.

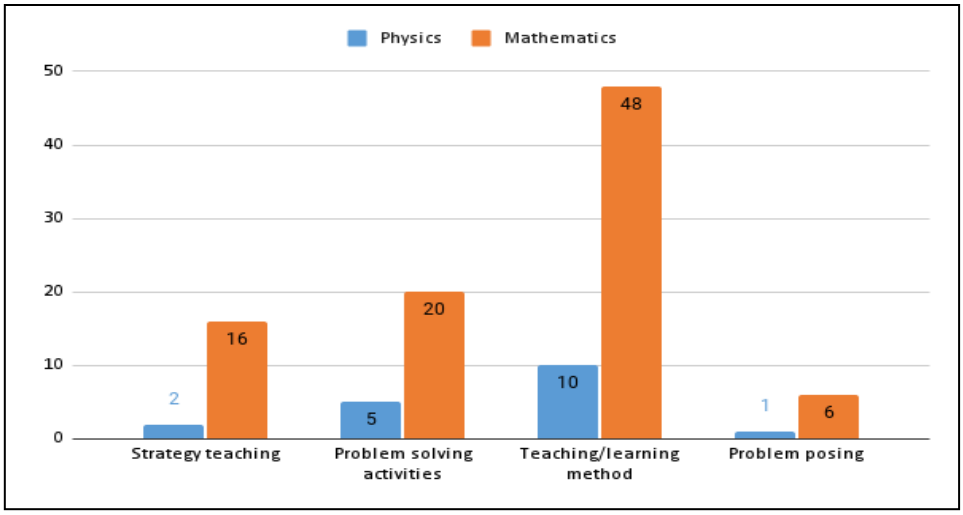

Figure 8. Status of independent variables discussed in theses conducted in physics and mathematics education

Figure 8 shows that the numerical ranking of the independent variables discussed in theses related to problem-solving is the same in physics and mathematics education. The effect of at most one teaching/learning method (mathematics 48, physics 10) was investigated in theses. Later respectively, the effect of problem-solving activities (mathematics 20, physics 5), the effect of strategy teaching (mathematics 16, physics 2) and the effect of problem posing (mathematics 6, physics 1) were investigated.

In the theses reached in the research, the state of the variables whose relations with other variables are investigated is shown in Figure 9.

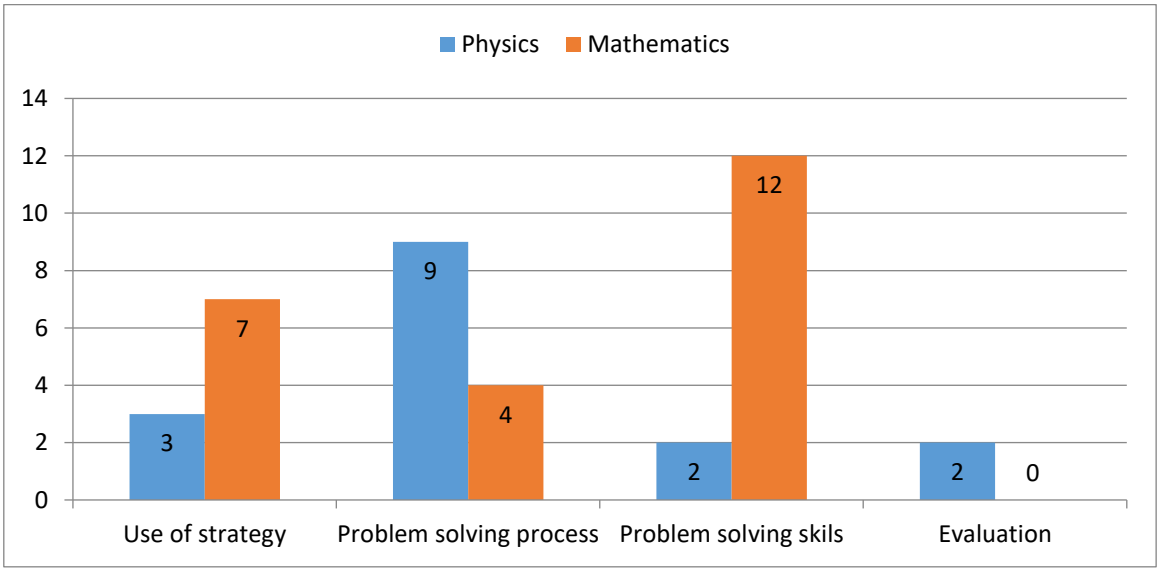

Figure 9. The status of variables whose relations with other variables are investigated in theses conducted in physics and mathematics education

As seen in Figure 8, the relationship of the problem-solving process (9) in physics education and the problem-solving skill (12) in mathematics education with other variables related to problem-solving was investigated. In theses, the relationship between the use of strategy (mathematics 7, physics 3) and the form of evaluation (physics 2) with other variables was also investigated.

6. Distribution of Topics of Conducted Theses in Physics and Mathematics Education Related to Problem-solving

As a result of the research, the distribution of physics subjects in which theses conducted in physics education are carried out is shown in Figure 10.

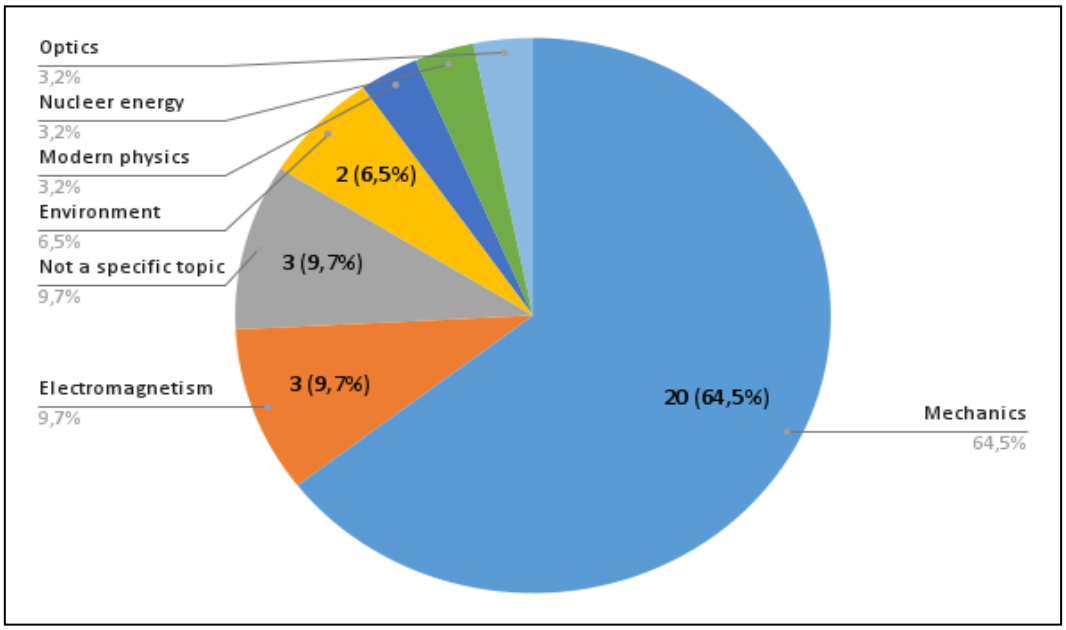

Figure 10. Distribution of theses conducted in physics education by topic

It can be seen in Figure 10, where mechanics (64%) and electromagnetism (10%) are most often selected as topics in theses related to problem-solving in physics education. While a certain physics topic was not determined in 10% of theses, in others environment (6%), optics (3%), modern physics (6%) and nuclear energy (3%) were selected as topics.

The distribution of theses conducted in mathematics education reached in the study according to learning areas is shown in Figure 11.

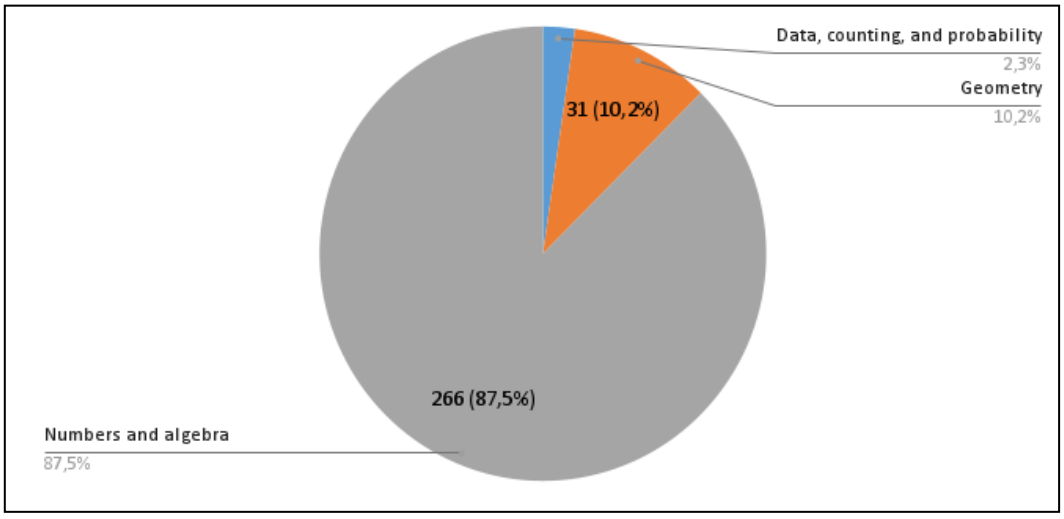

Figure 11. Distribution of theses conducted in mathematics education according to learning areas

As shown in Figure 11, 88% of theses related to problem-solving in mathematics education are related to numbers and algebra, 10% to geometry, and 2% to the field of data, counting, and probability learning. The distribution of the topics discussed in the theses on the field of learning numbers and algebra is seen in Figure 12.

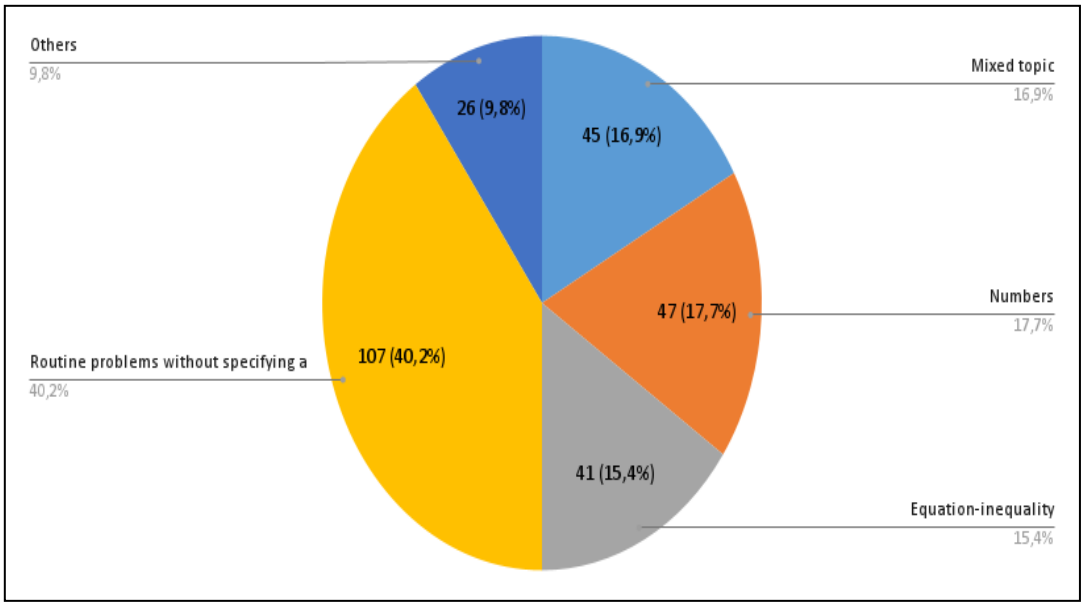

Figure 12. Distribution of topics in theses conducted in the field of learning numbers and algebra

Conclusion and Recommendations

There are more theses related to problem-solving in mathematics education (Figure 2). The small numbers of theses in physics education may be due to the fact that problem-solving is more often seen as a topic of mathematics. However, there is a lot of problem-solving in many aspects of physics. As Gürel et al. (2017) have noted, this may be an indication that interest in physics education in Turkey is declining. Most of the theses conducted in physics and mathematics education are at the master level (Figure 2). The small number of doctoral theses may be due to the fact that many people do not continue their education after master's degree in Turkey. The fact that the number of doctorate programs of universities is less than the number of master's programs can be justified for this result under the conditions required by universities to start a doctorate program (such as a foreign language requirement).

It was determined that experimental method and survey method were used more in theses conducted in physics and mathematics education (Figure 4-5). Uzunboylu & Aşıksoy (2014), in articles about physics education between the years 2008-2013, Gürel et al. (2017) in his thesis on physics education, Önder et al. (2013) in their published physics education articles on the Journal of Turkish Science Education between the years of 2004-2011 determined that articles about quantitative methods was adopted. In the same way, according to Ulutaş &Ubuz (2008), Yalçinkaya & Özkan (2012), Yaşar & Papatğa (2015), Smith and Thompson (2007), quantitative methods were used in mathematics education studies. The number of qualitative research is low in both areas. Problem-solving has many dimensions that can be carried out with qualitative research patterns. For this reason, it is recommended to adopt qualitative patterns more in problem-solving studies. Quantitative data allows you to get the numbers needed to prove the general points of your research. Qualitative data, on the other hand, provide you with details to understand their full implications. Qualitative studies are more time-consuming studies. In addition, details are very important in qualitative research. Therefore, data is collected more carefully. These circumstances may justify this conclusion. It was determined that theses in physics education are usually conducted by collecting data from high school and undergraduate students, while in mathematics education, data is collected from students and teachers of different levels (Figure 6). The reason for this situation may be that students encounter physics lesson in high school but math lesson in

primary school. Theses conducted in physics in primary school fall under the scope of Science Education. Similarly, Uzunboylu &Aşıksoy (2014), the researches in the articles on physics education; Gürel et al. (2017), theses conducted in physics education between 1990-2016; Önder et al. (2013), the samples of the articles on physics education published in the Journal of Turkish Science Education between 2004-2011. They determined that it mostly consists of high school and undergraduate students. Yaşar & Papatğa (2015) stated that studies are mostly conducted with 5th grade students in mathematics education. In addition, in the study conducted by Ulutaş & Ubuz (2008), it was observed that samples were carried out in primary and secondary schools, rather than in secondary education in their research on the orientation in mathematics education. In mathematics education, there are few theses that was conducted by collecting data from teachers and examining materials related to the course. In physics education, no theses were found in which teachers related to problem-solving were treated as samples or materials related to the course were examined. Teachers' classroom practices and materials used are effective factors in problem-solving success/ skill (Sayan, 2010). For this reason, it is recommended to consider teachers as samples or to study course materials in theses related to problem-solving in physics education.

It was determined that the dependent variables discussed in theses related to problem-solving in physics and mathematics education are distributed in the same way and that the attitude towards problem-solving is most studied (Figure 7). This variable may have been studied more since attitude has an effect on cognitive learning. It is believed that students will be more successful when their negative attitudes to problem-solving are eliminated. (Karataş, Alcı & Karabıyık Çeri, 2015). Following the attitude towards problem-solving in theses, problem-solving skills and performance were discussed the most. These variables are often considered indicators of success.

It was determined that independent variables discussed in theses related to problem-solving in physics and mathematics education are distributed in the same way and that the most used teaching/learning methods, problem-solving activities and strategy teaching were used (Figure 8). In general, by interfering in the teaching process by experimental methods (such as teaching method, activity, and strategy teaching) it was attempted to determine the effect of this intervention on the attitude, problem-solving skills or performance of problem-solving. For this reason, the attitude towards problem-solving in these theses may have been investigated more. (Balta, et al., 2016). Attitude towards problem-solving is seen as a variable that indirectly affects problem-solving ability, problem-solving performance and success. In a small number of theses, problem building was discussed as an independent variable. Problem posing is seen as high-level learning. (Koh, 2002; Korkmaz & Gür, 2006; Silver, 1994). For this reason, it is recommended to examine problems posing in different patterns in problem-solving studies.

The relationship between problem-solving skills with other variables in physics education and the problem-solving process in mathematics education was investigated the most (Figure 9). After these variables, the most common use of strategy is considered as a relational variable. Considering that the problem-solving skills, processes and strategies of expert-novices are different, it can be said that the variables discussed in theses correspond to the expert-novice differences in problem-solving. By determining the relationship of these variables with different variables, more information about expert-novice problem solvers can be reached. Solaz Portolés & Sanjosé López'in (2007) stated cognitive variables such as prior knowledge mental capacity, problem translating skill, knowledge types (declarative, procedural, and strategic) that affect problem-solving in their science review study. In this context, more studies can be done on these variables in the theses conducted in physics and mathematics education.

It was determined that theses on problem-solving in physics education were mostly conducted in mechanics (Figure 10), and in math education, they were mostly conducted in the field of numbers and algebra (Figure 11) by discussing non-routine problems (Figure 12). Uzunboylu & Aşıksoy (2014) found that the

mechanical subject was selected the most in the articles about physics education between 2008 and 2013. Considering that the problem-solving process may be different depending on the branch and subject (Türnüklü & Yeşildere, 2005), it is recommended to conduct research on other subjects. Lestari et.al. (2021), in their study examining articles published in journals from various countries in the last 10 years, determined that hybrid learning is a model that can be used in physics problem-solving teaching. This situation can be made clearer by conducting more research on teaching problem-solving in the hybrid learning model, which is obligatory during the pandemic period.

Ethics Committee Approval:

This research is a document analysis study so there is no ethics committee document.

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iojes
www.iojes.net

International Online Journal of Educational Sciences

ISSN: 1309-2707

A Quantitative Study: Investigation of the Universal Science Literacy Levels of Primary Teacher Candidates According to Some Variables

Research Article

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To cite this article: Tantan, M.; Kutur, K.; Aslan, H.; Koşar, B.; & Soyut, H. (2022). Investigation of Universal Science Literacy Levels of Primary School Teacher Candidates, *International Online Journal of Educational Sciences*, *12*(4), 1058-1074.

ARTICLE INFO

Article History:

Received: 21.06.2022

Available online: 24.10.2022

ABSTRACT

This study aims to determine the universal science literacy levels of primary school pre-service teachers studying at Bursa Uludağ University and Sakarya University and to examine how these levels change according to some variables (such as gender, education level, and parental education levels…). For this purpose, the Universal Science Literacy Scale (USLS) was applied to 214 pre-service teachers. This research, in which the quantitative research design is used, is in the survey model. The SPSS package program was used in the analysis of the data obtained from the research. As a result of the analysis of the data, it was determined (Classification, 201.7-240 score range was determined as "very high", $\bar{X}$=203) that the primary school pre-service teachers' universal science literacy level is "very high". In addition, it was determined that the gender variable affected the USL levels of teacher candidates and this effect was in favor of women. It was found that the level of education, the environment in which the education was completed, the type of high school graduated from, and the education level of the parents did not have a statistically significant effect on the USL levels of the classroom teacher candidates. The fact that universal science literacy level has been found to be very high might be indicating that science education in our country is given relating it with the daily life and using the laboratory environment frequently.

Keywords:
Universal science literacy, science education, pre-service teacher, primary school teacher candidates

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DOI: https://doi.org/10.15345/iojes.2022.04.011

Introduction

Reading and writing skills are at the forefront of the skills targeted since the early days of education (Akyol, 2015). A person who can read and write is also called "literate" by society. Although the concept of literate comes to mind as an individual who can perform reading and writing skills, illiteracy is associated with being uneducated (Yılmaz, 1989). In today's societies, literacy can be accepted as a measure of development and modernity (Vardar & Sarıoğlu, 2017). As time passes, it is seen that the definition of the concept of literacy has changed with the change in the value judgments of the societies and their expectations of the individual. As a result of the changes that the concept of literacy has undergone over time, it is seen that the concept of literacy has developed in special areas (Akyol, 2015; Bacanak et al., 2003; Dehart Hurd, 1958; Kurudayıoğlu & Tüzel, 2010). Different types of literacy are mentioned in many different fields, and with the evaluation of each literacy field within its scope, it is seen that different literacy types such as media literacy Aybek and Demir (2014), Çetin (2015), environmental literacy Kroufek et al. (2015), Yavuz et al. (2014), visual literacy Kocaarslan and Çeliktürk (2013), scientific literacy Bacanak and Gökdere (2009), Özdemir (2010), functional literacy Özenc (2013), mathematical literacy Çağırgan-Gülten (2013), Kesicioğlu (2014), information literacy Baran and Ata (2014), and computer literacy Yanık (2010) have developed. It is thought that, of these types of literacy, especially science literacy is of remarkable importance for the individuals to understand their environment better, to continue their life more meaningfully by establishing a relationship between science and daily life, to contribute to the scientific culture, and to increase the development level of the society by assuming an active role in social life. That's why, cultivating science literate individuals through science education programs has become a priority for many countries in the world (Turgut, 2007). Since especially 1980ies, science educators and science education institutions in the international arena have tried to define and shape science literacy within the science curricula (Bybee, 1997, akt. Turgut, 2007; Dani, 2009; Millar and Osborne, 1998; Miller, 1998; NRC, 1996; Shamos, 1995). Therefore, in order to define and shape science literacy, it is very important to determine the science literacy level of the target group, and their perception of and opinions about science literacy and the qualities a science literate individual should have. It has been observed that, considering this point, many studies have been conducted in order to get an idea about the related groups, in which scales have been developed to find out the science literacy levels Fives et al. (2014), Glynn and Koballa (2006), Laugksch and Spargo (1996), Mun et al. (2015), theoretical bases that would form the structure of science literacy have been suggested Choi et al. (2011), Çepni, Bacanak and Küçük (2003), Hodson (2003), advice and suggestions to enhance students' perception of science literacy have been stated Lederman, Antink and Bartos (2014), Liu (2009), Norris and Philips (2003), science literacy levels of the individuals have been measured Bacanak and Gökdere (2009), Laugksch and Spargo (1996), Miller (2002), Mun, Shin et al. (2015), Özdemir (2010), Yakar (2010), Yetişir and Kaptan (2006), effects of different variables on the science literacy levels of individuals have been examined Anagün (2011), Foster and Shiel-Rolle (2011), Işık Terzi (2008), Sarıbaş (2015), Şahin et al. (2010), science curricula and textbooks have been evaluated in terms of science literacy Boujoude (2002), Çakıcı (2012), Erdoğan and Köseoğlu (2012); Wei and Thomas (2006), Wilkinson (1999) and the historical and conceptual development process of science literacy has been discussed Choi et al. (2011), Deboer (2000) Hurd (1998), Laugksch (2000), Miller (1983), Turgut (2007).

Today, the factors affecting the efficiency of the educational process are science literacy, which is one of the important types of literacy that is closely related to scientific developments, and science education, which aims to gain literacy. Societies have tried to use natural resources for their benefit, to discover nature, to predict and manipulate natural events to make their lives easier and increase their welfare level, and these efforts have led to technological developments over time (Demirci Güler, 2017). Countries that aim to adapt to the requirements of the age have seriously focused on science education and followed science education policies independently from politics.

