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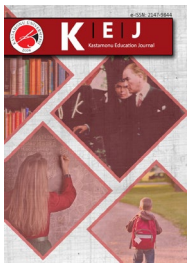

|Araştırma Makalesi / Research Article|

Beceri Temelli Soruların; Özellikleri, Öğretmene ve Öğrenciye Yansımaları

The Characteristics of The Skill Based Questions and Their Reflections on Teachers and Students

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Anahtar Kelimeler

1. Merkezi Sınavlar
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Abstract

This study aims at examining teachers' views on the characteristics of the skill-based questions that have been used in the High School Entrance Exam (LGS) since 2018, the reasons for their changes, and their reflections on teachers and students. Having a qualitative research model, the study employed phenomenological design. The working group consisted of 14 volunteer teachers who worked at secondary school in Kahramanmaraş during the 2019 and 2020 academic year and whose branches were included in High School Entrance exam. The data were obtained through a semi-structured interview form. Content analysis was used during data analysis. The participants stated that skill-based questions are daily life related, challenging and distinctive questions that not only test reading skills but also require high level mental skills. Skill-based questions were identified to contribute to the teachers' professional development, yet they led to some professional difficulties such as lack of resources and materials and unable able to catch up with the curriculum. Besides, skill-based questions were determined to make contribution to the students' problem-solving skills, higher-order thinking skills, interpretation skills and graphic reading skills as well as making knowledge meaningful. However, they also had a negative impact on students with low academic achievement, such as having a sense of failure.

Öz

Bu araştırmanın amacı Liselere Giriş Sınavı'nda (LGS) 2018 yılından itibaren sorulmaya başlanan beceri temelli soruların; özellikleri, değişme sebepleri, öğretmene ve öğrenciye yansımalarının neler olduğunu öğretmen algıları doğrultusunda incelemektir. Araştırma olgu bilim deseninde gerçekleşmiş nitel bir araştırmadır. Araştırmanın çalışma grubunu 2019-2020 öğretim yılında Kahramanmaraş'ta ortaokul kademesinde görev yapan, alanında LGS'de soru çıkan 14 gönüllü öğretmen oluşturmuştur. Araştırmada veriler yarı yapılandırılmış görüşme formuyla elde edilmiştir. Verilerin analizinde içerik analizi kullanılmıştır. Araştırmada beceri temelli soruların; okuma becerisine yönelik, üst düzey zihinsel beceri gerektiren, zorlayıcı, günlük hayatla ilişkili, ayırt edici sorular olduğu sonucuna ulaşılmıştır. Beceri temelli sorular öğretmenlerin mesleki gelişimine katkı sağlamakla birlikte, öğretmenlere programı yetiştirememe gibi bazı mesleki zorluklar getirdiği araştırmada ulaşılan diğer bir sonuçtur. Araştırma sonucuna göre beceri temelli sorular öğrencilerin; problem çözme becerileri ile üst düzey düşünme becerilerini geliştirmeye, bilgiyi anlamlı hale getirmelerine, yorum becerilerini artırmalarına, grafik okumalarına katkı sağlamıştır. Ancak araştırmada beceri temelli soruların akademik anlamda başarısı düşük öğrencilerin başarısızlık duygusuna kapılmalarına neden olmak gibi olumsuz yansımalarının da olduğu bulunmuştur.

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INTRODUCTION

The Ministry of National Education (MoNE) ensures that individuals receive qualified education in accordance with the principle of equality of opportunity in education (National Education Basic Law, 1973) and with the understanding of the social state (TC Constitution, 1982) in Turkey, where compulsory education lasts twelve years. Schools take significant responsibilities for individuals to receive quality education. Even though they make an effort for providing individuals with receiving a qualified education, there may be quality differences among schools due to various reasons such as the administrators and teachers, their physical capacities, workshops, laboratories, equipment, libraries, computers, the number of students in the classrooms (Büyüköztürk, 2016; Gedikoğlu, 2005), parents' socio-economic level and the effect of the physical environment in which the schools are located. Due to all the aforementioned quality differences, some schools may come to the prominence and are more demanded. The low quota of these schools and high demand has resulted in an imbalance of supply and demand, leading to the emergence of the examination as a phenomenon (Baykal, 2014; Büyüköztürk, 2016). Central exams in Turkey (Çepni, Özsevgenç, & Gökdere, 2003) are also named as "high stakes tests" in the relevant literature (Hamilton, Stecher, & Klein, 2002; Jones, Jones and Hargrove, 2003; Kumandaş and Kutlu, 2010).