Science Education; which includes the purpose of discovering and explaining the way nature works, and which aims to teach the use and application of scientific thought is a process that cannot be expected to be achieved in the short term (Asoko, 2002). Effective management of this process is directly related to the development levels of countries (Demirci Güler, 2017). Science literacy, which was first introduced in the literature by Paul DeHart Hurd (1958); is defined as being able to recognize the basic concepts of science, using the necessary concepts in their life, and having scientific thinking skills (AAAS, 1989). In USA and England, this concept is used as 'scientific literacy', whereas in France, we see it as 'scientific culture'. While some differences regarding the meaning of the concept are observed during its transition from the literature of one nation to that of another, it still retains its general meaning of 'people's perception of science' (Durant, 1993; Laugksch, 2000). In a world where the importance of science is continually increasing, science literacy has, proportionally, become a necessity (Boujaoude, 2002). Teaching science at schools is accepted to be essential for the general development of nations and enhancing the quality of human resources. That's why, developed and developing countries put special emphasis on science curricula. That's because the power of nations in many fields is closely related to the science literacy level of their people. Teaching science aims to contribute to the mental and cultural education not only of those who will specialize in the field of science but also of all the students, to provide them with skills that would help them apply what they learn during lessons to their daily life, to enable them to examine the events they face with a cause effect relationship and to train them as citizens prioritizing scientific thought and able to establish relationships between events.

In order for the science literacy to reach to the desired level, the countries prepare their programs in line with this goal and put them into practice at schools (Bybee, 1997; Chin, 2005; DeBoer, 2000; Hurd, 1998; Laugksch, 2000; Miller, 1983; Shamos, 1995). The concept of science literacy entered the science education process in our country after the 2000s (Yetişir & Kaptan, 2007). However, the concept of science literacy which was mentioned without referring to its name in those years, could find a conceptual place for itself only after 2005 (MEB, 2005). The aim of raising entrepreneurial and determined individuals who can keep up with the rapid changes in Science and Technology, produce knowledge, use the produced knowledge in their environment, think critically and solve problems is mentioned in the 2018 Science Curriculum (MEB, 2018). These individuals are defined as "science literate individuals" in the science education program (MEB, 2018). A scientifically literate individual can understand and explain scientific facts and concepts at certain levels. Within the framework of this understanding, it can follow technological developments and use them when necessary (Duban, 2010). In our country, it is among the important goals of national education that teachers provide students with STEM (science, technology, engineering and mathematics) skills in order to raise science literate individuals (MEB, 2018). Therefore, it can be thought that teachers should be professionally competent and scientifically literate individuals to be able to raise scientifically literate individuals (Kaya & Bacanak, 2013). Considering this context; it can be stated that one of the most important prerequisites for teachers to be able to effectively and efficiently achieve science teaching processes is to be a "science literate individual" (Duban, 2010). In addition to many factors, it can be said that the education process they spend in education faculties plays a major role in teachers' being scientifically literate (Yavuz, 2015).

In this context, determining the science literacy levels of teacher candidates who will give science education and the factors that have a role in this process are important in terms of increasing the quality of science education (Özdemir, 2010).

It has been observed that the 'Basic Science Literacy Scale' developed by Laugksch and Spargo in (1996), is one of the most frequently used scales in Türkiye literature, in order to discover the science literacy level of the individuals (Duruk, 2012; Huyugüzel Çavaş, 2009; Ulutaş, 2009; Yetişir, 2007). As this scale was developed in 1990ies, and the demands expected from the science literate individuals have changed, and the science curriculum was renewed in 2013 an updated scale representing the new science literacy concept is needed to

be developed. When the literature is searched a few studies, such as one Çelik did in 2016 with teacher candidates, and a scale study by Çelik and Can (2017), and another one by Can and Çelik (2020) with teacher candidates could be found. In this study, the universal science literacy scale was used.

It is thought that it is important to determine the literacy levels of primary school teacher candidates who are expected to be science literate in order to contribute to the literature. In addition, the fact that the science literacy of the primary school teacher candidates is very high is thought to be important in terms of the quality of science teaching in our country. The fact that the education level of the primary school teacher candidates, the environment in which they completed their education, the type of high school they graduated from and the education level of their parents do not have a statistically significant effect on their USL levels can prove that science education is at a good level in our country. In this study, it was aimed to determine the universal science literacy levels of primary school teacher candidates who are in education and training in Bursa Uludağ University and Sakarya University with a unique measurement tool. For this purpose, answers to the following research questions were sought: 1. What is the universal science literacy level of primary school teacher candidates? 2. Do universal science literacy levels of primary school teacher candidates show significant differences according to a) gender, b) Completing his education in rural or urban areas, c) Type of high school he graduated from, d) Education level of the mother, e) Education level of the father?

Method

This research is descriptive research, and a survey model was used in the research. In studies in which this model is used, participants' views on a subject or event or their interests, skills, abilities, attitudes, etc. characteristics are determined (Büyüköztürk et al., 2017; Fraenkel & Wallen, 2009).

The Sample of the Study

The universe of this study consists of primary school teacher candidates studying in Bursa and Sakarya provinces. The demographics of the participants are given in Table 1.

Table 1. Demographic characteristics of the participants

Participants	**Gender**			
	Female		Male	
	n	%	n	%
Pre-service classroom teachers	176	82.2	38	17.8

The data of the study were obtained by convenience sampling method. It was assumed that the primary school teacher candidates, to whom the research was applied, entered their information correctly in the demographic information form. In addition, it is assumed that the primary school teacher candidates, to whom the research was applied, reflect their knowledge correctly on the Universal Science Literacy Test. This research is limited to 214 classroom teacher candidates, 82.2% female and 17.8% male, studying at Bursa Uludağ University and Sakarya University in the 2021-2022 academic year.

Data Collection Tool

In this study, the Universal Science Literacy Scale was used to determine the universal science literacy levels of the primary school teacher candidates and to determine whether the universal science literacy levels change according to some variables. This scale was developed by Mun et al. in 2015 and its Turkish adaptation, validity, and reliability studies were carried out by Çelik (2016). The scale is in a five-point Likert type consisting of 48 items. In addition, the concept of universality brought to science literacy is based on seeing every individual in the society as a universal citizen (Mun et al., 2015).

The data obtained as a result of the pilot study were tested with confirmatory factor analysis. The fit indices obtained as a result of the analysis showed that the validity was ensured in the adaptation of the scale to Turkish. It was seen that the model fit indices of the adaptation study were at an acceptable level (X^2/sd= 2.03, NFI=.94, NNFI= .97, CFI= .97, GFI= .88, AGFI= .86, RMSEA= .04) (Çelik, 2016). The reliability of the scale was calculated with the Cronbach alpha internal consistency coefficient and this value was found to be .91. Cronbach's alpha internal reliability coefficients for the sub-dimensions were .81 to "mind habit", .76 to "character and values", .79 to "science as human endea avour", and .85 to "metacognition and self-control" (Çelik, 2016). In this study, the reliability coefficient of the scale was calculated as Cronbach-Alpha .95. USLS consisting of 48 items is a five-point Likert type scale in the form of "Strongly Disagree (1)", "Disagree (2)", "Undecided (3)", "Agree (4)", and "Strongly Agree (5)". The maximum score that can be obtained from the scale is 240, and the minimum score is 48. In this study, it was decided to use the USLS, which was adapted into Turkish and for which the necessary permissions were obtained.

The research was carried out with teacher candidates studying at Sakarya University and Bursa Uludağ University, Faculty of Education, Classroom Teaching program. The scale was reproduced on paper for prospective teachers and applied face to face. Necessary permissions were obtained from the Ethics Committee for the participants of the study and the research was started on a voluntary basis. In the research, USLS was used as a measurement tool. The scale applied consists of two parts, the first part, which includes the demographic characteristics of the participants, and the second part, which consists of 48 items. The first part was arranged according to the participants before the USLS was applied and then it was applied. Before the scale was distributed, pre-service teachers were told that this was a scientific study and that the data obtained would only be used for this research. Thus, they were asked to be sincere and reflect the facts in answering the scale.

Data Analysis

Data collected in line with the purpose of the research were analyzed using the SPSS package program. In this process, the universal science literacy levels of primary school teacher candidates were determined and it was examined how these levels were affected in terms of the variables in the demographic information form. Before deciding which tests to use, it was checked whether the data obtained showed a normal distribution. According to Tabachnick and Fidell (2013), when the skewness and kurtosis values are between +1.500 and -1.500, the distribution is considered as a normal distribution. As seen in Table 3, it can be said that the kurtosis and skewness coefficients of the data obtained in this study are between +1.500 and -1.500 and show a normal distribution. Kolmogorov-Smirnov normality test results were presented in Table 2.

Table 2. The results of the normality test of Kolmogorov-Smirnov.

	Kolmogorov-Smirnov		
Participants	**Statistic**	**df**	***p***
Universal Science Literacy Scale	.054	.214	.20

Table 3. The results of the normality test of the data obtained from the USLS and Subscales

Participants	**n**	$\bar{X}$	**ss**	**p**	**Skewness**	**SE**	**Kurtosis**	**SE**
Pre-service classroom teachers	214	4.21	.46	.07				
USLS	214				-.720	.166	1.486	.331
Mind Habit	214				.310	.166	.1450	.331
Character and Values	214				-.667	.166	.413	.331
Science as Human Endeavour	214				-1.490	.166	1.430	.331
Metacognition and Self-Control	214				-.525	.166	.084	.331

p<.05

As can be seen in Table 3, the normality test result of the pre-service teachers was calculated as p> .05, and according to this result, it was determined that the data obtained from the USLS showed a normal distribution, and parametric tests were used for the analysis of the data in the next stages. USL levels of primary school teacher candidates were determined by descriptive statistics. A one-way analysis of variance (ANOVA) was used to determine whether USL levels differed according to the education levels of the parents and the type of high school they graduated from. The effects of completing their education in rural or urban areas and the effects of gender were examined by using a t-test for independent samples. In this study, research ethics principles were followed and necessary ethics committee permissions were obtained. Within the scope of ethics committee permission; The document dated 24.12.2021 and numbered 11 was received from Bursa Uludağ University Social and Human Sciences Research and Publication Ethics Committee.

Findings

In this section, in line with the purpose of the research, the findings of the universal science literacy (USL) levels of teacher candidates are interpreted as follows:

The aim of the first question of this research is to find the universal science literacy level of primary school teacher candidates. For this purpose, the answers given to the scale by the primary school teacher candidates studying in Bursa Uludağ University and Sakarya University, Faculty of Education, Classroom Teaching program, are grouped according to a classification model consisting of five levels (very high, high, medium, low, very low). The classification was shaped in the form of five groups obtained by dividing by five the result found by subtracting the minimum score from the maximum score that can be obtained from the USLS [(240-48)/5=38.4]. According to this, the 48-86.4 score range is “very low”, the 86.5-124.8 score range is “low”, the 124.9-163.3 score range is “moderate”, the 163.4-201.6 score range is “high”, and 201.7-240 score range was determined as “very high”. The average scores of primary school teacher candidates in USLS are given in Table 4.

Table 4. USLS averages of primary school teacher candidates

	n	**Number of Items**	**Minimum Score**	**Maximum Score**	$\bar{X}$	**ss**
USLS	214	48	116	245	203	21.26
Mind Habit	214	13	30	94	54.08	7.16
Character and Values	214	9	17	45	37.51	5.38
Science as Human Endeavour	214	13	22	65	56.95	6.04
Metacognition and Self-Control	214	13	31	65	54.75	6.98

According to Table 4, the lowest score reached by the pre-service teachers participating in the research was calculated as 116, and the highest score as 245. The average of the scores of the pre-service teachers in the USLS is 203, and according to this situation, it has been commented that the USL level of the pre-service teachers is "very high".

The results of the independent group t-test, in which the USLS levels of the primary school teacher candidates were examined according to the gender, were given in Table 5.

Table 5. T-test results regarding gender of primary school teacher candidates' USLS scores

	n	$\bar{X}$	**ss**	sd	**t**	**p**

Gender	Female	176	4.26	.46	212	2.41	.017
	Male	38	4.08	.45			

p< .05

The effect value of the significant difference was expressed by calculating the Cohen's d value. This value was .44. It had a medium-sized effect.

According to Table 5, it has been determined that there is a significant difference [t (212) =2.41; p<.05] in the USL levels of primary school teacher candidates in terms of gender. In this case, it can be interpreted that the gender of pre-service teachers affects their USL levels. When the USLS score averages are examined, it has been seen that female teacher candidates' average USLS score ($\bar{X}$=4.26) is higher than the male teacher candidates' USLS point average ($\bar{X}$=4.08).

The change in the USL level of the primary school teacher candidates according to the level of their education was examined by using the t-test for independent samples and the data obtained were shown in Table 6.

Table 6. ANOVA test results regarding the grades of primary school teacher candidates' USLS scores

Source of Variance	Sum of Squares	sd	Mean Squares	F	p
Between groups	.296	2	.148	.752	.473
Within groups	41.538	211	.197		
Total	41.834	213			

p<.05

According to Table 6, there is no statistically significant difference [F (2, 211) = .752; p>.05] in the USL levels of the primary school teacher candidates according to the grades they are studying at.

Whether the primary school teacher candidates' USL level differs according to whether they completed their education in rural or urban environments was analyzed by t-test for independent samples and the data obtained were given in Table 7.

Table 7. T-test results of primary school teacher candidates' USLS scores regarding the variable of completing their education in the rural and urban environment

		n	$\bar{X}$	ss	sd	t	p
Where Education Completed	Rural	35	4.25	.56	212	.207	.837
	Urban	179	4.23	.42			

p< .05

According to Table 7, it was determined that there was no statistically significant difference [t (212) = .207; p>.05] between the primary school teacher candidates' USL levels according to whether they completed their education in rural or urban areas. In other words, it was seen that the pre-service teachers' completing their education in rural or urban areas did not affect their USL levels. However, when the mean scores are examined, it was found that the mean USLS score of the pre-service teachers who completed their education in the urban area ($\bar{X}$=4.25) was higher than the mean score of the pre-service teachers who completed their education in the rural area ($\bar{X}$=4.23).

The variation of primary school teacher candidates' USL levels according to the type of high school they graduated from was analyzed using analysis of variance (ANOVA) and the data obtained were given in Table 8.

Table 8. Descriptive statistical results of primary school teacher candidates' USLS scores regarding the variable of the type of high school they graduated from

	n	$\bar{X}$	ss

High School Type	Science and Social Sciences High School	15	4.01	.36
	Anatolian/Anatolian Teacher High School	163	4.27	.42
	Normal highschool	12	4.15	.68
	Vocational high School	24	4.14	.49

According to Table 8, the USLS score average was the highest in Anatolian/Anatolian Teacher-High School ($\bar{X}$=4.27) and the least in Science-Social Sciences High School ($\bar{X}$=4.01). The results of the analysis of variance (ANOVA) performed to determine whether there is a significant difference between the mean scores were given in Table 9.

Table 9. ANOVA test results of primary school teacher candidates' USLS scores regarding the variable of high school type they graduated from

Source of Variance	Sum of Squares	sd	Mean Squares	F	p
Between groups	1.262	3	.421	2.179	.092
Within groups	40.571	210	.193		
Total	41.834	213			

p< .05

According to the results of the analysis of variance (ANOVA) test shown in Table 9, there was no statistically significant difference [F (3, 210) =2.179; p>.05] between the USL levels of the primary school teacher candidates according to the type of high school they graduated from. In other words, it was seen that the variable of the high school type from which the teacher candidates graduated did not affect their USL levels.

The descriptive statistics of the data obtained to analyze the USL levels of the primary school teacher candidates according to the mother's education level were given in Table 10.

Table 10. Descriptive statistical results of primary school teacher candidates' USLS scores regarding the mother education level variable

		n	$\bar{X}$	ss
Mother Education Level	Undergraduate	21	4.25	.35
	High school	44	4.23	.42
	Middle School	55	4.24	.44
	Primary school	86	4.25	.49
	Other	8	4.08	.36

In the light of Table 10 data, the mean scores of teacher candidates according to their mother's education level are quite close to each other. The results of the analysis of variance (ANOVA) performed to determine whether there is a significant difference between these mean scores were given in Table 11.

Table 11. ANOVA test results related to the mother education level variable of the USLS scores of the primary school teacher candidates

Source of Variance	Sum of Squares	sd	Mean Squares	F	p
Between groups	.199	4	.050	.250	.909
Within groups	41.635	209	.199		
Total	41.834	213			

p< .05

As shown in Table 11, according to the analysis of variance (ANOVA) results, it was determined that there was no statistically significant difference [F (4,209) = .250; p>.05] between the mean scores of primary school teacher candidates' USL levels according to their mother's education level. In other words, it was

observed that the high or low education levels of the mothers of the prospective teachers did not affect their USL levels.

The descriptive statistics of the data obtained to analyze the USL levels of the primary school teacher candidates according to the father's education level were given in Table 12.

Table 12. Descriptive statistical results of primary school teacher candidates' USLS scores regarding the variable of father's education level

		n	$\bar{X}$	ss
Father Education Level	Undergraduate	53	4.21	.41
	High school	65	4.23	.48
	Middle School	48	4.28	.39
	Primary school	48	4.24	.49

According to Table 12, it can be seen that the USLS mean scores of the teacher candidates according to their father's education level are close to each other. The results of the analysis of variance (ANOVA) performed to determine whether there is a significant difference between these mean scores were given in Table 13.

Table 13. ANOVA test results regarding the father education level variable of USLS scores of primary school teacher candidates

Source of Variance	Sum of Squares	sd	Mean Squares	F	p
Between groups	.153	3	.051	.257	.856
Within groups	41.681	210	.198		
Total	41.834	213			

p<.05

As seen in Table 13, according to the results of the analysis of variance (ANOVA) test, there is no statistically significant difference between the mean scores of primary school teacher candidates' USL levels according to their father's education level [F (3,210) =.257; p>.05]. In other words, it was seen that the high or low education levels of the fathers of the prospective teachers did not affect their USL levels.

Discussion and Conclusion

It is not difficult to predict that the definition of the concept of literacy, which changes and develops day by day, will constantly change in the light of developing technology and scientific advances. Literacy, which is seen as a measure of modernity and development in modern cultures (Vardar & Sarıoğlu, 2017), is the most fundamental right that must be presented to the individual to solve the educational problems of a society and to create a healthy social structure. Of course, it is not a coincidence that many countries whose contribution to scientific and technological developments worldwide are the ones with the highest literacy rates (Maya, 2013). Therefore, the way to raise science-literate individuals is to raise science-literate teachers who are responsible for raising future generations (Kaya & Bacanak, 2013). When the effect of high science literacy level of teachers and teacher candidates on teachers' self-efficacy in science teaching is examined, it could easily be seen how increasing this scientific literacy level is important in terms of increasing the quality of science education and providing a better education environment for future generations (Akgün et al., 2014; Al Sultan et al., 2018; Flores, 2019; Kutur, 2021; Poluakan, 2012; Uludüz, 2017).

When the USLS average score results used in the research were examined, it was determined that the primary school teacher candidates' universal science literacy was "very high". Similar results were obtained in the study conducted by Salcı and Aydın (2021), which was aimed to determine the universal science literacy

levels of teachers and prospective teachers. In addition, in the study carried out by Uludüz (2017), the relationship between the science literacy levels of primary school teacher candidates and their self-efficacy toward science teaching was examined. In this study, it was found that 62% of the primary school teacher candidates scored above the success limit of the applied test. Again, in the study carried out by Çelik (2016) on this subject, it was seen that none of the pre-service teachers were "very low" or "low" science literate and 97.3% of the pre-service teachers were "high" and "very high" science literate. Tekin, Aslan, and Yağız (2016) reached similar results in their study in which they examined the scientific literacy levels and critical thinking dispositions of pre-service science teachers, and found that the scientific literacy level of pre-service science teachers was over 60%. At the same time, Saracaloğlu, Yenice and Özden (2013) and Caymaz (2008) stated in their research that pre-service science teachers' science literacy levels are sufficient. As a result of his research with pre-service science teachers, Yolagiden (2017) determined that pre-service science teachers' science literacy levels are slightly above the average. In addition, when the literature is examined, there are also studies showing that the science literacy levels of teacher candidates are at medium or low levels. As a result of his research, Özdemir (2010) stated that the science literacy levels of the pre-service teachers were moderate and this level was based on not knowing enough about key concepts, not following scientific developments and accompanying misconceptions. Kocabaş (2004), on the other hand, showed in his study that the literacy level of teacher candidates is moderate. In his research with secondary school students, Halimoğlu (2019) determined that the science literacy levels of the students were moderate. The relevant results are in line with the data of this study and are promising for the quality of education to be given by teachers who are responsible for raising science-literate individuals (MEB, 2013).

According to the data obtained when examining whether the gender variable has any effect on the USL levels of the primary school teacher candidates; it was found that the gender variable affected the USL levels of teacher candidates and this effect was in favor of women. These results are in line with the results of the study conducted by Çelik (2016). Similar findings were obtained in many studies (Çelik, 2016; Özdemir, 2011; Yolagiden, 2017). In the study conducted by Salcı and Aydın, although it was discovered that gender did not make a statistical difference in USL, it was concluded that the average score of female candidates was slightly higher than that of male candidates (Salcı and Aydın, 2021). In his research he made with teachers, Keskin (2020) questioned whether curriculum literacy perception scale scores differ according to the gender variable and couldn't find a statistically significant difference between them. As is also seen in this research, the average USLS scores of female teachers have been found to be higher than those of male teachers. In his research he conducted with science teachers, Yağan (2019) stated that there isn't a statistically significant difference between the science literacy test scores of male and female teachers, whereas the average science literacy scores of female teachers are higher than those of male teachers. In their research, Tekin, et al. (2016) stated that, when compared according to gender variable, basic science literacy scores of males and females are very close to each other and there isn't a statistically significant difference between the scores. Gündüz and Kurnaz (2019), in their research, looked for the change in the science literacy levels of science teacher candidates according to the gender, and found that, in one of the two different universities they chose as samples, the science literacy levels didn't differ whereas they did in the other. It may be possible to explain this situation with reasons such as the fact that female teacher candidates' curiosity, tendencies, and motivations towards science and their ability to empathize with environmental factors are high (Çelik, 2016).

It was examined whether the class teacher candidates' USL levels were affected by the level of their education. It was determined as a result of the data that the level of grade of at school did not have any effect on the USL levels of the classroom teachers. Among the existing studies, there are studies supporting these findings (Salcı & Aydın, 2021; Uludüz, 2017).

As a result of the data, when the USL level of primary school teacher candidates is examined according to the environment in which they completed their education, it was concluded that the environment in which the education was completed did not have a statistically significant effect on the USL levels of the classroom teacher candidates. However, the USLS average score of the primary school teacher candidates who completed their education in the urban area ($\bar{X}$=4.25) was slightly higher than that of the prospective teachers who completed their education in the rural area ($\bar{X}$=4.23). These results are consistent with the results of the study conducted by Salcı and Aydın (2021). In one of the similar studies, Saracaloğlu and his friends (2013) found out as a result of their research that the science and technology literacy levels of teacher candidates don't change significantly according to the settlement, they study in. Students who complete their education in an urban setting have easier access to course materials, resources, and research opportunities. The reason for this small difference may be due to the factors mentioned above.

As a result of the data, when the USL levels of the primary school teacher candidates were examined according to the type of high school they graduated from, it was determined that the type of high school they graduated from did not make a statistical difference in terms of USL levels. This result coincides with the results of the research carried out by Salcı and Aydın (2021). However, when the average scores obtained from USLS are examined, the average score of the Anatolian High School graduate teacher candidates is slightly higher than the other high school graduate candidates. This difference may be due to the facilities of the schools, the quality of the teachers, individual interest and motivation factors.

According to the results obtained from the data, which examined whether the education level of the parents had any effect on the USL levels of the primary school teacher candidates, it was found that the education level of the parents did not have a statistically significant effect on the USL levels of the prospective classroom teachers. There are studies supporting these results in the literature (Çelik, 2016; Keskin, 2008; Salcı & Aydın, 2021, Tunç Şahin and Say, 2010; Yakar, 2010; Yetişir, 2007). It is evaluated that the science literacy skills of teacher candidates are not affected by the education levels of their parents, but they may differ with variables such as personal interest, curiosity and motivation, and the quality of education they encounter in their education levels. Although the very high level of science literacy is promising for the future, it should be supported by studies with different and larger sample groups. Studies to be carried out by taking into account the different variables affecting science literacy can contribute to ensuring continuity and increasing productivity in this field. It is also important to carry out qualitative studies in this area. It may be beneficial to conduct similar studies with different sample groups with preschool and science teacher candidates, and current classroom and science teachers.

EK-1.

ULUDAĞ UNIVERSITY RESEARCH AND PUBLICATION ETHICS COMMITTEES
(Social and Human Sciences Research and Publication Ethics Committee)
MEETING

Session Date	Session No
December 24, 2021	2021-11

DECISION NO 11: Scale questions to be used in the research study titled 'Determination of the Universal Science Literacy Levels of the Classroom and Science Teacher Candidates', which will be conducted by Burcu KOŞAR, a postgraduate student at the Institute of Educational Sciences, and doctorate programme students Kamuran KUTUR, Melike TANTAN and Hüseyin ASLAN together, under the responsibility of associate professor Hakan SÖYÜT, lecturer at the Classroom Teaching Department of Basic Education received from the Faculty of Education, were started to be evaluated.

As a result of the evaluations; it has been decided unanimously and the legal, intellectual and authors royalties responsibilities regarding the methods and scale of the questions being at the responsibility of the applicant that the scale questions to be used in the research study titled 'Determination of the Universal Science Literacy Levels of the Classroom and Science Teacher Candidates', which will be conducted by Burcu KOŞAR, a postgraduate student at the Institute of Educational Sciences, and doctorate programme students Kamuran KUTUR, Melike TANTAN and Hüseyin ASLAN together, under the responsibility of associate professor Hakan SÖYÜT, lecturer at the Classroom Teaching Department of Basic Education received from the Faculty of Education, are appropriate.

Prof. Dr. Feridun YILMAZ
Committee Chairman

Prof. Dr. Abamüslim AKDEMİR
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iojes
www.iojes.net
International Online Journal of Educational Sciences
ISSN: 1309-2707

The Relationship between Leader-Member Exchange and Job Satisfaction: A Study on Coaches

Research Article

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To cite this article: Gunel, I., &. Duyan, M. (2022). The relationship between leader-member exchange and job satisfaction: A study on coaches, *International Online Journal of Educational Sciences*, *12*(4), 1075-1089.

ARTICLE INFO

Article History:

Received: 23.06.2022

Available online: 21.10.2022

ABSTRACT

This study was conducted to determine the relationship between leader-member exchange and job satisfaction of coaches who provide sports training in the public sector. As a data collection tool, Liden and Maslyn's (1998a) leader-member exchange scale and Chang and Chang's (2007) job satisfaction scale were used. The population of the study consists of coaches working in Antalya, Istanbul, and Mugla provinces of Turkey. A total of 183 coaches, 132 male, and 51 female working in the public sports sector of these provinces, selected by convenience sampling method from non-random sampling methods, constitute the sample of the study. The study was based on voluntary participation. A questionnaire was applied to the coaches participating in the study through electronic communication tools. The data collected from the participants using the relational research model from quantitative research patterns were analyzed through the SPSS and AMOS statistical programs. Frequency and percentage calculations were made to reveal the demographic characteristics of the coaches. Confirmatory factor analyses were performed on the scales whose reliability was ensured. In addition, correlation analysis was performed to determine the direction and strength of the relationship between the variables, and a two-step hierarchical regression analysis was conducted to determine whether the coaches' leader-member exchange had an effect on job satisfaction. According to the findings of the research; it can be said that the coaches participating in the research have a positive effect on their job satisfaction as a result of their exchange with their leaders.

Keywords:
Leader-member exchange, job satisfaction, coach, sports

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DOI: https://doi.org/10.15345/iojes.2022.04.012

Introduction

Sports, which is considered one of the most important social phenomena today, continues to exist as an economic, social, and cultural dynamic (Reyhan & Kolayiş, 2019). In today's world, all technological and sociological changes affect the working life directly and deeply as well as affecting every field (Büyükkaymakcı & Sundu, 2021). In addition to being more effective and efficient, organizations need to give importance to people, especially for institutions to have a competitive advantage (İspir, 2018). When leaders do not provide their followers with the necessary work environment, they cause their followers to face many difficulties in performing their work (Bhavya Sree & Satyavathi, 2017). Therefore, in public institutions where organizational commitment is weak and job dissatisfaction is experienced, employees' intention to leave is not directly affected by these conditions; it is also quite possible for the employee to develop attitudes such as moving away from the institution they work for, requesting an appointment to another institution in the same sector, or wanting to switch to a different sector (Çekmecelioğlu & Ülker, 2014). Thus, they need an appropriate manager or leader to provide an environment that will motivate employees and increase job satisfaction (Dilig-Ruiz et al., 2018). The important thing is that the leader is in constant dialogue with his/her followers and tries to find solutions by getting to the source of the problems (Şimşir & Seyran, 2020). Therefore, it can be said that leader-member exchange is an important factor on the job motivation and satisfaction of coaches. There are studies showing that leader-member exchange is an important factor on job satisfaction (Akkoç & Faruk, 2016; Bitmiş & Ergeneli, 2012; Büyükkaymakcı & Sundu, 2021; Çekmecelioğlu & Ülker, 2014; Han & Jekel, 2011; Malik et al., 2015; Shaikh et al., 2019). In this case, managers of sports organizations who want to gain a competitive advantage in the sports sector want to see high job satisfaction, performance and organizational commitment of sports employees (coaches), extra-role behaviour, and a decrease in absenteeism, turnover, and turnover rates (Yıldız, 2011). Ensuring the job satisfaction of coaches is important both in terms of increasing their performance towards the organizations they are affiliated with and increasing the quality of athletes. In the literature, there are studies examining the relationship between leader-member exchange and job satisfaction in other sectors. Studies conducted in the sports sector have examined the relationship between leader-member exchange and organizational citizenship (Yildiz, 2011b), job performance (Duyan & Yıldız, 2018), athlete performance (Akbıyıklı & Sürgevil Dalkılıç, 2020; Duyan, 2021), burnout-job satisfaction (Duyan, 2022; Yildiz, 2011a). However, when the studies conducted in the sports sector are taken into consideration, it is considered as a deficiency that there is no study addressing both variables especially on coaches. Therefore, the aim of this study, which is designed to fill this gap, is to examine the relationship between leader-member exchange and the job satisfaction of coaches working in the context of sports organizations.

Theoretical Background

Leader-member Exchange

Leader-member exchange theory is based on the Vertical Dyadic Linkage Model developed by Dansereau, Graen, and Haga (1975). According to this model, the vertical relationship between leaders or managers and followers or subordinates is considered the model, and the effect of the leader on the subordinates is tried to be explained (Dansereau et al., 1975; Graen & Uhl-Bien, 1991). LMX theory started from the model of vertical dyadic linkage formed by dyadic vertical relationships, in contrast to theories that argue that leadership behaviour is only group-oriented and monotonous interaction with many people (Eryılmaz, 2019). This theory states that a leader cannot stand at an equal distance from all of his/her followers and that a more special relationship may develop with some of them. According to the leader-member exchange theory, the relationships established between superiors and subordinates vary from low quality to high quality. There is a lower level of reciprocal exchange between superior and subordinate in low-quality relationships called out-of-group (Graen & Uhl-Bien, 1995). Accordingly, impersonal, contractual interaction (Graen et al., 2006; Graen & Uhl-Bien, 1995; Liden & Graen, 1980) is characterised by limited levels of

interaction, formalised roles and weakly connected relationships, low support and less reward (Dienesch & Liden, 1986). On the other hand, the high-quality relationship called in-group is a high-quality exchange between the leader and the member, such as a closer working relationship, mutual respect and trust, social support and resources, and frequent interaction beyond the formal contract (Dansereau et al., 1975; Dienesch & Liden, 1986; Graen & Uhl-Bien, 1995; Graves & Luciano, 2013; Liden & Graen, 1980; Steiner, 1988). LMX theory is an approach based on role and social change theories, which stating that the relations between leaders and members will emerge in two different ways (Dienesch & Liden, 1986; Liden & Maslyn, 1998b). While role theory focuses on the roles of leaders and members, social exchange theory mainly deals with the exchange between a leader and members. Graen (1976) states that in organizations, members of the organization fulfill their jobs and duties through the roles they assume (Bolat, 2011; Yildiz, 2011a). The basic principle of social change theory states that when the leader shows a positive approach towards the member, the member will exhibit behaviours that will contribute to the success of the leader towards these positive behaviours. Thus, the mutual relationship and exchange is effective on the behavior of the member or employee (Sürücü, 2021). Graen ve Uhl-Bien (1995) considered "loyalty", "respect" and "trust"; Dienesch ve Liden (1986) considered "contribution", "loyalty" and "influence"; Schriesheim et al. (1999) considered "mutual support", "trust", "liking", "tolerance", "attention" and "loyalty"; Davis ve Gardner (2004) considered "contribution", "influence", "commitment" and "professional respect". Dienesch and Liden (1986) and Liden and Maslyn (1998b) who made significant contributions to the multidimensionality of leader-member exchange, developed a theory that includes four dimensions by adding the dimension of "professional respect" as a fourth dimension to the dimensions of influence, commitment and contribution (Çöp & Öztürk, 2017).

Job Satisfaction

Job satisfaction is one of the most important issues in the field of industrial psychology and organizational behaviour management and is still being discussed today (Mishra, 2013). Hoppok and Spielgler (1938) define job satisfaction as integrated psychological, physiological, and environmental conditions that encourage employees to accept that they are satisfied with their jobs. According to Vroom (1964), job satisfaction is an orientation of employees' feelings towards the role they perform in the workplace. Locke (1969) defines job satisfaction as "*a pleasurable emotional state arising from the evaluation of one's job as achieving or facilitating the values of the job*". Locke (1976) defines job satisfaction as *"a pleasurable or positive emotional state resulting from the evaluation of one's job or work experiences"*. Brief (1998) defines job satisfaction as *"an individual's attitude towards work"*. When the literature is examined, it is seen that job satisfaction is defined as an attitude towards work or a state of emotion (Weiss, 2002). In the literature, job satisfaction is generally defined as the emotional feeling that an employee has towards his/her job. Furthermore, the role of employees in the work environment is emphasised as many factors influence an employee within the organization (Bhavya Sree & Satyavathi, 2017). Therefore, the concept of job satisfaction expresses the level of meeting the physical, mental and social needs of the employees in line with their expectations; it is one of the most important conditions for people to be successful, happy, and productive (Hoş & Oksay, 2015). The degree of satisfaction depends on the difference between the actual earnings and the expected earnings and is divided into two constructs: The first is intrinsic satisfaction and the second is extrinsic satisfaction (Chang & Chang, 2007). While intrinsic satisfaction consists of the elements related to the satisfaction related to the intrinsic quality of the job (promotion, appreciation, success, etc.), extrinsic satisfaction includes the elements related to the environment of the job (wage, organisational policies, etc.) (Köroğlu, 2012).

Relationship between Leader-Member Exchange and Job Satisfaction

The relationship between leader-member exchange and job satisfaction is among the frequently researched topics. The first study aiming to examine the results of the relationship between both variables (leader-member exchange and job satisfaction) is Scandura and Greaen's (1984) longitudinal study lasting 26

weeks. From the first day of the study, it was investigated how the interaction between leaders and members changed through seminars given for 2 hours per week. Therefore, as a result of this research, LMX quality increased after the seminar and positively affected job satisfaction, performance, and manager support (Eryılmaz et al., 2017). There is a positive relationship between leader-member exchange and job satisfaction. Research has concluded that since there is a high-quality interaction in leader-member exchange, it increases employees' participation in work, and intrinsic motivation, and facilitates access to more resources and support (Breevaart et al., 2015). According to the main focus of leader-member exchange theory, Dansereau et al. (1975) found that subordinates who have high-quality (in-group) interaction with their leaders achieve higher levels of job satisfaction and better attitudes than those who have low-quality (out-group) (Alshamrani, 2017). As a result, the leader-member exchange theory is based on the idea that different relationships can develop between the leader and the member. According to this theory, due to some reasons such as limited time and resources, the leader may develop closer and higher-quality relationships with some members and lower-quality and more authority-dependent relationships with some members (Çekmecelioğlu & Ülker, 2014). Therefore, it requires intensive contact and sharing between coaches working in sports organizations and their athletes or members participating in exercise, which takes place over a long period and in the same facilities. Accordingly, given the characteristics such as frequent, long-term, and competitive participation in sports organizations, coaches, who are the main actors of service delivery, may need to make more effort for the satisfaction of members who participate in sports or exercise (Yildiz, 2011b). Thus, in order to increase the performance of sports organizations, high-quality leader-member exchange is important in terms of increasing the job satisfaction of coaches. Therefore, the following hypotheses were developed to examine the relationships between these variables:

H_1. There is a significant and positive relationship between leader-member exchange and job satisfaction.

H_2: There is a significant and positive relationship between leader-member exchange and intrinsic satisfaction.

H_3: There is a significant and positive relationship between leader-member exchange and extrinsic satisfaction.

Methodology

Research Model

The research model designed for sports coaches is presented in Figure 1. This model shows the effect of leader-member exchange on intrinsic satisfaction, extrinsic satisfaction, and job satisfaction

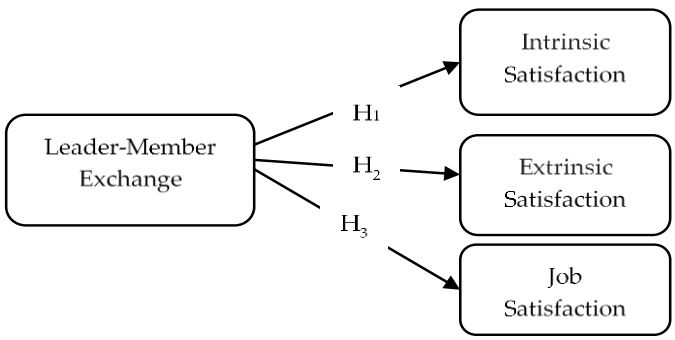

Figure 1. Relationship model between leader member exchange and job satisfaction

Measurement instruments

Leader-Member Exchange Scale: In this study, "Multidimensionality of Leader-Member Exchange " member scale developed by Liden and Maslyn (1998a) was used to determine the quality of leader-member exchange. The scale was adapted into Turkish by Baş, Keskin ve Mert (2010). Items 1-3 in the scale refer to the Impact dimension, items 4-6 refer to the Loyalty dimension, items 7-9 refer to the Contribution dimension, and items 10-12 refer to the Professional Respect dimension. In this scale, a 5-point Likert scale (1: Strongly Disagree, 5: Strongly Agree) was used to evaluate the members' perceptions of exchange with the leader. Baş et al. (2010), who adapted the scale into Turkish, determined the reliability coefficients for the four dimensions of the scale as 0.92 for the impact dimension, 0.86 for the loyalty dimension, 0.70 for the contribution dimension and 0.90 for the professional respect dimension. High scores obtained from the scale indicate that the level of leader-member exchange is high.

Job Satisfaction Scale: The job satisfaction scale used in this study was developed by Chang and Chang (2007). The scale was adapted into Turkish by Yıldız (2011), and then applied to the field of sport by Yıldız (2014). The reliability values of the scale were determined as 0.839 for intrinsic satisfaction sub-dimension, 0.747 for extrinsic sub-dimension and 0.835 for general job satisfaction (Yildiz, 2011). The scale was measured with 5-point likert type ("1=Strongly disagree", "5=Strongly agree").

Sample size and procedure

The population of the study consists of coaches working in Antalya, Istanbul, and Mugla provinces of Turkey. Since it is difficult to reach the entire population due to accessibility, time and cost difficulties, the study was limited to only 3 provinces. A total of 183 coaches, 132 male, and 51 female working in the public sports sector of these provinces, selected by convenience sampling method from non-random sampling methods, constitute the sample of the study. A questionnaire was applied to the coaches participating in the research by electronic communication tools. The data collected from the participants and using the relational research model, one of the quantitative research designs, were analyzed through SPSS 20.0 and AMOS 24 statistical programs. Frequency and percentage calculations were made to reveal the demographic characteristics of the participants. Confirmatory factor analysis was performed on reliable scales. In addition, correlation analysis was performed to determine the direction and strength of the relationship between the variables, and a two-step hierarchical regression analysis was performed to determine whether coaches' leader-member exchange has an effect on job satisfaction.

Results

Sample characteristics

The majority of the participants were 72.1% male, 29 % were between the ages of 36-45, and 63.4% were married. In addition, 61.2% of the participants have a bachelor's degree, 42.6% have a monthly income of 11001-12000 TL, 26.8% have a working period and 45.4% work in Istanbul (Table 1).

Table 1. Demographic characteristics of participants

Variables		f	%	$\bar{x}$	sd
Gender	Male	132	72.1	1.28	.450
	Female	51	27.9		
	Total	183	100.0		
Age	25 years and under	32	17.5	2.69	1.112
	26-35	39	21.3		
	36-45	53	29.0		
	46-55	43	23.5		
	56 years and over	16	8.7		

	Total	183	100.0		
Marital Status	Married	116	63.4	1.37	.483
	Single	67	36.6		
	Total	183	100.0		
Education	Undergraduate	112	61.2	1.39	.489
	Postgraduate education	71	38.8		
	Total	183	100.0		
Income (monthly, TL)	9000 TL and under	27	14.8	2.67	.956
	10000-11000 TL	42	23.0		
	11001-12000 TL	78	42.6		
	12001 TL and above	36	19.7		
	Total	183	100.0		
Total number of years employed (year)	1-5	49	26.8	3.09	1.753
	6-10	34	18.6		
	11-15	24	13.1		
	16-20	21	11.5		
	21-25	37	20.2		
	26 years and over	18	9.8		
	Total	183	100.0		
Province you work in	Antalya	57	31.1	2.81	1.693
	Istanbul	83	45.4		
	Mugla	43	23.5		
	Total	183	100.0		

Validity and Reliability Analysis

Since the validity and reliability of the scales used in this study have been confirmed in previous studies, only confirmatory factor analysis was performed to confirm the construct validity of the scales in this study and reliability coefficients were analysed. When the confirmatory factor analysis results and Cronbach alpha coefficients are analysed, it is seen that the X^2 /df values of the scales and the values of other indices have an acceptable fit (Meydan & Şeşen, 2011) , and the cronbach alpha coefficients of the leader-member exchange and job satisfaction scales are highly reliable (Bursal, 2017) (Table 2).

Table 2. Validity and reliability results of the scales

Variables	X^2	df	CMIN/DF ≤5	GFI ≥.85	AGFI ≥.80	CFI ≥.90	NFI ≥.90	RMSEA ≤.10	Cronbach Alpha
Leader-member exchange	131.497	48	2.740	.891	.823	.948	.922	.098	.0918
Job satisfaction	64.625	28	2.308	.932	.867	.951	.918	.085	.836

Note. Goodness of fit value ranges are arranged according to "acceptable standards" (Meydan & Şeşen, 2011)

Correlation Analyses

Pearson correlation analysis was performed to determine whether there were significant relationships between independent variables and dependent variables.

Table 3. Results of correlation analysis

	1	2	3	4	5	6	7	8	9	10	11
1. Gender	1										
2. Marital Status	-.323**	1									
3. Age	.312**	-.661**	1								
4. Education	-.120	-.070	.026	1							
5. Income	-.259**	-.441**	.410**	.239**	1						
6. Total number of years employed	-.159*	-.533**	.668**	.041	.484**	1					
7. Province you work in	-.138	.007	-.047	.196**	.003	-.147*	1				
8. Leader-member exchange	.083	-.021	-.019	-.027	-.021	-.014	-.031	1			
9. Intrinsic satisfaction	-.023	-.074	.102	-.119	-.012	.077	-.002	.466**	1		
10. Extrinsic satisfaction	.196**	.075	-.145	-.114	-.109	-.091	.045	.585**	.489**	1	
11. Job satisfaction	.107	.005	-.032	-.135	-.073	-.013	.027	.612**	.846**	.878**	1

*p<.05. **p<.01

According to the results of the analyses; among the demographic variables included in the independent variables, only gender variable was found to have a low level significant and positive relationship with extrinsic satisfaction (r= 0.196, p<0.01). In addition, it was observed that there was a moderately significant and positive relationship between the independent variable of leader-member exchange and the dependent variables of intrinsic satisfaction (r= 0.466, p<0.01), extrinsic satisfaction (r= 0.585, p<0.01) and job satisfaction (r= 0.612, p<0.01) (Table 3).

Hierarchical Regression Analysis

Two-step hierarchical regression analysis was applied to reveal whether the independent variables have an effect on the dependent variables. Accordingly, in the model in which intrinsic, extrinsic satisfaction and job satisfaction are assigned as dependent variables, demographic variables are included in the first step and leader-member exchange, which is the independent variable, is included in the model in the second step. According to the hierarchical regression analysis, demographic variables do not have any effect on job satisfaction. However, leader-member exchange has significant and positive effects on job satisfaction and its sub-dimensions of intrinsic and extrinsic satisfaction (p<0.001). Leader-member exchange, which is the independent variable, significantly predicted intrinsic satisfaction (β=.470, p<0.001), extrinsic satisfaction (β=.572, p<0.001), and job satisfaction (β=.607, p<0.001) (Table, 4; Table, 5; Table, 6).

While intrinsic satisfaction in Table 4 explains 2.8% of the total variance in the first step of the model ($F_{(7,175)}$=49.238 p<0.001), it explains 24.6% of the total variance as a whole when the leader member exchange variable is included in the model ($F_{(8,174)}$=7.109 p<0.001).