Central exams that have turned into a struggle for existence both for families and students (Büyüköztürk, 2016; Karadeniz, Er and Tangülü, 2014) are administered by the Ministry of National Education (MoNE) and the Student Selection and Placement Center (ÖSYM) in Turkey. Central exams, which are closely related to a large part of the society (Can, 2017; Çiftçili, 2007), have resulted in a great stress and anxiety tool for students over time (Büyüköztürk, 2016; Dinç, Dere, & Koluman, 2014; Gündoğdu, Kızıltaş, & Çimen, 2010; Kutlu, 2001; Mart, 2014; Şad and Şahiner, 2016; Şahin, Uz Baş, Şahin Fırat, Sucuoğlu, 2012; Taşkın and Aksoy, 2018). Therefore, the students preparing for the exams have difficulties in social, sportive, cultural and physical activities (Bakırcı & Kırıcı, 2008; Kumandaş & Kutlu, 2014; Şahin et al., 2012). Central exams create numerous adverse effects not only for students but also for families as well as teachers (Bakır & Kırıcı, 2008; Buyruk, 2014; Çetin & Ünsal, 2019; Gündoğdu et al., 2010; Kahveci, 2009; Şahin et al., 2012).

The cancellation of High School Entrance Examination (LGS), which is the first step of the central exam, has been a hot topic for years, but merely its name has changed (Güler, Arslan, & Çelik, 2019) and continued its existence under different names such as LGS, OKS, SBS, TEOG (Batur, Ulutaş and Beyret, 2019; Dinç et al., 2014; İncikabı, Pektaş and Süle, 2016). Applied as LGS since the 2017-2018 academic year, this exam consists of two sessions. The first session includes Turkish, Religious Culture and Moral Knowledge, T.C. Revolution History and Kemalism and Foreign Language courses, and the second session encompasses Mathematics and Science courses. Candidates are posed questions related to the verbal area of 50 questions in the first session and the numerical area of 40 questions in the second session (MoNE, 2020).

Since the 2017-2018 academic year, some changes have been made regarding the structure of LGS questions. Therefore, it is likely that the structure of LGS questions is mostly related to reading, understanding, reasoning, associating knowledge with daily life and using higher-level mental skills rather than only measuring knowledge. This new question structure is defined as a skill-based question by the Ministry of National Education. Considering that the questions in PISA are oriented towards realizing what students have learned, solving problems and reasoning, thinking critically and using knowledge (Batur et al., 2019), it may be wise to mention that skill-based questions in LGS exam are similar to those in PISA. In this regard, skill-based questions may also contribute to Turkey's ranking in the international exams.

Although various studies were conducted on LGS at different times (Akay, 2017; Aksoy, 2017; Bakırcı and Kırıcı, 2008; Batur et al., 2019; Büyüköztürk, 2016; Can, 2017; Çolak, 2017; Demirkaya and Karacan, 2016; Dinç et al., 2014; Güler, Arslan and Çelik, 2019; Gündoğdu et al., 2010; İncikabı et al., 2016; Şad and Şahiner, 2016; Şahin et al., 2012; Taşkın & Aksoy, 2018; Yavuz , Odabaş & Özdemir, 2016), there is no such a study specifically published on examining skill-based questions in LGS since 2017-2018 academic year. This was regarded as a shortcoming by the researchers. Besides, the study is expected to reveal the possible positive and negative reflections of skill-based questions on teachers and students, and to help decision makers create a data set within the question styles or the arrangements and changes to be made for LGS.

The results of this study will also contribute to the preparation of the textbooks and the learning objectives in accordance with the skill-based questions. In addition, the study may be a source in revealing the professional difficulties teachers experience about skill-based questions and in determining their professional development needs. Thus, this study aims to identify teachers' perceptions towards the skill-based questions that have been used in LGS since 2018, their characteristics, reasons for change, and their reflections on teachers and students. In service of this aim, answers to the following questions were sought.

1. What are the participants' views on the characteristics of the skill-based questions in LGS?
2. What are the participants' views on the reasons for transition to skill-based questions in LGS?
3. What are the participants' views regarding the reflection of the skill-based questions in LGS on teachers?
4. What are the participants' views regarding the reflection of the skill-based questions in LGS on students?

METHOD

This section presents information regarding the research design, working group, data collection, data analysis, validity and reliability studies.

Research Design

This study employed phenomenological design in accordance with the qualitative research model. The aim of the studies conducted in the phenomenological design is to reveal the meanings people attribute to the phenomenon (Creswell, 2016; Johnson & Christensen, 2012). The phenomenon examined in this study is skill-based questions. In this vein, the present study identified teachers' views regarding the characteristics of the skill-based questions in LGS, the reasons for transition to skill-based questions, their reflection on teachers and students through using the phenomenological design.