Table 4. Results of hierarchical regression analysis to determine the relationship between leader- member exchange and intrinsic satisfaction

	Step 1			Step 2		
Independent variables	**β**	**t**	**p**	**β**	**t**	**p**
1.Gender	-.005	-.055	.956	-.047	-.643	.521
2.Marital Status	-.028	-.272	.786	.012	.129	.898
3.Age	.079	.679	.498	.092	.889	.375
4. Education	-.119	-1.518	.131	-.113	-1.623	.106
5.Income	-.050	-.548	.584	-.046	-.569	.570
6.Total number of years	.042	.389	.698	.054	.565	.573
7.Province you work in	.031	.399	.690	.041	.591	.555
Leader-member exchange	-	-	-	**.470****	7.094	**.000**
F		.729			7.109	
R^2		.028			.246	
Adjusted R^2		-.011			.212	

Note. Standardized beta values were used. **p<0.001 *p<0.05

While the extrinsic satisfaction in Table 5 explains 6.5% of the total variance in the first step of the model ($F_{(7,175)}$=1.731, p<0.001), when the leader member exchange variable is included in the model, it explains 38.8% of the total variance as a whole ($F_{(8,174)}$=13.801, p<0.001).

Table 5. Results of hierarchical regression analysis to determine the relationship between leader-member exchange and extrinsic satisfaction

	Step 1			Step 2		
Independent variables	**β**	**t**	**p**	**β**	**t**	**p**
1.Gender	.173	2.152	.033	.121	1.859	.065
2.Marital Status	-.079	-.772	.441	-.030	-.359	.720
3.Age	-.131	-1.145	.254	-.116	-1.248	.214
4. Education	-.107	-1.382	.169	-.099	-1.574	.117
5.Income	-.025	-.278	.781	-.020	-.273	.785
6.Total number of years	.011	.106	.916	.026	.300	.765
7.Province you work in	.086	1.127	.261	.098	1.578	.116
Leader-member exchange	-	-	-	**.572****	9.591	**.000**
F		1.731			13.801	
R^2		.065			.388	
Adjusted R^2		.027			.360	

Note. Standardized beta values were used. **p<0.001 *p<0.05

While the general job satisfaction in Table 6 explains 3.4% of the total variance in the first step of the model ($F_{(7,175)}$ =.882, p<0.001), it explains 39.8% of the total variance as a whole when the leader member exchange variable is included in the model ($F_{(8,174)}$ = 14.366, p<0.001).

Table 6. Results of hierarchical regression analysis to determine the relationship between leader-member exchange and job satisfaction

	Step 1			Step 2		
Independent variables	**β**	**t**	**p**	**β**	**t**	**p**
1.Gender	.103	1.263	.208	.049	.750	.454
2.Marital Status	-.063	-.613	.541	-.012	-.142	.887
3.Age	-.037	-.315	.753	-.021	-.223	.824
4. Education	-.131	-1.665	.098	-.122	-1.963	.051
5.Income	-.043	-.469	.640	-.037	-.517	.606
6.Total number of years	.030	.277	.782	.045	.531	.596
7.Province you work in	.070	.897	.371	.082	1.334	.184
Leader-member exchange	-	-	-	**.607****	10.251	**.000**
F		.882			14.366	
R^2		.034			.398	
Adjusted R^2		-.005			.370	
Note. Standardized beta values were used. **p<0.001 *p<0.05						

In other words, as a result of the hierarchical regression analysis, the leader-member exchange variable included in the model in the second step increased the variance explained by 21.8% for intrinsic satisfaction, 32.3% for extrinsic satisfaction, and 36.4% for job satisfaction.

Discussion and Conclusion

In this study, hierarchical regression analysis was conducted to examine the effect of leader-member exchange on job satisfaction of coaches working as sports trainers within the Provincial Directorate of Youth and Sports. In this study, the relationship between leader-member interaction and job satisfaction was examined.

This research conducted in the public sports sector shows that the exchange between the leader and his/her members has positive effects on the job satisfaction of coaches. According to the findings of the study; as a result of the interactions of the coaches participating in the research with their leaders (supervisors), positively affects the job satisfaction of the coaches in the organizational environment. This relationship between leader-member exchange and job satisfaction supports the social exchange theory. Since behaviours in social exchange are motivated by reciprocity and the expectation of reward, employees in the business environment (in business and customer relations) generally determine behaviour by calculating cost-benefit. In other words, employees will want to obtain some returns and rewards (benefits) in return for some positive behaviours (costs) (Yıldız, 2017). Therefore, it can be said that providing conditions such as a good working environment, welfare, and material and moral rewards related to the job as a result of high-quality communication with the leader increases extrinsic satisfaction more than intrinsic satisfaction. Research shows that leader-member exchange has a significant effect on job satisfaction in the organizational environment (Mishra, 2013). The main findings of the study show that leader-member exchange has an effect on job satisfaction. The findings obtained in the study are similar to the findings of previous studies. When the researches are examined, the high-quality interaction established between the leader and the member is observed in the education sector (Akkoç & Faruk, 2016; Çekmecelioğlu & Ülker, 2014; Duyan, 2022; Gökalp et al., 2015), in the health sector (Han & Jekel, 2011; Pan et al., 2021) and those working in other sectors (Ergün, 2018; Li et al., 2018) have been found to increase job satisfaction. Therefore, it is possible to say that the job satisfaction levels of sports coaches can be increased positively by increasing the quality of leader-member exchange. High-quality relationships with their leaders increase job satisfaction of coaches who provide sports

training, as well as developing good relations in the work environment and reducing burnout (Duyan, 2022), increasing job performance and motivation (Ali et al., 2018; Duyan & Yıldız, 2018), improving organizational identity (Loi et al., 2014), providing more resources and support (Han & Jekel, 2011), improving creativity (Khan & Malik, 2017), building high levels of trust, appreciation, and respect ((Yukl et al., 2009) mediates extra-role behavior and high performance (Yildiz, 2011b). In parallel with these results, it was determined that the interaction behaviours exhibited by the coaches in high quality and the positive climate environment provided in the organizational environment were effective on the performances of the athletes (Duyan, 2021; Hanin, 2007; Jowett & Cockerill, 2003; Mata & Da Silva Gomes, 2013; Nicholls et al., 2017; Nikbin et al., 2014; Rottensteiner et al., 2015; Vieira et al., 2015).

As a result, this study reveals that there is a positive relationship between leader-member exchange and job satisfaction. Since there are very limited studies in the literature on the relationship between LMX and JS in the sports sector and especially in sports management, this study aims to contribute to the literature. Since there is very limited research in the literature on the relationship between LMX and job satisfaction in the sports sector and especially in sports management, this study aims to contribute to the literature. Similar to other studies, this study also has some limitations. The first of these is that the results obtained from this research cannot be generalized to all coaches working in the public sector, since it was conducted only on coaches who provide sports training within the Provincial Directorates of Youth and Sports in Antalya, Istanbul, and Mugla. Secondly, coaches interested in individual and team sports were not categorized. As the third constraint, sports education specialists and civil servants, who are other sports employees, were not included in the study. In future studies, similar studies can be carried out in public institutions providing sports services in different provinces and different geographies. In addition, similar to this study, private sports organizations can be included in future research. Therefore, in order to fully test the leader-member exchange, experimental and qualitative studies on the exchange of members with their leaders and leaders with their members can be conducted in future studies.

Conflict of interest

The authors declare that they have no conflict of interest

Ethics Committee Approval

This study received ethics approval from the Humanities Sciences Ethical Review Committee of the Social and Human Sciences Ethics Committee of Inonu University [2022/08-31].

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iojes
www.iojes.net
International Online Journal of Educational Sciences
ISSN: 1309-2707

Views Of Parents on The Distance Education Period

Research Article

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To cite this article: Kuru, E. (2022). Views of parents on the distance education period, *International Online Journal of Educational Sciences*, *12*(4), 1090-1106.

ARTICLE INFO

Article History:

Received: 27.06.2022

Available online: 12.10.2022

ABSTRACT

The aim of this study is to analyze the views of parents on the distance education period. The study was carried in the phenomenology design, which is one of the qualitative research methods. The study group of the study consists of a total of 20 individuals, 13 of whom are female and 7 of whom are male, who are parents of students who go to official state schools in the city of Şanlıurfa in the 2021-2022 academic year. In the study, convenience sampling which is one of the purposeful sampling methods was used. In the analysis of the data, content analysis was used in line with the qualitative research design. As a result of the study, the parents expressed that distance education has advantages such as being able to receive/give education everywhere and having an economic structure. They also stated that it has disadvantages such as being a structure which causes losing students and creates difficulties in active use due to inefficient technological infrastructure. In addition, they expressed that distance education increases the parents' responsibilities and follow-up of their children, makes students asocial since they are removed from school environment and causes students to be disinterested and unwilling towards their lessons, whereas they emphasized that infrastructure support should be given throughout the country to increase the efficiency of distance education.

Keywords:
Education, distance education, parent, COVİD-19, pandemic

Introduction

Pandemic is a generally used term for contagious diseases which have the potential to spread to wide areas, take numerous countries, continents under their control simultaneously and cause many problems afterwards (World Health Organization [WHO], 2020; Üresin, İlik, Anıl & Alıcıoğlugil, 2021). With pandemics which affect the whole world, abnormal changes are experienced in many areas of life and political, economic,

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commercial processes and education process which is a life-blood for society are naturally affected as well. In fact, the world has witnessed numerous examples of this in the past. The diseases called COVID-19 which emerged in China in the last of 2019 and then spread to the whole world has been defined by the World Health Organization as the greatest and scariest pandemics ever experienced (WHO, 2020) and a need to take numerous precautions has come into the picture in many areas. COVID-19, which has become one of the important global crises in the 21st century has affected our lives in various ways as well. Unfortunately, one of the most affected area from the pandemic has been the area of education and training (Telli and Altun, 2020). As a result of scientific studies, it has been understood that the virus could spread in a speedier manner in crowded populations and when this necessitated taking certain precautions in areas in which human interaction is high with the aim of slowing down the spread of the virus, it has been decided to suspend educational activities which involve a high level of human interaction (UNESCO, 2020). After this decision, countries have suspended educational activities physically for a certain period of time. With the first diagnosis of the virus on 11 March, 2020 in our country, the Ministry of Education needed to suspend face to face education synchronously with the world (Can, 2020). As a result, face to face education started to be replaced with online educational activities which would decrease human interaction in general in the world but would allow education and training to continue (Marcellis-Warin, Munoz & Warin, 2020). Besides the fight against the impacts of the pandemic on the world, certain distance education applications have been implemented throughout the world as much as technological infrastructure allowed to minimize the learning loss of students (TEDMEM, 2020). In Turkey, the Ministry of Education progressively began implementing the educational process within the scope of distance education activities with the programs on TRT-EBA TV and EBA and the lessons given in live classroom format over EBA for all grades (Can, 2020; Özcan, 2020; Aydemir, 2020). In addition, numerous online network applications have also started to be used like other countries besides EBA. The live classroom application, which allows interactive lessons to be given, has made it possible for teachers and students to attend their lessons in their home environment. The live classroom applications were firstly initiated for 8th and 12th grades and then all grades were included. Thus, face to face education was continued through distance online platforms.

Distance education is a type of education which goes back to the 19th century, which allows the continuation of educational activities without schools, which are environments where education and training take place, where students are physically not together. Distance education is defined as an education and training system, provided to individuals who are away from each other through technological tools and applications; which offers time and place flexibility and makes communication and interaction possible. Distance education has a different structure compared to formal education. The traditional roles assumed in educational environments display differences in the educational process and both teachers and students assume different roles. This system provides the freedom to receive education for all age groups at a platform chosen by the individual regardless of the age and the educational level of the student (Ülkü, 2018; Aydemir, 2018; Berigel & Çetin, 2020; Gökbulut, 2021). In our country, although the history of distance education goes back to 1920's, it is know that the first developments in this area started in 1927 (Kırık, 2014). During that period, it was considered that distance education would be beneficial due to the physical limitations of educational institutions.

The gradually developing infrastructure of distance education has shown its impact during the pandemic period. Since a majority of schools continued their education in online environments, the traditional understanding of education was replaced with a technologically supported, easily accessible structure which has no physical restrictions. Naturally, this implementation had negative consequences besides the positive ones and caused changes in the life-styles of students and parents as well. Although educational implementations can be used actively or have become useable as technological developments reached great levels, it should not be forgotten that learning losses will continue partially if they are not supported with face

to face education (Reimers, 2020). In distance education, there is a need for special teaching and learning systems as different from traditional in-class learning (Kang, 2009; Gökbulut, 2021). Individuals' gender, age, ethnic roots, individual online learning skill and prejudices formed in the past should be taken into consideration in distance education as well (Muilenburg & Berge, 2005; Gökbulut,2021). It has been observed that educational activities carried out by ignoring such aspects do not form a healthy educational application in the distance education process and that distance education does not reflect its context and what is desired from an education method.

During the distance education process, certain communication can be experienced due to teachers or students, physical distance, place, the channels used and time factor (Elcil and Sözen-Şahiner). Due to such reasons, it is apparent that students who continue their educational activities at home through online environments inevitably need their parents' support (Griffith, 2020; Lau & Lee, 2020), because parents are the people who accompany students physically at home. Parents assume the role of teachers for their own children in the home environment as well (Günbaş & Gözüküçük, 2020). Surely, this has brought certain problems along for parents who have become a part of the education and training process through their children have been educated in the formal education system (Akıncı &Tunç, 2021) Parents who were caught off-guard to this sudden change were left to deal with many problems at home. The leading problems are the insufficient technological infrastructure and lack of knowledge about using technological tools (Garbe, Ogurlu, Logan & Cook, 2020). Serious problems were experienced in areas where the infrastructure was not sufficient and in the implementation of this education method, as a result of this sudden change. In particular the need for remote access tools and the internet increased greatly during the pandemic and parents and students suffered due to their lack of competency in using digital tools (Lawton, 2020). In addition, distance education has increased parents' responsibilities increased in students' educational lives. Parents have attempted to create a new order to help their children adapt to distance education and prevent their success from getting affected negatively. Due to the difficulties experienced by children in adapting to this process which they found themselves in for the first time, responsibilities in the face to face education such as waking up, having breakfast, getting dressed and being on time for class started to be neglected and children were not shown any empathy, families needed to create new school and home related routines for their children, give great care to their children's study environment and assume new responsibilities such as helping with homework (Otçeken, 2022).

Due to the wide-spread impact of the pandemic, sudden changes experienced in all areas have caused problems as well. In order to minimize the impact of the pandemic, limitations put in crowded places have affected education and training negatively and students had to be away from their schools. The temporary placement of face to face education in online environments have increased the responsibilities of parents at home as the Ministry of Education's TRT-EBA TV lessons began. This has created negative outcomes at home where the infrastructure was insufficient and for parents who did not have adequate technological knowledge. It was aimed at identifying the views of parents on distance education, the problems they experienced and contribute to the literature for future studies in this study.

Within the scope of this general aim, the answers to the following questions were sought:

1. What are parents' views on distance education?

2. What are parents' views on the disadvantages of distance education?

3. What are parents' views on how the distance education process affects parents?

4. What are parents' views on how the distance education process affects children?

5. What are parents' views on increasing the effectiveness of the distance education process?

Methodology

Model of the Study

This study in which the views of parents on distance education were evaluated, was carried out in the phenomenology design which is one of the qualitative research methods. The phenomenology design focuses on phenomena we are aware of in daily life but do not have an in-depth and detailed understanding of (Yıldırım & Şimşek, 2018). The phenomenology design was preferred in the study with the aim of identifying how parents define distance education, what kind of a meaning they attribute to distance education and presenting the consequences of the effect of distance education on parents.

Study Group

The study group of the study consists of 20 parents, 13 of whom are female and 7 of whom are male, whose children go to schools affiliated with Şanlıurfa Provincial Directorate for National Education in the 2021-2022 academic year. In the study, convenience sampling which is one of the purposeful sampling methods was used. Convenience sampling method is preferred since it adds speed and practicality to the study and it is economic (Yıldırım & Şimşek, 2018). The demographic characteristics of the parents who participated in the study are shown in Table 1.

Table 1. Demographic characteristics of the participants

Code	Relationship	Age	Education Level
V1	Mother	39	Primary School
V2	Mother	42	Primary School
V3	Mother	35	Primary School
V4	Father	35	Primary School
V5	Mother	41	University
V6	Father	38	Middle-school
V7	Father	45	Middle-school
V8	Mother	33	University
V9	Father	37	High-School
V10	Mother	34	Primary School
V11	Father	41	High-School
V12	Father	38	University
V13	Mother	32	High-School
V14	Mother	35	Middle-school
V15	Mother	37	Primary School
V16	Father	49	Primary School
V17	Mother	33	Primary School
V18	Mother	36	High-School
V19	Mother	35	Middle-school
V20	Mother	40	Primary School

Table 1 shows that 13 % of the parents in the study is mothers and 7 % of the parents 9 of the parents are primary school graduates, 4 are middle-school graduates, 4 are high-school graduates and 3 are university graduates.

Data Collection Tools, Collection of Data, Validity and Reliability

The data of the study were obtained through the semi-structured interview form prepared by the researcher. During the process of the development of the data collection tool, the nine interview questions planned to be asked to the parents were prepared by the researcher and were sent to three field experts. In

line with the corrections made by the field experts, 4 questions were excluded from the interview form, two questions were revised and it was decided to keep three questions as they were. Two parent interviews were carried out with interview questions consisting of five items. As a result of the pilot interview, two of the interview questions were revised again and were changed into a more understandable and answerable form. Then, the interview questions were shown to the parents in the pilot application again and the questions were finalized after the views of the participants were asked. The finalized interview questions were applied to 20 parents. In the implementation process, face to face interviews were carried out with each parent in the teachers' room, the data were recorded in a written manner and an average interview lasted about 20 minutes. It was expected of each parent to answer all of the interview questions and this was achieved.

Analysis of the Data

Content analysis was used in the analysis of the data. Content analysis involves coding of the obtained data, finding themes, structuring the data in line with the codes and themes and interpreting the findings (Yıldırım & Şimşek 2018). When using content analysis, the aim of the study is determined through data analysis, concepts are defined, data are collected, a rational structure is created prior to analysis, coding categories are determined, views are coded, findings are interpreted and results are written (Büyüköztürk, Kılıç Çakmak, Akgün, Karadeniz, Demirel, 2020). In the analysis of data, the responses of the parents were transferred to the code table, a code list was formed and it was attempted to find the underlying reasons and causes for the codes. When sharing the findings of the study, direct quotes were given place to and the names of the parents were not given in line with ethical rules. The parents were given codes as: P1-F, P4-M… P20-F.

Findings

Findings Related to the First Research Question

The first sub-problem of the study is, "What are your views on the advantages of the distance education period?" and the data obtained from the parents were analyzed, coded and presented in Table 2 with frequency values.

Table 2. Views of the Parents to the question, "What are your views on the advantages of the distance education period?"

Theme	Codes	f
Advantages of Distance Education	Education everywhere	14
	Being economic	8
	Self-management (individual learning)	5
	Parents support	3
	Use of technology	3
	Flexibility	2
	Easy access	2

**As more than one parent expressed some of the codes, the total result might be higher than the number of the participants.*

As it can be seen in Table 2, the views of the parents on the advantages of distance education were united under seven codes. While more than half of the parents expressed the advantage of distance education as "education everywhere," some parents expressed as "self-management (individual learning)," "parent support," "flexibility" and "easy access."

The views of the parents on the advantages of distance education are as follows:

P4-M: *"The limitations of the place of education have been removed. Students can participate in the lessons in every area from their homes, nature and each suitable place they happen to be in. Therefore, some health and safety issues which may be of concern in transportation to and from school were removed…"*

One of the parent views on the being economic code

P11-M: *"… not wasting any time in commuting to and from school, some additional expenses in schools such as electricity and water and transportation not being met by the state…"*

One of the parent views on the self-management (individual learning) code:

P5-F: *"…distance education also allows a person to learn on his/her own, develops individual studying skills and thus, makes a person gain self-management skills."*

One of the parent views on the parent support code

P15-F: *"the importance of a relative providing support to the student in terms of keeping up with lessons, following up of homework, use of tablets, phones, computers has been understood…"*

One of the parent views on the use of technology code:

P12-M: *"…carrying education to homes has increased the use of technology, developed students' research skills and facilitated the application of various lessons."*

One of the parent views on the flexibility code

P6-M: *"…we did not have to deal with getting students dressed for school, preparing lunch, helping them get to school on time. In addition, since students were always at home and visible, no problems were experienced in school buses, during commuting or at schools. We no longer had concerns such as whether our children had their lunch…"*

One of the parent views on the easy access code

P7-M: *" …students who have health issues and were not able to go to school had a chance to participate in the same lessons with their friends and teachers…"*

The parents mostly expressed that, students had an opportunity to participate in the lessons in every place where the infrastructure was sufficient and that distance education is economic. Due to distance education, the control of the parents over the students has increased and problems related to commuting were no longer valid.

Findings Related to the Second Research Question

The second sub-problem of the study is, "What are your views on the disadvantages of the distance education period?" and the data obtained from the parents were analyzed, coded and presented in Table 3 with frequency values.

Table 3. Views of the Parents to the question, "What are your views on the disadvantages of the distance education period?"

Theme	Codes	f
Disadvantages of Distance Education	Loss in learning	10
	Technological infrastructure	8
	Socialization	6
	Communication	5
	Addiction to technology	4
	Motivation	3

Health problems	3
Economic problems	2

** As more than one parent expressed some of the codes, the total result might be higher than the number of the participants.*

In Table 3, the views of the parents on the disadvantages of distance education were united under eight codes. The parents defined the disadvantages of distance education as "loss in learning," "technological infrastructure," "socialization," communication," "addiction to technology," "motivation," "health problems" and "economic problems."

The example responses of the parents on the disadvantages of distance education are as follows:

One of the parent views on the loss of learning code:

P8-F: *"Education is a process based on touching, feeling and learning through living. We have experienced problems such as not being able to apply some subjects that were applied and teachers not being able to use some methods and techniques during the lessons. In particular in the lower age groups, establishing eye contact with the teachers, portraying of some behaviors required by being in the classroom were not possible since the lessons were online…"*

One of the parent views on the technological infrastructure code:

P3-F: *"…Certain problems have been experienced in homes and places without internet connections. In rural areas, students were not able to benefit from distance education as desired…"*

One of the parent views on the socialization code:

P18-F: *"…schools are not only places where lessons are taught but also places where the sense of living as a community develops in children and where communication with each other is established actively. Unfortunately, online lessons prevented these…"*

One of the parent views on the communication code:

P20-F: *"…since students were not required to turn on their cameras during the live lessons did not allow supervision to see what they were doing during the lessons and power shortages and problems related to internet connections prevented the lessons from being productive…"*

One of the parent views on the addiction to technology code:

P16-M: *"…students' being stuck in front of screens for long periods and using screens for other purpose in their free times has created addiction to technology."*

One of the parent views on the motivation code:

P5-F: *"…technological problems from not having a physical classroom to participating in the online lessons precented the students from adapting to this system and direct their attention…"*

One of the parent views on the health problems code:

V14-K: *"Since the distance education process was spent in front of screens, it caused some health problems as well. For instance, students started having health problems related to their eyes and sitting position…"*

One of the parent views on the economic problems code:

V12-E: *"We had to use a mobile line at the beginning since we did not have an internet connection at home and this created an extra expense. Since devices such as tools were needed, these created extra costs as well. Students with financial problems experienced difficulty in accessing the lessons…"*

The parents expressed in terms of the disadvantages of distance that loss of learning was high and technological problems added to this situation. Students' being away from the school environment affected

their communication and sense of being together negatively. Some students were not able to benefit from distance learning in an equal manner. Being this close to technology caused certain health problems in students and their dependence on technology increased as well.

Findings Related to the Third Research Question

The third sub-problem of the study is, "How has the distance education period affected you as a parent?" and the data obtained from the parents were analyzed, coded and presented in Table 4 with frequency values.

Table 4. Parents' Views on the Question, "How has the distance education period affected you as a parent?"

Theme	Codes	f
The effects of distance education on parents	Parents' follow-up and responsibilities	8
	Student-parent interaction	4
	Discipline problems	3
	Economic problems	3
	Affective problems	2
	Large number of students within the family	2

** As more than one parent expressed some of the codes, the total result might be higher than the number of the participants.*

Table 4 shows the effects of distance education on the parents under six codes. The parents expressed these effects as "parents' follow-up and responsibilities," "student-parent interaction," "discipline problems," "economic problems," "affective problems" and "large number of students in the family."

The parents' example responses on the effects of distance education on parents are as follows:

One of the parent views on the parents' follow-up and responsibilities code:

P11-M: *"…the distance education period has increased our responsibilities even more. Schools were carried to homes and required us to do more follow-up on giving breaks, participating in online lessons and lesson programs…"*

One of the parent views on the student-parent interaction code:

P2-F: *"We spent more time with our children. We became their teachers as well besides being their parents, mothers and fathers."*

One of the parent views on the discipline problems code:

V8-K: *"…unwillingness of the students to participate in the lessons created difficulties for us."*

One of the parent views on the economic problems code:

V1-K: *"…having two children who go to school required us to buy a new computer and to separate their joint room to make it possible for them to engage in their lessons separately. These costs created difficulties for us."*

One of the parent views on the affective problems code:

V15-K: *"…the direct impact of problems of distance education, in particular the stress and concern for the future the students experienced were felt deeply by the parents as well."*

One of the parent views on the large number of students within the family code:

V19-K*: "It has not been easy to provide online lesson space and material for families with more than one child. Having three children who were supposed to participate in their lessons at the same times and not having separate computers for each of them caused them to participate in the lessons taking turns, sometimes participating in their lessons*

using their phones and sometimes on the computer. And sometimes one of them had to wait while the other two participated in their lessons. This upset as us parents very much and caused us to seek alternative methods."

When the effects of distance education on the parents are analyzed, it can be seen that the responsibilities of the parents increased even more in terms of the students being able to participate in their lessons and keeping the lessons in order. Students' being relaxed in the home environment brought certain disciplinary problems and caused families with multiple children to have financial problems.

Findings Related to the Fourth Research Question

The fourth sub-problem of the study is, "How has the distance education period affected your children who are students?" and the data obtained from the parents were analyzed, coded and presented in Table 5 with frequency values.

Table 5. Parents' Views on the Question, "How has the distance education period affected your children who are students?"

Table 5. Parents' views on the question "How has the distance education period affected your children who are students?"

Theme	Codes	f
The effects of distance education on children who are students	Socialization	7
	Interest, willingness and motivation	7
	Inadequate learning	4
	Psychological factors	4
	Teacher-student interaction	4
	Infrastructure (internet access) problems	4
	Health problems	3
	Discipline problems	3
	Technological addiction	2
	Technological literacy	2

** As more than one parent expressed some of the codes, the total result might be higher than the number of the participants.*

Table 5 shows the effects of distance education on children who are students under ten codes. The parents expressed these effects as "socialization," "interest, willingness and motivation," "inadequate learning," "psychological factors," "teacher-student interaction," "infrastructure problems," "health problems," "discipline problems," "technological addiction" and "technological literacy."

The parents' example responses on the effects of distance education on children who are students are as follows:

One of the parent views on the socialization code:

V7-E*: "During this period, students had to be away from social learning in schools, their friend circles and the gains of peer interaction based on in-class communication."*

One of the parent views on the interest, willingness and motivation code:

V10-K*: "…distance education affected the students since they were removed from the order they are used to and their interest and willingness to participate in the lessons decreased…"*

One of the parent views on the inadequate learning code:

V13-K: *"…they were not able to listen to the lessons like they were in the classroom. In particular my son who started the 1st grade had great difficulties in learning to read and write. If I had not given support, he would not be able to learn through distance education."*

One of the parent views on the psychological factors code:

V6-E: *"…while my child who was not in the classroom environment attended online lessons, he was self-conscious about other family members watching or listening to him. He felt stress…"*

One of the parent views on the teacher-student interaction code:

V2-K: *"Being away from the classroom weakened the emotional ties between students and teachers."*

One of the parent views on the infrastructure problems code:

V20-K: *"…Since there was no internet infrastructure in my neighborhood, my children had to be online using my phone internet package. Slowing down of the connection or running out of internet package suspended their participation in the lessons…"*

One of the parent views on the health problems code:

V18-K: *"Children spending long periods of time in front of the screens triggered their health problems…"*

One of the parent views on the discipline problems code:

V12-E: *"…students who were not able to move around enough and spend their energy started being aggressive and less disciplined in the home environment."*

One of the parent views on the technological addiction code:

V17-K: *"…children who were interested in phones and computers started being more addicted to these devices and had to remain awake until the late hours with the excuse of doing homework."*

One of the parent views on the technological literacy code:

V9-E: *"Most students being young and not having competency in technological devices made it difficult for them to participate in lessons and they missed their lessons since they did not know how to reestablish the internet connection."*

When the effects of distance education on children who are students were analyzed, it was seen that the parents emphasized that their children were negatively affected rather than positively. It has been observed that being away from their friends and teachers increased loss of learning in the students and that the students were disinterested towards their lessons. Technological addiction and health and discipline problems have also been observed.

Findings Related to the Fifth Research Question

The fifth sub-problem of the study is, "Do you have any suggestions on how the efficiency of distance education period can be increased? What are they?" and the data obtained from the parents were analyzed, coded and presented in Table 6 with frequency values.

Table 6. Parents' Views on the Question, "Do you have any suggestions on how the efficiency of distance education period can be increased? What are they?"

Theme	Codes	f
The effects of distance education	Infrastructure support	11
	Lesson durations	4
	Student-parent education	3
	Enriched content	3

Hybrid education	2
Mandatory participation	2

** As more than one parent expressed some of the codes, the total result might be higher than the number of the participants.*

Table 6 shows the suggestions of parents on raising the efficiency of distance education under six codes. It was seen that the parents mostly emphasized "infrastructure support" and that this suggestion was followed by "lesson durations," "student-parent education," "enriched content," "hybrid education" and "mandatory participation."

The parents' example responses on suggestions to increase the efficiency of distance education are as follows:

One of the parent views on the infrastructure support code:

V9-E: *"The number of EBA support points should be increased in particular in village schools and places without internet connections. Ministry of Education should provide solutions to infrastructure related problems to places with problematic internet connections such as mobile internet and satellite nets."*

One of the parent views on the duration of lessons code:

V8-K: *"…the beginning time and content of the lessons should be arranged taking students' presence and attention spans into consideration."*

One of the parent views on the student-parent education code:

V5-K: *"In order to make the distance education process more efficient, firstly seminars should be provided to students and parents to give them more competency and presentations with educational content should be sent to parents."*

One of the parent views on the enriched content code:

V2-K: *"…interesting, educational games and visuals should be used. Educational films and videos should be increased…"*

One of the parent views on the hybrid education code:

V3-K: *"…instead of giving education completely in distance education form, an application where the students go to school for two days a week could have been tried. Distance education could have been mostly supported by courses and supplementary lessons."*

One of the parent views on the mandatory participation code:

V20-K: *"…students' participation should be followed just like the school period by taking attendance because ten students participate in the lessons in a class of thirty and when students know that participation is not mandatory, they do not participate in the lessons if their parents are not at home…"*

Among the suggestions made to increase the efficiency of the distance education process, providing infrastructure support and presentation of the lessons in a manner where all students can benefit are the primary ones. Arrangement of lesson durations not to bore the students, teaching student and parents how best to use technology through training, education not being providing completely as distance education and participation being made mandatory are the other suggestions made by the parents.

Conclusion and Discussion

In this study, it was aimed to analyze the effects of distance education on parents. In the first research question of the study, the views of the parents on the advantages of distance education were analyzed. The parents expressed views such as "education everywhere," "self-management (individual learning)," "parent

support," "use of technology," "flexibility" and "easy access" dimensions. It was expressed by the parents that with the pandemic period, distance education allowed education to be given free from the restrictions of time and place, loss of time in commuting was removed, food, transportation, electricity, water, etc. related expenses normally paid by the state decreased, students' skills in using technology developed and students who did not have a chance to go to school due to health problems were able to benefit from distance education as the other students. When the studies on this subject were analyzed, it was seen that in parallel with the results of this study, one of the most important advantages of distance education is stated as "being independent of time and place" (DeNeui & Dodge, 2006; Horspol & Lange, 2012; quoted by. Özdoğan & Berkant, 2020). Similarly, Özbay (2015) underlined the importance of distance education, stating that due to not experiencing problems related to buildings, classrooms, teachers, educational materials which would affect the quantity of students to participate in the lessons, distance education contributes to decreasing educational costs. In Otçeken's study (2022), it was concluded that distance education has certain advantages and emotionally positive aspects since it in particular facilitates education in terms of time and the fear of the COVID virus is not experienced.

In the second research question of the study, the parents' views on the disadvantages of distance education were analyzed. The parents expressed dimensions such as, "loss of learning," "technological infrastructure," "socialization," "communication," "technological addiction," "motivation," "health problems" and "economic problems" as the disadvantages. The parents underlined that loss of learning has increased as a disadvantage. Applied lessons and lessons which should be face to face in lower grades being given as distance education prevented productivity and infrastructure related problems increased loss of learning in education as well. Similarly in Erol & Erol's study (2020), it is reported that the effect of distance education is not as strong as face to face education and that students experience loss of learning for that reason. In addition, the parents stated that students with an interest in technology had to work more closely with technological devices and this increased technological addiction in young people, bring some health problems along as well. The parents pointed out students were not able to benefit from distance education equally and the greatest reason for this was economic problems. In support of this view, the studies of Yılmaz (2020), Altıntaş Yüksel (2021), Saygı (2020) and Şumuer & Arslan (2020) have underlined that some disadvantages were experienced as a result of economic reasons. In the studies of Erbaş (2021) and Türküresin (2020), it is stated that disadvantages of distance education are internet connection problems, system related problems, students not having any digital devices or the ones they have being very outdated. In Gülseren's study (2021), it is expressed that some problems were experienced in the distance education process and these were mostly related to technical, system related and focusing issues and that the main technical and system related issues were the internet connections, devices and not being able to access the system. Otçeken (2022) stated that technical problems, psychosocial problems, encouragement of digital addiction and health problems are the negative sides of distance education. Similarly in the literature, there are studies which concluded that distance education has disadvantages (Akkaş et al., 2020; Arslan et al., 2021; Başaran et al., 2020; Günbaş & Gözüküçük, 2020; Kaya & Dilekçi, 2021; Özdoğan & Berkant, 2020).

In the third research question of the study, the views of parents on the effects of distance education on parents were analyzed. The parents expressed the effects of distance education as "parents follow-up and responsibilities," "student-parent interaction," "discipline problems," "economic problems," "affective problems" and "large number of children in the family" dimensions. The parents stated that the parents' follow-up activity and responsibilities increased and that their interaction with their children were focused on lessons during the distance education period. They expressed that their children experienced some discipline problems as they were away from the school environment and school rules were not valid at home; some families experienced problems as they had more than one child who needed to follow and participate in their lessons and that the use of electronic devices at home were also problematic.

In the fourth research question of the study, the parents' views on the effects of distance education on their children who are students were analyzed. The parents expressed the effects of distance education on students as, "socialization," "interest, willingness and motivation," "inadequate learning," "psychological factors," "teacher-student interaction," "infrastructure problems," "health problems," "discipline problems," "technological addiction" and "technological literacy" dimensions. They stated that distance education caused students to be away from the environment they were used to and being away from their teachers and schools created social and psychological problems. In addition, they stated that students were unwilling to participate in their lessons and this resulting in inadequate learning is an important effect on the students. Supporting the findings of this study, (2020) stated in his study that students experienced affective problems during the distance education process and the Ministry of Education provided a psychological support system for problematic students. Parents expressed that there were students who did not know how to use technological devices, the use of technology increased in areas other than lessons and long-term use of technology resulted in health and discipline problems. In İnci Kuzu's study (2020), it was concluded that students experienced problems in suing technological devices and connecting to the internet and this negatively affected the process of education. Gülseren (2021) stated that students experienced problems concentrating on their studies in the distance education process and the noise in the home environment prevented them from focusing on their lessons. Türküresin (2020) stated that students who did not have their own rooms during distance education were affected from sounds in the home environment and had difficulty focusing. Otçeken (2022) concluded that distance education created motivation, attention-concentration and affective problems in students.

In the fifth research question of the study, the suggestions of the parents on increasing the efficiency of distance education were analyzed. The parents expressed their suggestions as, "infrastructure support," "lesson durations," "student-parent interaction," "enriched content," "hybrid education" and "mandatory participation" dimensions. When the parents' views on increasing the efficiency of distance education were analyzed, it was seen that the parents mostly underlined the need to increase and generalize infrastructure support. In addition, they suggested increasing the variety of the content of the online lessons, arranging lesson durations not to distract the students and bore them, rather giving distance education completely, students may be at school on certain days and at home on other days and participation in the lessons should be made mandatory in online lessons just like face to face education. Supporting the findings, in Koçoğlu, Kalın, Tekdal & Yiğen's study (2020), it was concluded that there is a need to add more variety and enrich the distance education content provided to the students. Similarly, Uyar (2020) also reached the conclusion that the need for technological devices such as computers and tablets should be met, the internet problem should be solved and participation in the lessons should be mandatory.

In the light of these findings, the distance learning process caused by the pandemic affected administrators, teachers, students and in particular parents with its advantages and disadvantages. Parents, who had never been so nested with the education and training process in the past, have perhaps become the most important aspect of the distance education process with the pandemic. Parents who are not able to follow education and training activities closely have faced a great difficulty in following the development of their children. As not all parents have the opportunities to support education and training at home, this situation has created certain problems in the distance education process. It has become difficult for the education process to continue in a healthy manner due to parents who have difficulty in using technology, do not have computers, internet connections or any knowledge of using these. In addition, there have been problems related to communication as well during the distance education process. The students not being as disciplined next to their parents as they are in school, not obeying their parents and the parents behaving in a more flexible manner towards their children are among the other factors that made the process difficult. Additionally, the hectic work life of parents in particular in the rural areas, families with multiple children not being able to allocate sufficient time to all of their children, the indifferent attitude of parents, the inclusion of students who

did not have a room of their own and were not able to find a quiet environment in the distance education process with their families are among the factors which made it difficult to reach the desired productive level and considered as the disadvantageous aspects of the distance education process. Despite all these points, there are surely various advantages of distance education as well. First of all, there are advantages such as providing equality of opportunity, making the students the focal point, removing time and place limitations and thus, giving the opportunity to receive education and training at any place and time, allowing individuals to adjust themselves according to their own learning pace, giving the chance to access information in a healthy and easy manner, being economic, besides providing a chance for individuals with physical handicaps the opportunity to receive education.

As a result of this study, in which the views of parents on distance education were analyzed, the following suggestions were made:

The places where infrastructure problems are experienced during the distance education period can be identified in the best manner and action can be to allow all sharers to access the benefits of distance education.

Education can be provided to the parents in subjects such as the scope of distance education, pros and cons compared to face to face education and expectations related to distance education.

Participation being made mandatory in all distance education applications and giving exams to assess to what extent gains are learned may serve the purpose of the education provided.

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International Online Journal of Educational Sciences

ISSN: 1309-2707

Understanding the Internationalization of Higher Education in Turkey: The meaning and Current Policies*

Research Article

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To cite this article: Ericok, B., & Arastaman, G. (2022). Understanding the internationalization of higher education in Turkey: The meaning and current policies, *International Online Journal of Educational Sciences*, *14*(4), 1107-1124.

ARTICLE INFO

Article History:

Received: 25.07.2022

Available online: 05.10.2022

ABSTRACT

In the present study, the issue under scrutiny is the meaning and current policies of the internationalization of higher education (HEI) in Turkey. This research is a descriptive case study and the data were collected through document analysis. The documents analyzed within the scope of the study are as follows: "Internationalization Strategy Document in Higher Education 2018-2022 (CoHE, 2017)"; "Research Project Report on Making Turkish Universities an Attraction Center for International Students in the Framework of Internationalization of Higher Education (Kadıoğlu & Özer, 2015)"; "Growth, Quality, Internationalization: A Roadmap for Higher Education in Turkey (Çetinsaya, 2014)", "10th Development Plan 2014-2018 (T.R. Ministry of Development, 2013)" and "11th Development Plan 2019-2023 (T.R. Presidential Strategy and Budget Department, 2019)". The content analysis method was used to analyze the data. The available evidence seems to suggest that the internationalization of higher education in Turkey has academic meanings in the sub-dimensions of education/training, institutional quality, research/publication, and human resources; cultural meanings in the sub-dimensions of cultural ambassador, diversity, and integration; political meanings in foreign policy, soft power, political closeness sub-dimensions and, finally, economic meanings in the sub-dimensions of human resources, growth, global competition, and economic mobility. There is overwhelming evidence corroborating the notion that the policies of recognition and visibility, mobility, internationalization, strategic planning, and student opportunities have been applied to the internationalization of higher education in Turkey. Overall, this study strengthens the need for the Internationalization of Higher Education Working Committee, which comprises all the stakeholders under one roof. The current data highlight the importance of continuous efforts to make the faculty members, students, and administrative staff competent in foreign languages.

*This study was produced from the first author's doctoral dissertation

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DOI: https://doi.org/10.15345/iojes.2022.04.008

Keywords:
Higher education, internationalization, internationalization of higher education, internationalization policies, management of higher education

Introduction

The concept of internationalization has been at the core of the university for centuries. In the historical process, the method, reasons, indicators, or driving forces of internationalization have undergone various changes. There are several reasons for these changes. Developed countries' desire to attract qualified minds, increasing technological opportunities, development efforts of developing countries, positive international relations established by countries with strong cultural ties, efforts to earn income in economic terms, travel facilities, acquiring different academic perspectives, lifelong learning, and globalization. The internationalization of higher education has become one of the leading research topics in the world in recent years (Aydınlı & Mathews, 2020; Asada, 2022; Bulnes & de Louw, 2022; Chang & Lin, 2018; Elken, Hovdhaugen & Wiers-Jenssen, 2022; Ergin, de Wit & Leask, 2019; Seggie & Çalıkoğlu, 2021; Pogorelskaya, 2022; Wetzinger, 2022).

The concept of internationalization in higher education has been defined in various ways in the literature, but Elkin, Devjee, and Farnsworth (2005, p. 320) state that there is no consensus on the definition of internationalization in higher education. It is very difficult to define internationalization as universal because it is a comprehensive concept that applies to many different countries, cultures, and education systems. For this reason, it is difficult to gather the reasons, benefits, results, actors, activities, and stakeholders of internationalization under a single definition, as they vary greatly from one nation to another or from one institution to another (Knight, 2004, p. 11). For a higher education institution, internationalization means establishing mutual interaction both within its own culture and between other cultures through ways such as teaching, research, and service. At the same time, internationalization means the interaction of a university with universities in other countries (Yang 2002, p. 83). According to another definition that is frequently encountered and accepted in the literature, "internationalization is the process of integrating an international, intercultural or global dimension of education into the purpose, functions or service of post-secondary education (Knight 2003, p. 2)". Knight (1999, p. 17) argues that there are different ways of defining internationalization, as well as different reasons and motivations for internationalization. Knight (2008, p. 24) refers to these reasons as "the driving force" for countries, sectors, and institutions.

In the literature, the reasons for the internationalization of higher education are listed as economic, political, cultural, and academic reasons (Knight, 1999, pp. 17-20, 2004, p. 21; Knight and de Wit, 1995, pp. 9-14). de Wit (2002, pp. 83-85) listed the economic reasons for the internationalization of higher education as economic development and competitiveness, the labor market, national demand for education, and financial incentives for governments and institutions. According to Knight (1999, p. 17), international education has been seen as an important foreign policy tool in the context of national security and interstate peace in the past. de Wit (2002, pp. 79-82), on the other hand, associated political reasons with foreign policy, national security, technical assistance, peace, mutual understanding, and national and regional identity. Mayor (1989, pp. 5-15) expressed the cultural side of higher education by emphasizing that universities are the producers, transmitters, and reproducers of culture. Yang (2002, p. 83) approached internationalization in terms of university and national education systems.

> "For a university, internationalization means the awareness and operation of interactions within and between cultures through its teaching, research, and service functions, with the ultimate aim of achieving mutual understanding across cultural borders. For a national higher education system, internationalization refers to dialogue with those in other countries. Internationalization, then, is not a newly emergent topic or phenomenon."

Knight (1999, p. 19) mentioned the history and development of universities in terms of the academic reasons for the internationalization of higher education. He stated that there has been the mobility of academics and the addition of an international dimension to the research dimension for centuries. Accordingly, the leading academic rationale for internationalization is to achieve international standards in teaching and research.

As can be seen, the internationalization of higher education is a comprehensive concept that concerns the teaching, research, and service dimensions of the university and is constantly up-to-date on a global scale. Similarly, Bulut-Şahin and Kondakı (2022) assert that "the internationalization of higher education (IHE) has become a key policy issue for governments, a research field for scholars, a strategic priority for universities, and a career orientation for administrative staff." So, in the last few years, internationalization has attracted much attention from researchers. However, to the authors' best knowledge, very few publications are available in the literature that discusses the issue of internationalization of higher education. In the Turkish context, comprehensive studies that deal with the internationalization of higher education with a holistic perspective at the level of policy documents are quite limited (Bulut Şahin, 2017; Ergin, 2017; Selvitopu, 2016; Şişmanoğlu Kaymaz, 2018; Taşçı, 2018; Vural Yılmaz, 2014, 2016). Existing researches are on more limited subjects such as various dimensions of internationalization, internationalization status of various institutions, globalization, exchange programs, Bologna Process, quality, and international students (Arkalı Olcay & Nasır, 2016; Büyükgöze & Özdemir, 2016; Dölek & Taşçı, 2018; Önder and Balcı, 2010; Özer, 2012, 2017; Şimşek and Bakır, 2016; Vural Yılmaz, 2017; Yağcı, 2010; Yalı, 2017). Unlike these studies, the current research evaluates the internationalization process of Turkish higher education from a more comprehensive perspective. With this research, it is thought that a different and all-encompassing view will be gained on the field of internationalization of higher education, which is still developing in Turkey.