Working group

The working group of this study consisted of 14 teachers working in the fields of Mathematics, Turkish, Social Studies, Science, Religious Culture and Moral Knowledge and English in Kahramanmaraş. One of the purposive sampling methods which is widely used in qualitative data collection, criterion sampling method was used for determining the working group (Büyüköztürk, Çakmak, Akgün, Karadeniz, & Demirel, 2018; Yıldırım & Şimşek, 2016). In criterion sampling, criteria that are considered critical for selection are identified (Tavşancıl & Aslan, 2001). The criterion determined in this study was to be a teacher of the courses that have questions in LGS. Besides, great attention was paid to ensure that the teachers had different professional experiences, that there were teachers of all branches with questions in LGS and at least two teachers from the same branch in order to obtain more in-depth and original information from the participants.

Table 1 depicts demographic information regarding the participants.

Table 1. Demographic Information regarding the Participants

		F	Total
Graduation Faculty	Faculty of Education	11	14
	Faculty of Theology	2	
	Faculty of Science and Letters	1	
Gender	Female	9	14
	Male	5	
Seniority	Between 0-5 Years	11	14
	Between 6-10 Years	3	
Age	Between 20-30	12	14
	30 and over	2	
Branch	Mathematics	3	14
	Religious Culture and Moral Knowledge	2	
	Turkish	3	
	Social Sciences	2	
	Science Teaching	2	
	English	2	

Table 1 displays that eleven (78.5%) of the teachers are graduates of education faculty, and three (21.5%) faculty of theology and science and letters. Among the participants, 9 (64.2%) are female and 5 (34.8%) are male teachers. 11 of them have 0-5 years of seniority (78.5%) and 3 have 6-10 years of seniority (21.5%). Twelve (85.7%) of the teachers are between the ages of 20-30, and two (14.2%) over the age of 30. Three (21.4%) of the participants are Mathematics teachers, two (14.2%) Religious Culture and Moral Knowledge, three (21.4%) Turkish, two (14.2%) Social Studies, two (14.2%) Science, two (14.2%) are English teachers.

Data Collection

The data were collected through a semi-structured interview form prepared by the researchers. The form includes nine questions, four of which aim at revealing teachers' views on the characteristics of the skill-based question style, the reasons for transition to skill-based questions, their reflections on teachers and students, while five of them are related to the demographic characteristics.

Data Analysis

Content analysis method was used during data analysis. Analyses were carried out in four stages. The data were coded, the themes were created, the data and codes were organized and the findings were defined and interpreted, respectively (Yıldırım & Şimşek, 2016). The views of two experts were taken during coding process.

Reliability and Validity

Some measures were taken to increase the validity and reliability of the study, and efforts were made to conduct the study in an ethical way (Merriam, 2013). Validity and reliability studies were carried out in terms of the concepts of credibility,

transferability, dependability and confirmability (Yıldırım & Şimşek, 2016). Expert view, researcher collaboration and participant confirmation help to ensure the credibility of the study. An understandable language was used, direct quotations were included, and the findings were visualized for transferability (Çetin & Ünsal, 2020). Data were recorded to ensure confirmability in the study. Besides, the data were coded separately by two different researchers to reach the themes and a common view for dependability.

FINDINGS

This section visually presents findings regarding the research questions.

The first research question is related to the characteristics of skill-based questions. In this regard, Table 2 displays the findings obtained from the interviews.

Table 2. The Characteristics of Skill-Based Questions

Themes	Codes	Participants
The Characteristics of Skill-Based Questions	Developing reading skills	T5, T10, T13
	Selecting students with time management	T4, T5, T6, T13
	Associated with daily life	T3, T11, T13
	Challenging questions	T1, T3
	Measuring high-level skills rather than knowledge	T5, T6, T7, T11, T14
	Being oriented towards interpretation and reading comprehension	T1, T2, T3, T4, T5, T6, T8, T9, T10, T11, T12, T14
	Developing reasoning skills	T3, T4, T6, T9, T11, T13
	Intense content	T1, T4, T6, T8
	Being distinctive	T1, T13

Upon analysing Figure 1, the characteristics of the skill-based questions were identified as developing reading skills (T5,T10,T13), selecting students with time management (T4,T5,S6,T13), associated with daily life (T3,T11,T13), challenging questions (T1,T3), measuring high-level skills rather than knowledge (T5,T6,T7,T11,T14), being oriented towards interpretation and reading comprehension (T1,T2,T3,T4,T5,T6,T8,T9,T10,T11,T12,T14), developing reasoning skills (T3,T4,T6,T9,T11,T13, intense content (T1,T4,T6,T8) and being distinctive (T1,T13).