What has come to the fore in recent years is the trend of *studying abroad* (being an international student, mobility, internationalization). OECD (2020, p. 227) highlights that there has been growing policy attention on international student mobility in recent years. Surprisingly, determining comprehensive strategies for the internationalization of higher education in Turkey and publishing the policy document is not very old. The documents to be evaluated in this context are "Internationalization Strategy Document in Higher Education 2018-2022 (CoHE, 2017)"; "Research Project Report on Making Turkish Universities an Attraction Center for International Students in the Framework of Internationalization of Higher Education (Kadıoğlu & Özer, 2015)"; "Growth, Quality, Internationalization: A Roadmap for Higher Education in Turkey (Çetinsaya, 2014)", "10th Development Plan 2014-2018 (T.R. Ministry of Development, 2013)" and "11th Development Plan 2019-2023 (T.R. Presidential Strategy and Budget Department, 2019)".

This article aims to analyze the policy documents written on the internationalization of higher education in Turkey. The paper concentrates on the meaning of the internationalization of higher education in Turkey and the policies of internationalization of higher education applied in Turkey are aimed to be revealed. For this purpose, answers to the following questions were sought.

1. According to the policy documents on the internationalization of higher education,

    a. What is the **meaning** of the internationalization of higher education in Turkey?

    b. What are the **policies** implemented in the process of internationalization of higher education in Turkey?

Method

This research was conducted with case study, one of the qualitative research designs. According to Creswell (2013, p. 44), qualitative research begins with interpretative/theoretical perspectives and assumptions

that contain information about the research problem. To investigate this problem, the researcher continues processes such as data collection in natural environments, data analysis such as induction/deduction, and establishing patterns and themes. The case study can be defined as an in-depth description and examination of a limited system (Merriam, 2009, p. 40). Within this research, the documents in the literature on the internationalization of higher education were determined as the analysis units.

Study Group

The study group consists of documents that are rich in information. Documents published by universities, various state institutions, syndicates, various non-governmental organizations, faculty members, websites, and all resources were searched. While searching, search terms such as "higher education, policy, internationalization policies, education policies, education planning, Turkey" were used. The search was performed without covering a specific date range. As a result of the searches, many documents were obtained. Since the study discussed the context of Turkey, the focus was on documents originating from Turkey. Documents that addressed the internationalization of higher education holistically at the policy level and included the meaning of internationalization were recorded and examined through the document review form prepared by the researchers. The document review form includes the author, year, type of documents, and the person/institution to which they belong. There is a checkbox indicating whether the document has the content to answer the research question. For example, is internationalization defined in the document? Is the importance of internationalization stated in the document? Are internationalization policies mentioned in the document? Literature review and research questions were taken into consideration in the creation of the document review form. The other documents were not included in the scope of the research because they did not address the internationalization of higher education at the policy level. At the end of this review documents titled "Internationalization Strategy Document in Higher Education 2018-2022 (CoHE, 2017)"; "Research Project Report on Making Turkish Universities an Attraction Center for International Students in the Framework of Internationalization of Higher Education (Kadıoğlu & Özer, 2015)"; "Growth, Quality, Internationalization: A Roadmap for Higher Education in Turkey (Çetinsaya, 2014)", "10th Development Plan 2014-2018 (T.R. Ministry of Development, 2013)" and "11th Development Plan 2019-2023 (T.R. Presidential Strategy and Budget Department, 2019)" were selected for analysis. It is assumed that these documents enabled a description of the internationalization of higher education at the policy level.

Analysis of Data

The content analysis method was used to analyze the data. Content analysis is defined as an effort to make sense of voluminous qualitative data (Patton, 2002, p. 453). Merriam (2009, pp. 175-176) stated the purpose of data analysis as exporting the meaning of data through interpretation and integration. Creswell (2013, p. 180) and Yıldırım and Şimşek (2013, p. 260) put forward various processing steps in content analysis. Following all these purposes and stages, the researchers read the documents in the study group carefully and at various intervals. He took various notes in each session and aimed to have a detailed knowledge of the content of the documents. When the researchers thought they were ready to code, he started the coding process. The researchers associated the codes with the sub-themes and then with the themes using the inductive method. At the last stage, the researchers verified the obtained codes, sub-themes, and themes, with the approval of other coders and eliminated the incompatibilities. The researchers presented the final themes by supporting them with figures.

Establishing Credibility and Trustworthiness

There are various strategies to develop and expand validity and reliability in qualitative research (Merriam, 2009), and researchers are advised to adopt various accepted strategies to prove the accuracy of their studies (Creswell, 2013). In this study, various strategies were followed to increase the credibility

(internal validity) of the study and to ensure its transferability (external validity). A prolonged involvement strategy was used for credibility (internal validity). Lincoln and Guba (1985) defined prolonged involvement as building trust, solving problems arising from the participants or the researcher, and spending enough time learning about the culture. After the researchers decided on this study, which aims to evaluate the internationalization of higher education in Turkey, they were in constant interaction with the experts and administrators who carried out the internationalization studies of the state university where they worked and received support for their work. In addition, the researcher closely followed the university's quality studies in higher education, the work of the ECTS and Bologna coordinator, and attended the meetings held. In this way, the researchers aimed to be closer to the research area and to be familiar with its culture.

Reliability (Consistency) is concerned with what the results will be if research is carried out at the same or similar times with the same or similar participants (Lincoln & Guba, 1985). In this study, various strategies were followed to increase the internal consistency (internal reliability) of the study and to ensure its external reliability. To increase the internal reliability of the research, simple explanations were presented from the data collection stage. With these simple explanations, it is aimed that the whole process will proceed smoothly. The raw data collected within the scope of the research were backed up and stored. In this study, other researchers were used to ensure external reliability, and different perspectives were taken into account in the processes of data collection, analysis, and revealing of the findings. Coders with qualitative research experience were used in the study. During the analysis of the data, it was ensured that there was consensus among all coders.

Findings and Discussion

The Meaning of the Internationalization of Higher Education in Turkey (1a)

For the first part of the research question (1a), the meaning of the internationalization of higher education in Turkey was investigated through the documents in the study group.

The findings obtained as a result of this research are shown in Figure 1 below as codes, sub-themes, and themes.

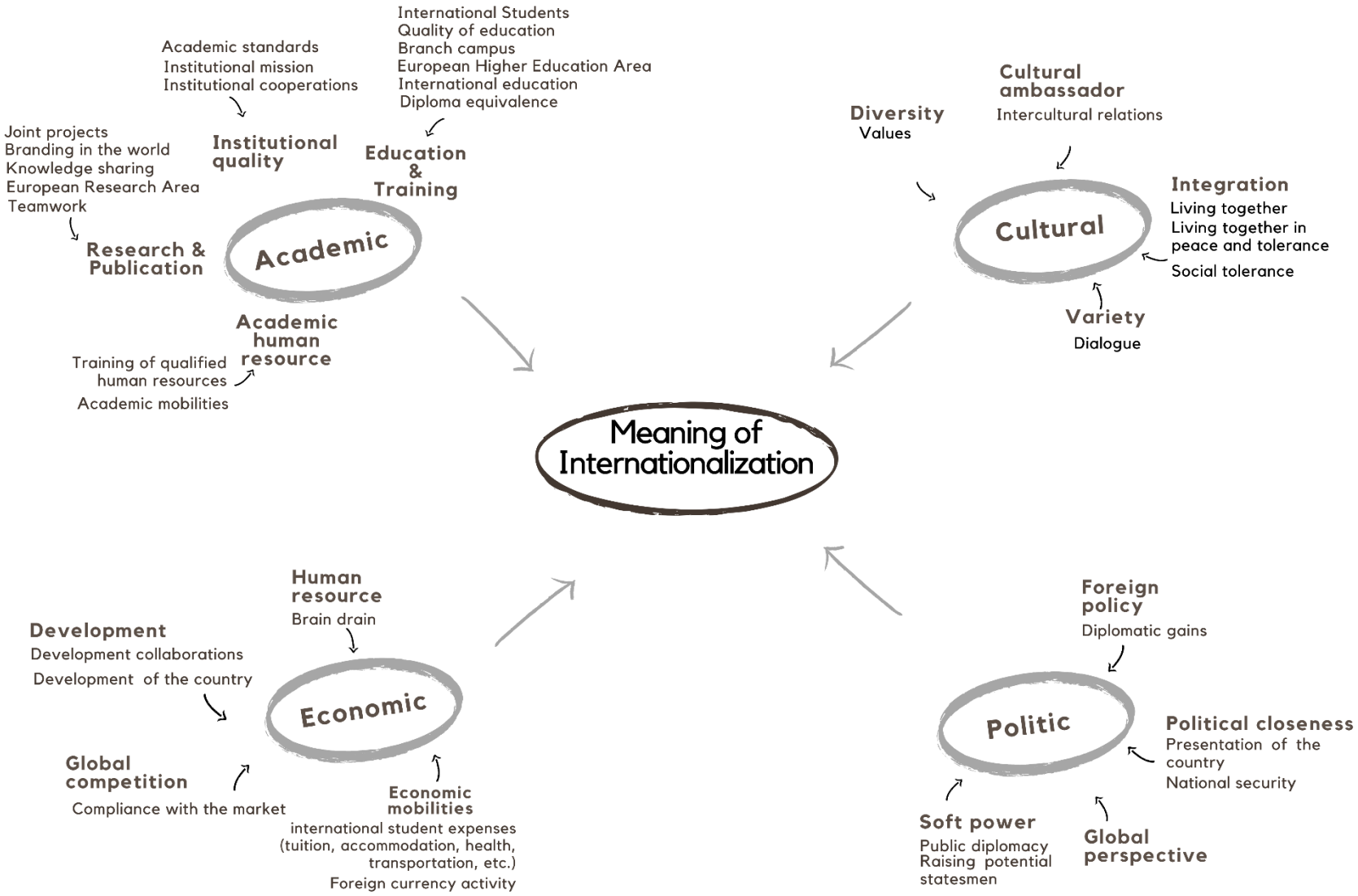

Figure 1. The Meaning of the Internationalization of Higher Education

When Figure 1 is examined, it is seen that the internationalization of higher education in Turkey has academic, cultural, economic, and political meanings.

Theme 1: The statements regarding the academic meaning of the internationalization of higher education in Turkey are presented below.

> *"One of the important contributions of internationalization is its contribution to the increase of institutional quality and capacity through the sharing of knowledge in academic and scientific fields (CoHE, 2017, p. 7).*

> *"International students are on the agenda of many countries today because of their academic, social, cultural, political and economic contributions (Kadıoğlu & Özer, 2015, p. 11).*

> *"Strengthening the field of higher education in Turkey in internationalization is important not only to contribute to the regional and global position of our country but also to enrich the understanding of the university and increase the education and research quality of our universities (Çetinsaya, 2014, p. 170)."*

> *"The higher education system will be transformed into a quality-oriented competitive structure within the framework of the principles of autonomy, performance-oriented, specialization, and diversity based on accountability (T.R. Ministry of Development, 2013)."*

Theme 2: The statements regarding the economic meaning of the internationalization of higher education in Turkey are presented below.

> *"The sine qua non for our country to be among the top ten economies in the world is the qualified human resource, which plays a key role in shaping the future of the country (CoHE, 2017, p. 7).*

> *"However, in the benefits of internationalization … the benefits that can be grouped as a source of economic benefit come to the fore more than others (CoHE, 2017, p. 7).*

> *"International students contribute to the economy of the country they are in, both with the tuition fees they pay and the expenses they make with their family members to meet their accommodation, travel, and daily needs. Education fees not only contribute to the country's economy but also support the financial sustainability of higher education institutions (Kadıoğlu & Özer, 2015, p. 12).*

> *"The transformation of higher education institutions into an output-oriented structure that attaches importance to technology production in cooperation with industry will be encouraged, and entrepreneurial activities and income sources will be diversified (T.R. Ministry of Development, 2013, p. 33)."*

Theme 3: The statements regarding the cultural meaning of the internationalization of higher education in Turkey are presented below.

> *"However, the benefits of internationalization … being a means of interaction between countries and cultures … (CoHE, 2017, p. 8).*

"International students become an important tool of production and development goals by staying in the countries they are in after their education, or they return to their countries as cultural ambassadors and act as a bridge between their countries and the country they host in political, social, cultural and commercial areas (Kadıoğlu and Özer, 2015, p. p. 11)."

"Again, internationalization aims to change the introverted structure of higher education institutions; It is one of the most suitable means for universities to increase intercultural dialogue, negotiation and interaction, and to transform them into research and knowledge sharing spaces (Çetinsaya, 2014a, p. 143)."

"Besides the acceleration, it has brought to quality processes, the most positive contribution of internationalization to higher education is its contribution to university culture. That the university institution is the place where all opinions are voiced, international students from different cultures and different backgrounds breathe and interact with the same environment with the students of the country, the diversified campus environments provide a climate of tolerance, and it helps to enrich higher education in every way. (Çetinsaya, 2014a, p. 142)."

Theme 4: The statements regarding the political meaning of the internationalization of higher education in Turkey are presented below.

"Internationalization also makes important contributions to public diplomacy. When international students return to their countries, they can come to senior positions and have a say in determining the country's policy. It is known that observing the country's interest in foreign policy and public diplomacy and development areas is prominent (CoHE, 2017, p. 8).

"In addition, international student mobility is an effective foreign policy, public diplomacy and development cooperation tool to increase cooperation and solidarity between countries and cultures (Kadıoğlu and Özer, 2015, p. 3)."

"Higher education is one of the main areas that will enrich the position of our country, which has an important human resource and historical background for the solution of regional and global problems, and increase its interaction with other countries (Çetinsaya, 2014a, p. 169)."

All these statements reveal the finding that the internationalization of higher education in Turkey is a multidimensional concept that has academic, economic, political, and cultural meanings. Vural-Yılmaz (2016) conducted a study investigating the opportunities and importance levels offered by the internationalization of higher education. The opportunities that stand out in the results of the study are research and innovation infrastructure, university rankings, international cooperation, intercultural dialogue, academic and personal development, employment of graduates, and opportunities to improve the qualifications of faculty members. When examined carefully, we can see that the findings of Vural-Yılmaz's research overlap with the academic, economic, cultural, and political themes reached within this research. Similarly, Knight (2008) explained the importance of the internationalization of higher education for socio-cultural, political, economic, and academic reasons. We can say that these reasons coincide with the findings of this study. Taşçı (2018) focused on the meaning of internationalization in her study. Although the findings of both studies show similarity in academic and cultural dimensions, they do not show similarity in terms of politics. In the study of Aydınlı and

Mathews (2020, p. 10), academic goals are expressed as the centre of universities' internationalization efforts. In this respect, it can be said that this finding overlaps with the academic meaning theme of the current study.

The finding that the internationalization of higher education in Turkey has academic, cultural, economic, and political meanings is largely confirmed by Kondakçı (2011, p. 588). Kondakçı (2011, p. 588) explained the movements of international students around the world in four circles. The first circle includes traditional destinations such as the USA, England, and Australia. For these countries, the economic reasons for student mobility are at the forefront. The second circle includes countries with Anglo-Saxon education systems, and economically developed, but non-native English-speaking countries. Higher education institutions in these countries may try to attract foreign students for economic reasons, but academic, social, and cultural motivations are also clear for these countries. The third circle includes economically developing and non-English-speaking countries. In this circle, including Turkey, cultural, geographical, historical, and political reasons are relatively more prominent than economic reasons. In addition, these countries are likely to be "sending" countries into student mobility. The fourth circle comprises other countries that are fully qualified as sending countries. Although economically developed and English-speaking countries are attracting attention as study abroad destinations, the trend in international student mobility points to an increasing and intense flow towards countries in the third circle, including Turkey.

Similarly, the finding that the internationalization of higher education in Turkey has a cultural meaning is like the findings of Kondakçı, Çalışkan, Bulut Şahin, Yılık, and Engin Demir (2016, p. 302). Cultural, historical, religious, and social affinities emerge as a pull factor and, for these reasons, the Balkan countries become Turkey's internationalization hinterland. Amblee and Dhayanithy (2018, p. 412) reached various themes in their study on the meaning of internationalization of higher education for faculty members. Internationalization is gaining international visibility; developing intercultural perspectives, and adopting global standards; knowledge production, and learning across borders; It means the movement of people and ideas. It is seen that the aforementioned theme is like the academic, cultural, political, and economic themes that emerged in the current study.

The Internationalization Policies of Higher Education in Turkey (1b)

To answer the second question of this study (1b), the internationalization policies of higher education in Turkey were investigated according to the information obtained from the documents in the study group. The codes, sub-themes, and themes obtained as a result of this research are shown in Figure 2 below.

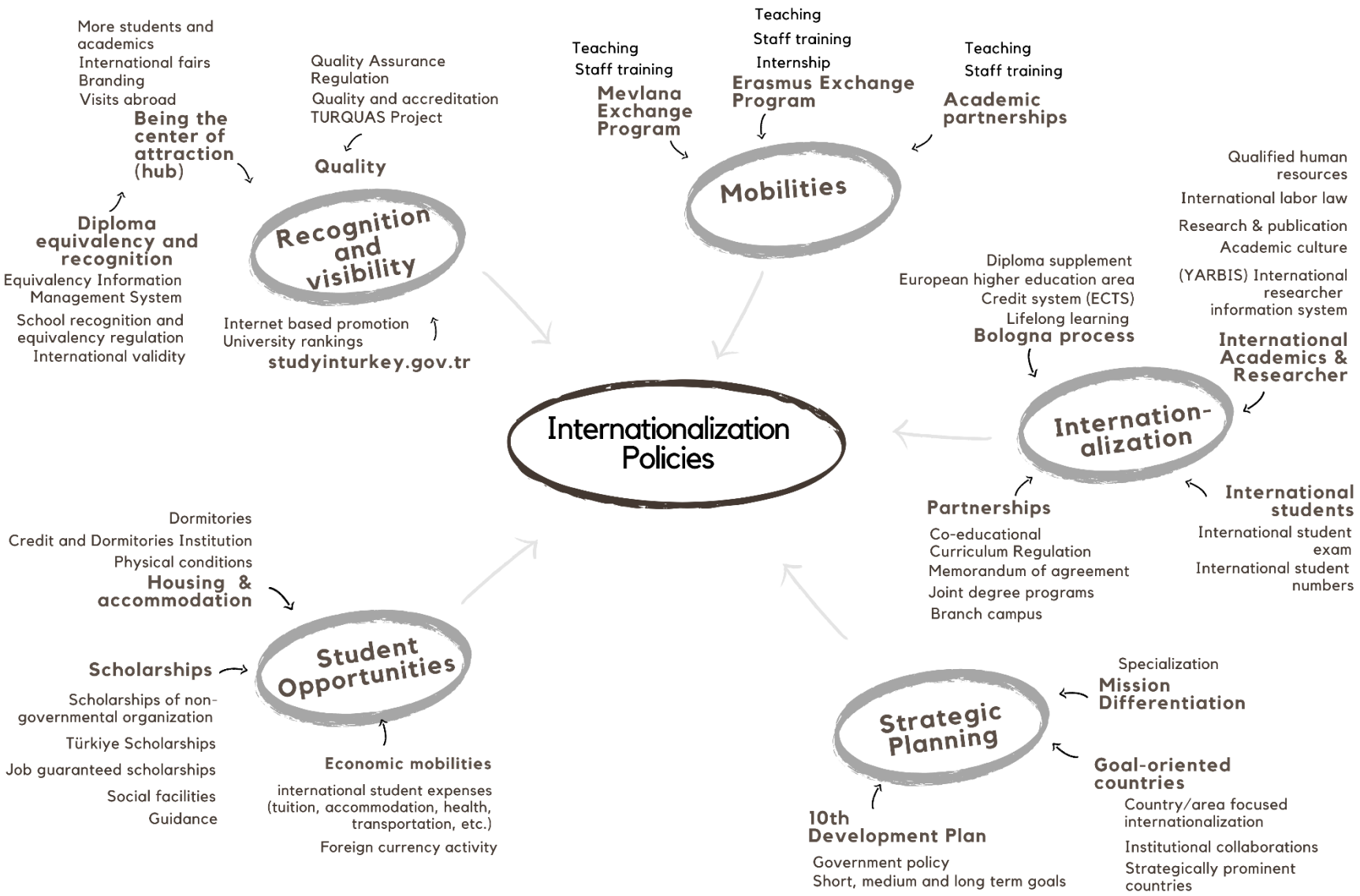

Figure 2. Internationalization Policies of Higher Education Implemented in Turkey

When Figure 2 is examined, it is seen that there are recognition and visibility, mobility, internationalization, strategic planning, and student opportunities policies for the internationalization of higher education in Turkey.

Theme 1: The statements regarding the recognition and visibility policies implemented for the internationalization of higher education in Turkey are presented below.

> *"Various strategies are being developed for the Turkish higher education system to become an international center of attraction and attract more students and faculty members from more countries, and efforts are made to keep the dynamics of internationalization strong with the policies pursued in this area (CoHE, 2017, p. 15).*

> *"Strategic Goals and Targets*
> *Aim 1. To make Turkey a center of attraction in higher education (CoHE, 2017, p. 52)."*

> *"The issues of accreditation, equivalence, and language of instruction determine the country and university preferences of international students. After determining the target countries for attracting international students, a detailed examination should be made about the recognition status of Turkish universities in these countries and the equivalence of their diplomas, and the initiatives on this subject should be systematized by YÖK (CoHE) (Kadıoğlu and Özer, 2015, p. 6).*

Levent and Karaevli (2013) make various suggestions under the theme of communication and promotion in their study, which examines the policies for the education of international students and offers various suggestions. The theme of communication and promotion in the aforementioned study is parallel to the theme of recognition and equivalence, which is the finding reached within the current study. In addition, the strategy of developing communication networks in Şişmanoğlu-Kaymaz's (2018) study coincides with the recognition and visibility dimension of this research. According to the findings of this study, Turkey aims to be a centre of attraction for international students through its recognition and visibility policies. This finding is in line with the study of Kondakçı, Bedenlier, and Zawacki-Richter (2018, p. 531) in which they describe Turkey as a centre emerging in its region. Similarly, Kondakçı, Çalışkan, Bulut Şahin, Yılık, and Engin Demir (2016, p. 301) emphasize that statistical data confirm Turkey is a centre in its region.

Theme 2: The statements regarding the student opportunities policies implemented at the point of internationalization of higher education in Turkey are presented below.

> *"Our Core Policies*
>
> *Diversification of scholarship opportunities (CoHE, 2017, p. 50)."*

> *"… Türkiye Scholarships, … YÖK (CoHE)'s start of granting scholarships to international students are some of the important initiatives that strengthen this process (CoHE, 2017, p. 15)."*

> *"Our Core Policies*
> *Increasing the housing capacity (CoHE, 2017, p. 48)."*

> *"…, housing opportunities of higher education institutions for international students will be developed and institutional capacity will be increased in internationalization (T.R. Presidency of Strategy and Budget Directorate, 2019, p. 140)."*

Şişmanoğlu-Kaymaz (2018) introduced the university's housing facilities as an institutional strategy for international students and faculty members. Vural-Yılmaz (2016) in his research, which tries to determine the priority dimensions in the internationalization strategies of universities, put forward a priority dimension to increase Turkey's political-cultural influence by providing scholarships to international students. In this study, since the dimension of student opportunities emerged as the dimension of the internationalization policies of higher education, it is seen that the findings of the studies overlap.

Theme 3: The statements regarding the strategic planning policies implemented for the internationalization of higher education in Turkey are presented below.

"Our Core Policies

Determining target/focus countries and focusing on these countries (CoHE, 2017, p. 48)."

"Our Core Policies

Identifying priority areas of education and cooperation in the country's context (CoHE, 2017, p. 49).

"Our Core Policies

Identifying target state universities and supporting them in internationalization (CoHE, 2017, p. 49).

"... the extension of the stay of doctoral students in Turkey after graduation, the start of YÖK (CoHE) granting scholarships to international students are some of the important initiatives that strengthen this process (CoHE, 2017, p. 15)."

"Turkey should establish its internationalization strategy in line with its regional power and global goals. In this context, it is a viable strategy for Turkey to develop relations in higher education not only with nearby geographical and cultural basins but also with Asian, African, and Latin American countries (Çetinsaya, 2014a, p. 169)."

In the context of internationalization, strategic planning gains importance primarily in making choices, determining the focal point, determining priorities, and creating effectively organized, coordinated and structured activities (de Haan, 2014, 147). Soysal (2018) reached the sub-theme of strategic planning of higher education under the theme of higher education-quality- management in his study, which aims to analyze higher education studies descriptively. In this sense, the findings of both studies are similar.

Theme 4: The statements regarding the internationalization policies implemented for the internationalization of higher education in Turkey are presented below.

"Strategic Goals and Targets

Purpose 2. To increase the institutional capacity in internationalization (CoHE, 2017, p. 52)."

"Various strategies are being developed in order for the Turkish higher education system to gain more students and academic staff from more countries … and the dynamics of internationalization are tried to be kept strong with the policies followed in this field (CoHE, 2017, p. 15)."

"In this context, the International Labor Law No. 6735, which was published in the Official Gazette dated 13 August 2016 and entered force, will contribute significantly to our goals of being a center of attraction for qualified foreign labor force (CoHE, 2017)."

"One of the most important steps taken in terms of the internationalization of higher education in Turkey is that the Council of Higher Education abolished the -central and compulsory-Foreign Student

Examination (YÖS) in 2010, giving universities a great deal of flexibility in determining the procedures and principles regarding the admission of international students. This flexibility and advantage have created an opportunity for our universities, and our universities have taken advantage of this opportunity. The best indicator of this is the significant increase in the number of international students in our country after 2010 (Çetinsaya, 2014a, p. 152)."

"The number of qualified international students in the higher education system will be increased (T.R. Presidency of the Presidency of Strategy and Budget, 2019, p. 140)."

Yağcı (2010) analyzed the Bologna process and discussed the process in terms of diploma degrees, mobility and recognition, quality assurance, lifelong learning, and social dimension. The above dimensions of the Bologna process are parallel to the sub-theme of the Bologna Process, which is included in the international theme of this study. Kara and Çalık (2022) examined the experiences of academics who went abroad for at least one year to carry out academic studies while they were working in Turkey and who did academic studies at foreign higher education institutions. According to this, during the time they spent abroad, academicians felt inadequate in the use of foreign languages and professionally.

Theme 5: The statements regarding the mobility policies implemented for the internationalization of higher education in Turkey are presented below.

"With the Learning Mobility of Higher Education Students and Staff, it is aimed to develop the competencies of higher education students and staff and to offer them professional development opportunities abroad (CoHE, 2017, p. 18)."

"… Erasmus and Erasmus+ programs, … Mevlana Exchange Program, … Project-Based International Exchange Program … are some of the important initiatives that strengthen this process (CoHE, 2017, p. 15)."

"Exchange students take part in international mobility through exchange programs such as Erasmus and Mevlana or bilateral agreements between universities and universities abroad (Kadıoğlu and Özer, 2015, p. 18)."

"One of the most important elements of the internationalization process, which should also be evaluated in terms of massification and universalization of access to higher education, is student mobility (Çetinsaya, 2014a, p. 143)."

In the last two decades, the internationalization of higher education has become a leading policy debate and research topic. Student mobility from various aspects of internationalization has become the subject that attracts the most attention from international institutions, governments, and higher education institutions (Gümüş, Gök, and Esen, 2019, pp. 16-17). Porfirio (2012) reiterates that student mobility is the most important internationalization strategy by higher education administrators. Şişmanoğlu-Kaymaz (2018) put forward increasing international student mobility as an institutional strategy. In his study, Vural-Yılmaz (2016) tried to determine the priority dimensions in the internationalization strategies of universities and revealed that student and faculty mobility should be a priority to a large extent. Since there is a mobility theme among the findings of the internationalization policies of higher education in this study, the findings of these studies overlap.

Conclusion

The Meaning of the Internationalization of Higher Education in Turkey (1a)

Returning to the question posed at the beginning of this study (1a), it is now possible to state that the internationalization of higher education in Turkey has academic, cultural, economic, and political meanings.

The academic meaning of the internationalization of higher education in Turkey includes students and faculty members and their mobility, joint projects, teamwork, publications, academic information sharing, quality and accreditation, and foreign language studies. With this research, it has been revealed that the internationalization of higher education in Turkey is a process that allows the sharing of scientific knowledge, which combines the academic meaning of qualified human resources, research/publication opportunities, and institutional quality with the education process.

The economic meaning of the internationalization of higher education in Turkey includes qualified human resources, expenses such as fees, accommodation, transportation, and health of international students and their relatives, transforming information into value-added production, industry, and university cooperation studies. This study identified that the economic meaning of the internationalization of higher education in Turkey is an understanding that aims to see international students as qualified human resources, as well as to contribute to production by transforming their expenditures and knowledge into technology.

The cultural meaning of the internationalization of higher education in Turkey includes the ability of different cultures to live together, in peace and interaction, tolerating differences, increasing solidarity between countries and cultures, and training cultural ambassadors. The research presented here reports that the cultural meaning of the internationalization of higher education in Turkey is an understanding that includes keeping intercultural relations alive by interacting with different cultures based on human values, integrating with the world, and raising cultural ambassadors.

The political meaning of the internationalization of higher education in Turkey includes diplomatic gains, public diplomacy, soft power, and foreign policy studies. This finding indicated that the political meaning of the internationalization of higher education in Turkey is an understanding that aims to establish deep-rooted and solid relations with the countries that are planning to interact through higher education and to increase the influence of the Republic of Turkey by contacting the peoples of those countries.

The Policies of the Internationalization of Higher Education in Turkey (1b)

The principal findings of this research regarding the second part of the research question (1b) are that the policies of recognition and visibility, student opportunities, strategic planning, internationalization, and mobility for the internationalization of higher education in Turkey were implemented. Among the recognition and visibility policies for the internationalization of higher education in Turkey, there are efforts to become a centre of attraction, reach more students and faculty, create a legal basis, make internet-oriented promotion, and create a competitive system that is higher in university rankings and quality studies. The analysed data suggests that higher education in Turkey maintains its recognition and visibility policies by targeting higher ranks in university rankings, trying to be a centre of attraction or a hub, maintaining quality studies, and strengthening its infrastructure in areas such as equivalence & recognition.

Student opportunities policies for the internationalization of higher education in Turkey include student dormitory construction, Higher Education Credit and Hostels Institution studies, improvement of physical conditions, Türkiye Scholarships, job-guaranteed scholarship programs, social opportunities, and guidance. The research presented here confirms that higher education in Turkey continues its student opportunities policies by expanding the accommodation opportunities for international students, giving scholarships to international students, arranging social opportunities for international students, and providing guidance services to them.

There are activities such as teaching, studying, and doing internships within the mobility policies for the internationalization of higher education in Turkey. The analysis concludes that higher education in Turkey maintains its mobility policies by focusing on Erasmus Exchange Program, Mevlana Exchange Program, and academic collaborations.

Internationalization policies for the internationalization of higher education in Turkey diploma supplement include studies such as the European Higher Education Area, credit system, lifelong learning, number of international students and selection exam, academic cultural richness, international faculty information system, post-graduate stay in the country, bilateral agreements, joint diploma, and branch campus. The results of this investigation show that the higher education system in Turkey maintains its policies of being international with efforts such as adopting the Bologna process, continuing its studies for international students and faculty members, and continuing its studies on qualified human resources, cooperation and partnerships.

Among the strategic planning policies for the internationalization of higher education in Turkey, there are studies to make the issue a government policy, set short-middle-long-term goals, determine the country and field-oriented areas, seek opinions from relevant ministries on strategic issues, to identify countries that stand out from the strategic point of view, and to specialize in higher education. One of the more significant findings to emerge from this study is that strategic planning policies are maintained by including the subject of internationalization in higher education in the development plans in Turkey, by determining the target-oriented and priority countries, and by continuing the mission differentiation studies.

Recommendations

As a result of this study, it was concluded that the internationalization of higher education in Turkey has academic, cultural, economic, and political meaning and that the policies of recognition and visibility, student opportunities, being international, strategic planning, integration, and mobility have been produced for the internationalization of higher education in Turkey. On the other hand, some studies suggest that a comprehensive and planned internationalization process is not carried out in Turkey. This particular research finding also points to the need for the Internationalization of Higher Education Working Committee, which comprises faculty members who carry out academic studies on the internationalization of higher education in Turkey, people who carry out the internationalization practices of universities, relevant units of ministries that contribute directly or indirectly to internationalization, foundations, non-governmental organizations, and student representatives. This committee can contribute importantly to the production of more comprehensive and coordinated studies on the internationalization of higher education by bringing together policymakers, practitioners, and employees who face different problems with different motivations, faculty members, and students.

As previously stated, it was revealed that the internationalization of higher education in Turkey also has an economic meaning. Although international students are perceived as qualified human resources and their economic added value, the other part of this economic meaning is related to accommodation, health, transportation, and other expenses of international students and family members in Turkey. It is clear that Turkey needs to calculate not the economic income to be obtained from the expenditures of international students and their family members, but the long-term contributions of international students to teaching environments, research laboratories, knowledge production, and information technologies in Turkey. In this sense, a second broad recommendation for practitioners is to make more comprehensive plans for international students in Turkey.

As indicated previously, it was revealed that the internationalization of higher education in Turkey also has a cultural meaning. On the other hand, it is revealed as a result of some studies that there are foreign language deficiencies among faculty members and students in Turkey and that there are faculty members and administrative staff with poor awareness of cultural diversity in universities. The importance of knowing a foreign language and having an awareness of intercultural interaction to engage in cultural interaction cannot be denied. So, continuous efforts are needed to make the faculty members, students, and administrative staff competent in foreign languages.

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www.iojes.net
International Online Journal of Educational Sciences
ISSN: 1309-2707

Digital Technological Competencies of Lecturers Teaching Turkish as a Foreign Language

Research Article

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To cite this article: Yorganci, O. K., & Bas, B. (2022). Digital technological competencies of lecturers teaching turkish as a foreign language, *International Online Journal of Educational Sciences*, *12* (4), 1125-1136.

ARTICLE INFO

Article History:

Received: 15.09.2022

Available online: 11.10.2022

ABSTRACT

The aim of this research is to find out the views of lecturers who teach Turkish as a foreign language about their digital technological competencies. The opinions of the lecturers were collected using the "Digital Competence Questionnaire for Educators," and Google Forms prepared by the researcher. The questionnaire consists of two parts containing personal information and questions. The research was conducted using the survey model, which is a quantitative method. Data from 85 lecturers from 17 different cities were analyzed using descriptive analysis. The answers "yes," i.e., the presence of competence, "partially," i.e., the presence of partial competence, and "no," i.e., the absence of competence, were digitized, given frequencies and percentages, and finally interpreted and evaluated. Most of the lecturers who teach Turkish as a foreign language do not consider themselves "incompetent" in any of the digital competencies queried, with 22 items under 6 headings. However, they considered themselves "partially competent" in the item "4.2. I analyze all data available to me using digital technologies to identify students who need additional support" under the heading "4. Assessment," and considered themselves "competent" in the other items.

Keywords:
Turkish as a foreign language, lecturers, digital competencies, technology

Introduction

As in the past, there is a continuous process of change, transformation, and development in social spheres today. Technology is one of the most effective determinants of this change and transformation, affecting almost every area of social life. In this age of rapidly evolving technology, significant advances have been made in digital technologies in addition to information and communication technologies. These advances

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DOI: https://doi.org/10.15345/iojes.2022.04.015

in digital technologies, as well as information and communication technologies, have a direct impact on living spaces. Therefore, the people who are the cornerstones of the social structure are also affected by the developments. People have to adapt to the new society. To do so, they must be equipped with the appropriate skills. Education, which is an integral part of social life and in which people are the subjects, is naturally and significantly affected by the changes brought about by technology. For this reason, educational environments equipped with relevant technologies and educators with digital technological competencies are needed so that the individuals who make up society acquire skills that can adapt to change and transformation. Since higher education institutions are educational institutions and the lecturers working there are teachers, the lecturers who teach Turkish as a foreign language should also have digital technological competencies to effectively carry out today's teaching processes.

As well as professional, pedagogical, and technical knowledge, it is important that trainers have technical knowledge concerning the sustainability of today's educational processes. Teachers can only incorporate and use the digital technologies they know in their teaching. Several variables play an important role in the use of digital technologies. Kreijns, Vermeulen, Van Acker, and Van Buuren (2014) presented these variables in their study as follows.

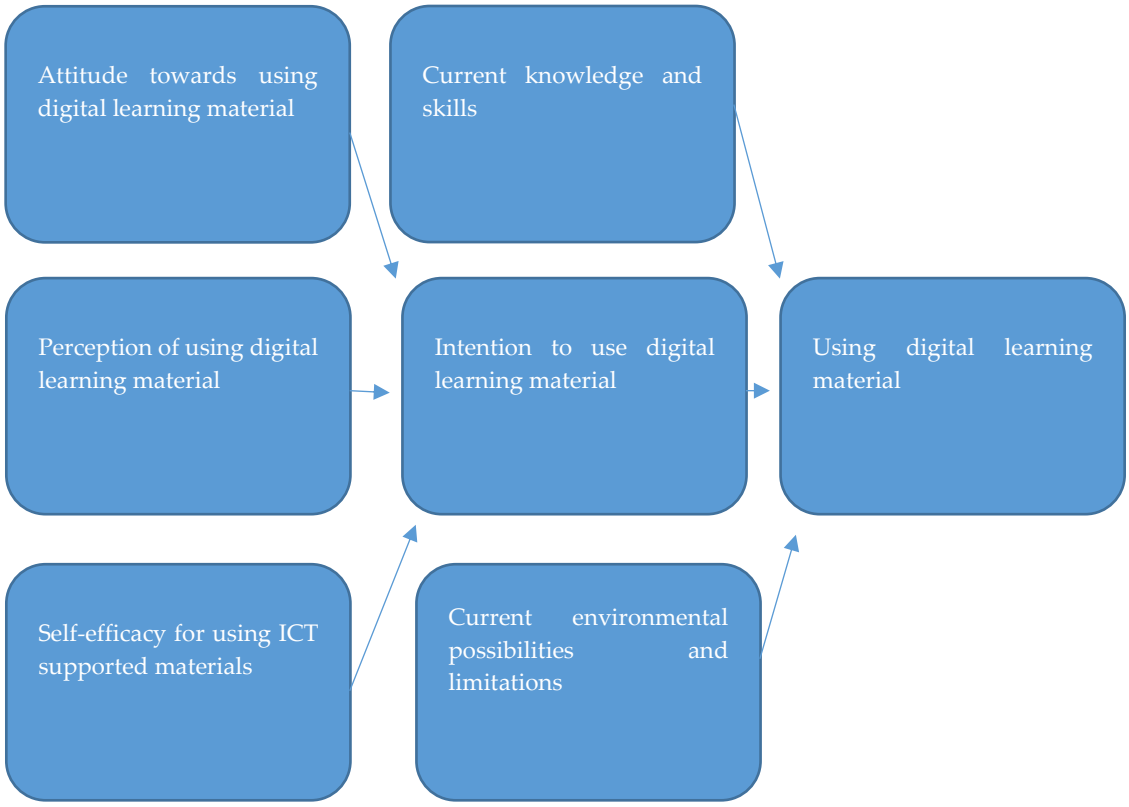

Figure 1. Variables necessary for educators to add knowledge of digital technologies to their pedagogical knowledge.

(This Figure is taken from the study of Uzun, and Akay (2021) that they cited from the study by Kreijns et al. (2014)).

Figure 1 shows that it is impossible to acquire digital technological competencies with technical knowledge alone.

Analysis of publications on the teaching of Turkish as a foreign language, which has increased in recent years, shows that in a study conducted with 280 PhD theses between 1985 and 2017, the topics generally consisted of set exams and grammar (Türkben, 2018). In another study conducted with 191 articles between the years 2010-2016, it was found that the topics generally consisted of problems in the teaching process, textbook reviews and suggestions for new material (Biçer, 2017). According to another study based on articles from 2000-2014, the most studied skill was writing, but listening skills were rarely studied (Erdem, Gün, Şengül, & Özkan, 2015). In another study, covering the years 1982-2012, it is found that most doctoral theses were written between 2006-2012 and the topics of the papers generally consisted of grammar and sets (Büyükikiz, 2014). The results of the study, which focused on the research analysis of teaching Turkish as a foreign language, show that there is almost no study on the topic of technology.

The current research findings by Genç Ersoy and Ersoy (2021) show that the number of studies that include the analysis of publications in the field of teaching Turkish as a foreign language has increased, especially in recent years, but only two technology-oriented research analyses have been examined.

Since there are few technology-based studies on teaching Turkish as a foreign language and almost no studies on digital competencies, this study focusing on the digital competencies of lecturers teaching Turkish as a foreign language will contribute to the literature and open the door for other studies to be conducted on the same topic.

Methodology

This section explains the purpose, model, sample of the study, data collection instrument used in the study, data collection and analysis, and ethics committee approval.

Purpose of the Study

This study aims to determine digital competency levels based on the opinions of Lecturers who teach Turkish as a foreign language.

Model of the Study

The study was conducted using the survey model, which is one of the quantitative research methods. The survey model aims to uncover the characteristics of a group in relation to a specific area and allows general tendencies, attitudes or opinions to be explained quantitatively through studies conducted on a sample selected from the population (Creswell, 2017; Büyüköztürk et al., 2017).

Sample of the Study

The sample consists of 85 lecturers who teach Turkish as a foreign language in the Turkish teaching centres of state, foundation and private universities in 17 different cities.

The table showing the cities that comprised the sample and the number of lecturers in these cities is as follows:

Table 1. Cities and Number of Lecturers

Cities	Number of Lecturers
Adana	1
Aksaray	3
Ankara	14
Antalya	7
Bartın	1
Bayburt	1
Bolu	6
Erzurum	1

Hatay	2
İstanbul	35
Kayseri	7
Mardin	1
Muğla	1
Rize	2
Sakarya	1
Trabzon	1
Yurt dışı	1
Total	**Total**
17	85

Data Collection Tool

The "Digital Competence Questionnaire for Educators," prepared by the researcher, was used as a tool to collect data in this study. This survey is based on the digital competencies described in the report "Digital Competence Framework for Educators (DigCompEdu)" (Punie, Y., editor(s), Redecker, C., 2017) published as a result of a study conducted by the European Commission.

For the content validity of the questionnaire, which comprises 22 items under 6 headings, the opinions of 5 lecturers from the fields of Turkish language teaching (2), educational science (1), measurement (1) and foreign languages (1) were obtained.

Data Collection and Analysis

Lecturers' opinions on their digital competencies were obtained between 15/01/2022 and 30/01/2022 via the "Digital Competence Questionnaire for Educators" on Google Forms.

The research data was analyzed with a descriptive analysis and the results were presented with a frequency and percentage analysis.

Research and Publication Ethics

The principles stated in the "Higher Education Institutions Scientific Research and Publication Ethics Directive" were followed in research. The actions mentioned in the section "Acts contrary to scientific research and publication ethics" of the above-mentioned guideline were not carried out.

Ethical Committee Approval

Name of the Committee = Yıldız Technical University Social and Human Sciences Research Ethics Committee

Date of Ethical Committee Decision = 20.10.2021 Meeting No= 2021/08

Findings and Comments

The results obtained from the responses of 85 lecturers (50 females, 35 males) teaching Turkish as a foreign language in the personal information section of the corresponding questionnaire, which were considered important because of their connection with digital technologies, are shown in the first three diagrams.

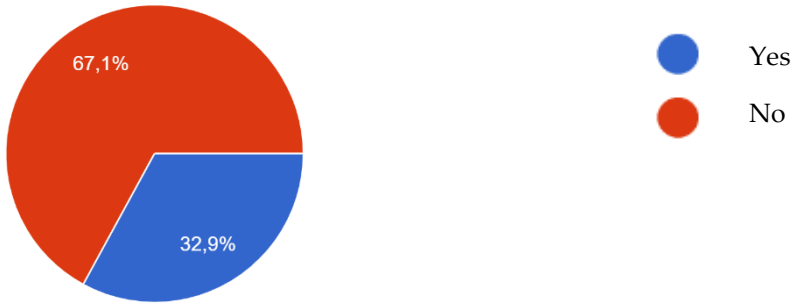

Diagram 1. Status of taking technology courses in graduate education

While 57 of the lecturers indicated that they did not receive any technology-related courses in graduate school, only 28 indicated that they received technology courses.

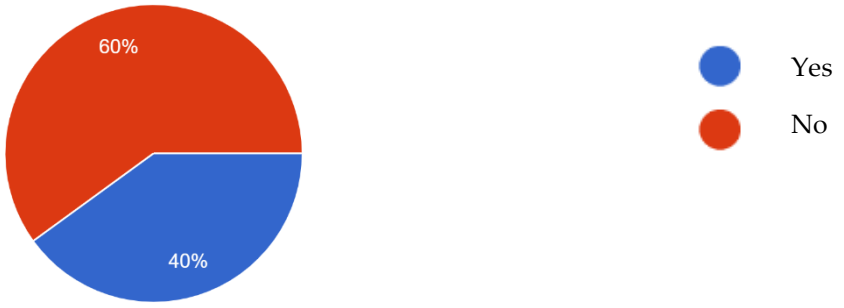

Diagram 2. Status of taking technology courses in Turkish as a foreign language teaching certificate programs

While 51 lecturers indicated that they did not receive technology courses in Turkish as a Foreign Language certificate programs, only 34 faculty members indicated that they received technology courses in related certificate programs.

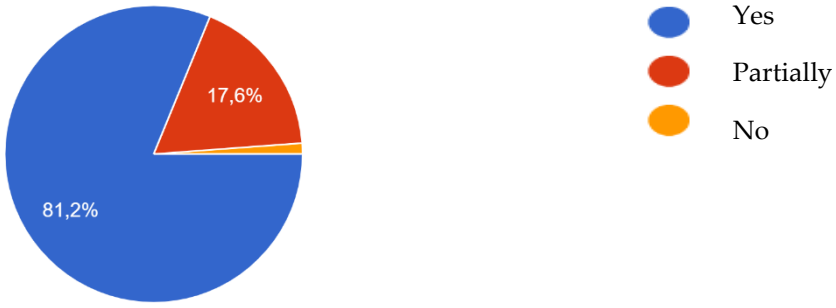

Diagram 3. Use of digital technology in lessons

69 out of 85 lecturers say they use digital technologies in their teaching, 15 say they use them partially, and 1 does not.

According to the first three diagrams' results, 57 lecturers have not received technology courses in graduate programs, and 51 lecturers have not received technology courses in certificate programs for Turkish

as a foreign language. The fact that 15 lecturers use digital technologies partially in their courses and 1 lecturer does not use them attracts attention as this is not expected of 21st-century lecturers.

The digital competencies of the lecturers will be explained and interpreted starting from Diagram 4, which shows the answers to the second and most important part of the questionnaire, which consists of 22 questions under 6 headings.

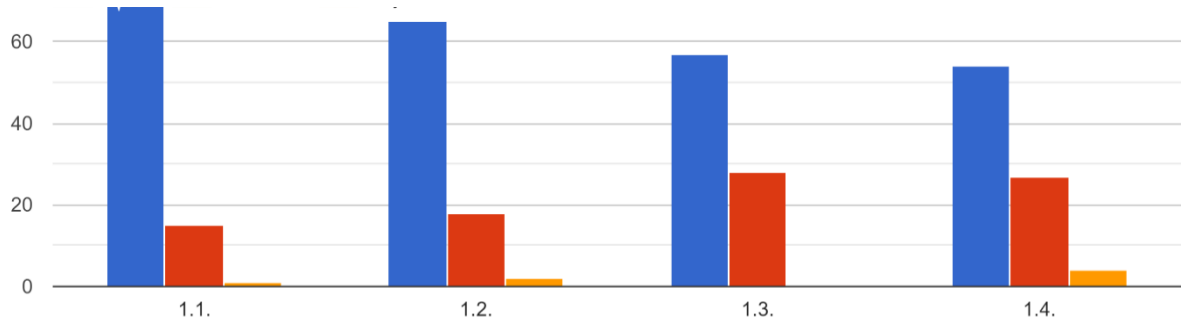

Diagram 4. Use of Digital Skills in the Profession

The majority of the lecturers believe that they are competent in all digital competences, the answers to which are presented in 4 items under the heading "1. Use of digital skills in the profession."

"1.1. I systematically use different digital communication channels (email, blog, school website, apps, etc.) to improve communication with students, parents, and colleagues." This item was answered by 69 of the lecturers as "I am competent," 15 of them as "I am partially competent," and only 1 of them as "I am incompetent."

"1.2 I use digital technologies to collaborate with colleagues inside and outside the school." It can be seen that 65 of the lecturers answered this item as "I am competent," 18 answered as "I am partially competent," and only 2 answered as "I am incompetent."

"1.3 I am constantly improving my digital learning and teaching skills." It can be seen that 57 of the lecturers answered "I am competent" and 28 answered "I am partially competent". And the number of lecturers who answered "I am partially competent" for the competency asked has increased compared to the previous two competencies. However, none of the lecturers answered "I am incompetent" to this item.

"1.4 I participate in online training (e.g. online courses and seminars and MOOC-based training, etc.)." It can be seen that 54 of the lecturers answered "I am competent", 27 answered "I am partially competent" and 4 answered "I am incompetent". It can be seen that the number of lecturers who answered "I am partially competent" to the question on competence is higher than for question 3 compared to questions 1 and 2.

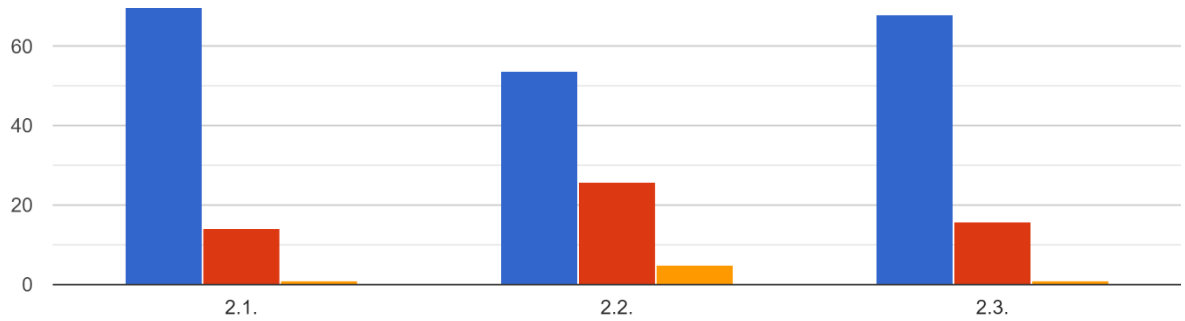

Diagram 5. Digital Resources

Most of the lecturers believe that they are competent in all of the digital competencies whose answers are sought in 3 items with the heading of “2. Digital resources”.

"2.1. I use different websites and search strategies to find and select different digital resources." It can be seen that 70 of the lecturers answered "I am competent", 14 answered "I am partially competent" and only 1 answered "I am incompetent."

"2.2 I produce, modify and improve the digital resources I need." It can be seen that 54 of the lecturers responded with "I am competent", 26 with "I am partially competent" and 5 with "I am incompetent". The number of lecturers who answered "I am partially competent" has increased significantly compared to the other questions in this section.

“2.3. I protect important digital content such as exams, student grades, personal data, etc..” It can be seen that 68 of the lecturers answered "I am competent," 16 answered "I am partially competent," and only 1 of them answered, "I am incompetent," to this item.

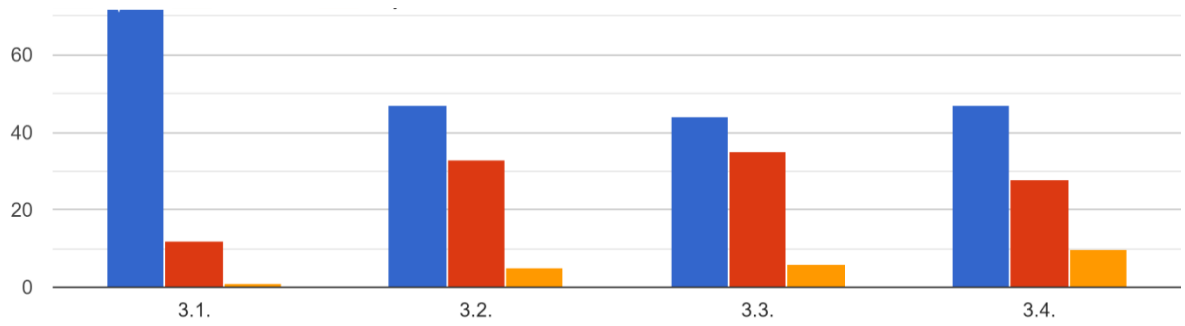

Diagram 6. Learning and Teaching

The majority of lecturers believe that they are competent in all digital competences, the answers to which are asked in 4 items under the heading "3. Learning and teaching".

"3.1 I specifically think what, how and when I use digital technologies to ensure their effective use in the classroom." It can be seen that 72 of the lecturers answered "I am competent", 12 of them answered "I am partially competent" and only 1 of them answered "I am incompetent" to this item.

"3.2 I monitor my students' activities in online collaborative environments". It can be seen that 47 of the lecturers responded "I am competent", 33 responded "I am partially competent" and only 5 responded "I am incompetent". It can be seen that the number of the lecturers’ responses to this item, namely "I am competent and partially competent", is close to each other.

"3.3 I enable students doing group work to use digital technologies to achieve and document learning outcomes." It can be seen that 44 of the lecturers answered, "I am competent," 35 of them answered, "I am partially competent," and 6 of them answered, "I am competent." It can be seen that the number of responses of the lecturers, "I am competent and partially competent," is close to each other as in the item 3.

"3.4 I use digital technologies to enable students to plan, document, and monitor their own learning (e.g., self-assessment exams, e-portfolios for documentation and presentation, etc.)." It can be seen that 47 of the lecturers answered, "I am competent," 28 answered, "I am partially competent," and 10 answered, "I am incompetent." It can be seen that the number of responses that the lecturers consider themselves incompetent has increased for this item compared to the other items in the heading. This item is seen to be the second most answered as "I am incompetent" in the digital technology questionnaire, which questioned 22 competencies under 6 headings.

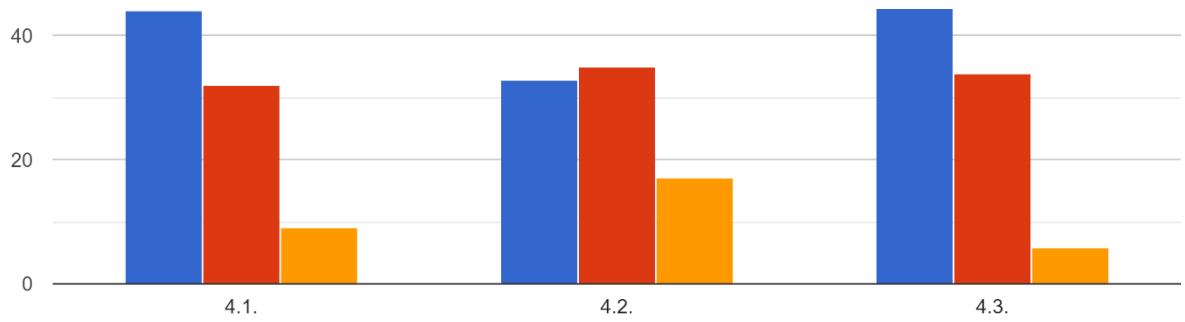

Diagram 7. Assessment

Most lecturers believe that they are competent in two of the digital competencies whose answers are sought in 3 items under the heading "4. Assessment". However, most lecturers consider themselves partially competent in one of the digital competencies asked under this heading.

"4.1 I use digital assessment tools to monitor student progress." It can be seen that 44 of the lecturers responded "I am competent", 32 responded, "I am partially competent," and 9 responded, "I am incompetent." It is seen that the number of lecturers' responses, namely "I am competent and partially competent," to this item is close to each other..

"4.2. I analyze all the data available to me using digital technologies to identify students who need additional support." It can be seen that 35 of the lecturers answered, "I am partially competent," 33 of them answered, "I am competent," and 17 of them answered, "I am incompetent." This item stands out because it is the only item where most of the lecturers gave the answer "I am partially competent," both in the relevant heading and in the whole questionnaire. Furthermore, this item is the only one where lecturers most often gave the answer " I am incompetent," both in the relevant heading and in the whole questionnaire.

"4.3 I use digital technologies to provide feedback." It can be seen that 45 of the lecturers answered, "I am competent," 34 answered, "I am partially competent," and 6 answered, "I am incompetent." It can be seen that the number of lecturers' responses "I am competent and partially competent" is close to each other.

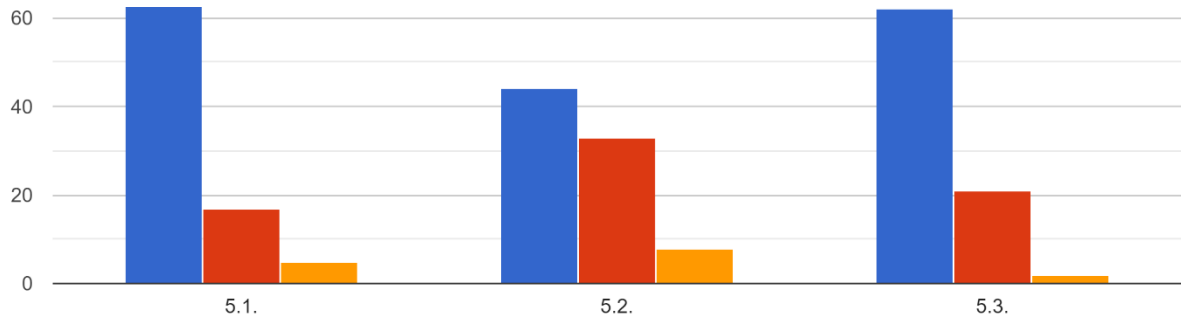

Diagram 8. Supporting Students' Learning Process

The majority of lecturers believe that they are competent in all digital competencies, the answers to which are asked in 3 items under the heading "5. Supporting students' learning process."

"5.1. I consider potential digital challenges that students may encounter when creating digital assignments (e.g. equal access to digital devices and resources, problems working together, lack of digital skills, etc.)." It is seen that 63 lecturers responded "I am competent," 17 answered, "I am partially competent," and 5 answered, "I am incompetent," to this item.

"5.2. I use digital technologies to provide students with individualized learning environments (For example, I assign different digital tasks to different students to address their individual learning needs, preferences and interests). It is seen that 44 of the lecturers responded "I am competent," 33 answered, "I am partially competent," and 8 answered, "I am incompetent," to this item. It is seen that the number of lecturers' responses, namely "I am competent and partially competent," to this item is close to each other.

"5.3 I use digital technologies to enable active student participation in the classroom." It can be seen that 62 of the lecturers answered "I am competent", 21 of them answered "I am partially competent" and only 2 of them answered "I am incompetent."

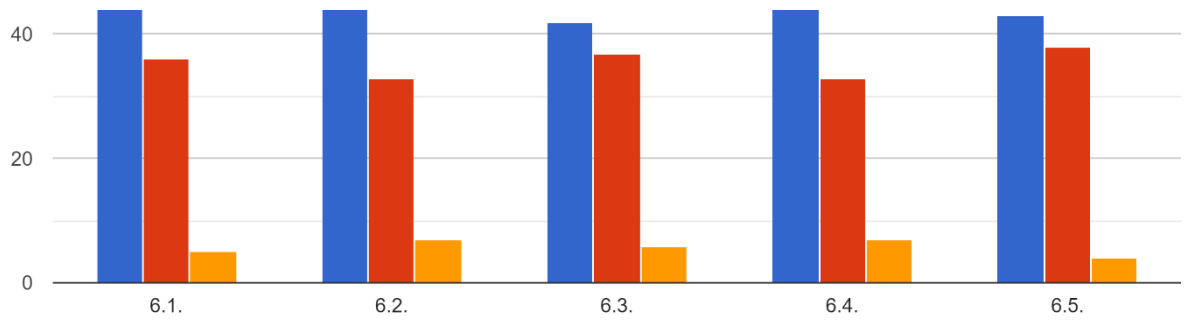

Diagram 9. Facilitating Students' Digital Competencies

The majority of the lecturers believe that they are competent in all digital competencies, the answers to which are asked in 3 items under the heading "6. Facilitating the digital competencies of students.'' This heading which has 5 items stands out because it is the only heading in which the number of lecturers' responses, namely "I am competent" and "I am partially competent," to this item is close to each other.

"6.1 I teach students how to evaluate the reliability of the information in digital environments and to recognize misinformation and bias." It can be seen that 44 of the lecturers answered, "I am competent", 36 of them answered, "I am partially competent" and 5 of them answered, "I am incompetent.

"6.2 I give students tasks to use digital tools to communicate and collaborate with each other or with their environment." It can be seen that 45 of the lecturers responded to this item with "I am competent", 33 with "I am partially competent" and 7 with "I am incompetent".

"6.3 I give students assignments to create digital content." It is seen that 42 of the lecturers gave the answer "I am competent", 37 of them "I am partially competent" and 6 of them "I am incompetent."

"6.4 I teach students how to behave safely and responsibly on online platforms." It can be seen that 45 of the lecturers responded "I am competent", 33 responded "I am partially competent" and 7 responded "I am incompetent".

"6.5 I encourage students to use digital technologies creatively to solve concrete problems (e.g. to overcome obstacles or difficulties encountered in the learning process, etc.)." It can be seen that 43 of the lecturers answered "I am competent", 38 answered "I am partially competent" and 4 answered "I am incompetent."

Discussion, Conclusion and Recommendations

In reviewing the literature, it is clear that the topic of Technological Pedagogical Content Knowledge (TPACK) has been researched in general and especially in recent years; most of the research has focused on teachers, prospective teachers and students, and technological competencies; It can be seen that the studies conducted with the academic staff and lecturers are very few and mainly related to TPACK (Artun and Gunuç,

2020; Kır, 2020; Orhan and Tekin, 2019; Demirer and Dikmen, 2018; Keleş and Turan Güntepe, 2018; Kaleli and Yilmaz, 2015). Moreover, in reviewing the literature, it is not yet possible to find research on technology, especially digital competencies, for lecturers who teach Turkish as a foreign language.

In this study, which attempts to determine digital literacy levels based on the opinions of lecturers who teach Turkish as a foreign language, the general interpretation of the "Digital Competence Questionnaire for Educators," which contains the digital literacies questioned with 22 items under 6 headings, reveals that the majority of the 85 lecturers do not consider themselves incompetent in any digital competencies. It is concluded that they consider themselves partially competent in 1 item and competent in the remaining 21 items.

Considering the qualifications and characteristics that 21st-century lecturers should have, most of the lecturers say: "The fact that they consider themselves competent in all the digital competencies asked under the heading of "1. Use of digital skills in the profession" allows us to interpret that they can incorporate digital technologies in the processes of teaching Turkish as a foreign language."

Most lecturers say: "The fact that they consider themselves competent in all 3 competences asked under the heading "2. Digital resources" leads us to believe that digital resources are easily accessible and that solutions can be worked out to protect digital content, which can be considered as one of the most important problems of our time.

Although most lecturers indicated that they consider themselves competent in all items under the heading "3. Learning and teaching", the number of answers "I am competent and partially competent" is close to each other in items "3.2, 3.3 and 3.4". From this we can conclude that lecturers can be supported in issues such as monitoring activities in the online collaborative environment, students achieving and documenting learning outcomes during group work and again students planning their own learning process.

Since the answers "4.1 and 4.3" under the heading "4.Assessment," which ask for 3 competences, are close to each other and "4.2" is the only competence where the number of answers "I am partially competent" in the questionnaire is high, supporting lecturers in assessment with digital technologies can be considered.

The fact that the majority of lecturers consider themselves competent in all 3 competencies asked under the heading "5.Supporting students' learning" allows us to conclude that lecturers have already recognised the contribution of digital technologies to effective participation in teaching with individualised learning and the difficulties students may encounter when creating digital assignments.

Although the lecturers indicated that they generally consider themselves competent in all 5 items under the heading "6. Facilitating the Digital Competencies of Students," the number of responses "I am competent" and "I am partially competent" is very close to each other in all items asked under the heading. This allows us to assess that it might be beneficial to offer training to lecturers on the digital competencies of the topic in question.

When the questionnaire is evaluated as a whole, it shows that, with the exception of 1 item in one heading, the lecturers consider themselves competent in all digital competencies. According to these results regarding the digital literacy levels obtained through the opinions of the lecturers, studies can be carried out on the competencies where there is only one digital literacy, which the vast majority indicate as "I am partially competent," and on the competencies where the number of answers "I am competent and partially competent" are close to each other. This will benefit lecturers in today's digital world. In addition, this study will probably shed light on future studies on digital competence development.

APPENDICES

Appendix 1. Digital Competence Questionnaire for Educators

Digital Competence Questionnaire for Educators

1. Use of Digital Skills in the Profession

1.1. I systematically use different digital communication channels (e.g. e-mail, blog, school website, apps, etc.) to improve communication with students, parents and colleagues.

Yes ( ) Partially ( ) No ( )

1.2. I use digital technologies to work with colleagues inside and outside of school.

Yes ( ) Partially ( ) No ( )

1.3. I constantly improve my digital learning and teaching skills.

Yes ( ) Partially ( ) No ( )

1.4. I attend online trainings (For example, online courses and seminars and MOOC-based trainings etc.).

Yes ( ) Partially ( ) No ( )

2. Digital Resources

2.1. I use different websites and search strategies to find and select different digital resources.

Yes ( ) Partially ( ) No ( )

2.2. I create, modify and enhance the digital resources I need.

Yes ( ) Partially ( ) No ( )

2.3. I preserve important digital content such as exams, student grades, personal data, etc.

Yes ( ) Partially ( ) No ( )

3. Learning and Teaching

3.1. I specifically think about what, how and when to use digital technologies to ensure effective use in the classroom.

Yes ( ) Partially ( ) No ( )

3.2. I monitor my students' activities in collaborative online environments.

Yes ( ) Partially ( ) No ( )

3.3. I enable students who do group work to use digital technologies to obtain and document learning outcomes.

Yes ( ) Partially ( ) No ( )

3.4. I use digital technologies to enable students to plan, document and monitor their own learning processes (e.g., self-assessment exams, e-portfolios for documentation and prsentation, etc.).

Yes ( ) Partially ( ) No ( )

4. Assessment

4.1. I use digital assessment tools to monitor students' progress.

Yes ( ) Partially ( ) No ( )

4.2. I analyze all the data I have with digital technologies to identify students who need additional support.

Yes ( ) Partially ( ) No ( )

4.3. I use digital technologies to provide feedback.

Yes ( ) Partially ( ) No ( )

5. Supporting Students' Learning Process

5.1. I consider potential digital challenges students may encounter when creating digital assignments (e.g. equal access to digital devices and resources, problems caused by working together, lack of digital skills, etc.).

Yes ( ) Partially ( ) No ( )

5.2. I use digital technologies to provide students with individualized learning environments (For example, I assign different digital tasks to different students to address their individual learning needs, preferences and interests).

Yes ( ) Partially ( ) No ( )

5.3. I use digital technologies to enable active student participation in the classroom.

Yes ( ) Partially ( ) No ( )

6. Facilitating Students' Digital Competencies

6.1. I teach students how to evaluate the reliability of information in digital environments, to detect misinformation and prejudices.

Yes ( ) Partially ( ) No ( )

6.2. I give assignments to students to use digital tools to communicate and collaborate with each other or their environment.

Yes ( ) Partially ( ) No ( )

6.3. I give assignments to students to create digital content.

Yes ( ) Partially ( ) No ( )

6.4. I teach students how to behave safely and responsibly on online platforms.

Yes ( ) Partially ( ) No ( )

6.5. I encourage students to use digital technologies creatively to solve concrete problems (for example, to overcome obstacles or difficulties that arise in the learning process, etc.).

Yes ( ) Partially ( ) No ( )

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