In terms of developing reading skills, T10 stated that "*Questions about reading comprehension. Even science questions are in a paragraph question style, which means that children are now learning to interpret the paragraph instead of learning knowledge*. T6 shared the view about selecting students with time management as "*students who read, comprehend and apply what they read, and also do good time management…".* In terms of associating with daily life, T11 mentioned that "*since students experience real-life problems during the learning process, they gain skills to solve real-life problems in this process".* T1 emphasized the challenging questions as "*skill-based questions are not really at the secondary school mathematics level, and even sometimes teachers have difficulty"….* Regarding the measurement of high-level skills instead of knowledge, T14 said that *"The previous questions were classical question types that could be solved without the need for high-level mental skills such as understanding, analysis, interpretation, inference, and that a person could memorize knowledge. The current questions measure high-level mental skills, logical reasoning, analysis, interpretation, inference, synthesis, part-whole relationship rather than the knowledge level…*"

As for being oriented towards interpretation and reading comprehension, T12 noted that *"... there are questions about further interpretation and understanding what you read. In addition, there is an increase in graphic interpretation questions."* T4 explained developing reasoning skills as *"skill-based questions, students who read, think, interpret what they read, who make inferences by reasoning, and who produce instant solutions to problems…"*. With regard to the intense content, T4 said, "*The content should be more general and superficial. Some questions are elaborative. We learn them in faculties. It is difficult for children…"*. Regarding its distinctiveness, T13 implied "*to measure students' comprehension, application, analysis, thinking and mental skills along with identifying those who know and who do not...".*

The second research question refers to the reasons for transition to skill-based questions. In this context, Table 3 depicts the findings obtained from the interviews.

Table 3. The Reasons for Transition to Skill-Based Questions

Themes	Category	Codes	Participants
Reasons for transition to skill-based questions	Reasons related to the student	Selecting the successful student	T7
		Getting to know the student	T7
	Preparation for international exams	Preparation for PISA exam	T8, T12, T14
	Using knowledge	Providing permanent learning	T3, T6
		Interpreting knowledge	T1, T2, T6, T10, T12, T14
	Reading skills	Increasing the Significance of Reading	T4, T9, T10
		Reading comprehension	T1, T8, T9, T10, T12, T14
	Thinking skills	Increasing reasoning skills	T6, T8, T14
		Developing higher-order thinking skills	T5, T14, T11, T13
		Multidimensional thinking	T1, T4, T7, T11

Figure 2 presents participants' views on the reasons for transition to skill-based questions; reasons related to students, preparation for international exams, using knowledge, reading skills and thinking skills.

The codes of selecting the successful student (T7) and getting to know the student (T7) emerged under the theme of reasons related to the student. T7 interpreted getting to know the student with such a statement as *"it provides an opportunity for students to explore their different and unknown characteristics".* The theme of preparation for international exams includes the code of compliance with the PISA exam (T8, T12, T14). In this regard, T12 said *"International exams such as PISA involve questions mostly to understand what you read and to measure interpretation level, and unfortunately, our country's average in these types of exams was quite low. The Ministry of National Education realized this situation and changed their question styles to understanding and interpreting what they read…".*

The codes of providing permanent learning (T3,T6) and interpreting knowledge (T1,T2,T6,T10,T12,T14) were gathered under the theme of using knowledge. With regard to providing permanent learning, T3 noted *"to gain an education system that makes the knowledge more permanent in order to change the education system that cannot be internalized due to memorization, forgotten in a short time, and cannot be associated with daily life...".* As for the code of interpreting knowledge, T12 said, *"There are more questions about interpretation and reading comprehension compared to the previous questions. There is also an increase in graphic interpretation questions."*

The theme of reading skills was determined to include the codes such as increasing the significance of reading (T4,T9,T10) and reading comprehension (T1,T8,T9,T10,T12,T14). T9 interpreted increasing the significance of reading as *"Students have become more conscious about the significance of reading books"*. As for the code of reading comprehension, T14 stated *"creating a new generation that can understand what they read and that can make solutions".*

The emerging codes such as increasing the reasoning skills (T6,T8,T14), providing high-level thinking skills (T5,T14,T11,T13), multidimensional thinking (T1,T4,T7,T11) were found to be related to the theme of thinking skills. For increasing the reasoning skills, T6 used the phrase *"skill-based questions do not ask us to train robots, but people with reasoning skills".* T1's view on multidimensional thinking was that *"In fact, these types of questions are prepared for multidimensional and interdisciplinary thinking".*

The third research question sought for the reflections of skill-based questions on teachers. Table 4 depicts the findings obtained from the interviews.

Table 4. Reflections of Skill-Based Questions on Teachers

Themes	Category	Codes	Participants
Reflections of skill-based questions on teachers	Contribution to professional development	Using classroom management effectively	T9, T10
		Opportunity to notice the shortcomings	T13
		Teaching in accordance with constructivism	T5, T13
		Using new methods and techniques	T3, T5, T12
	Causing professional difficulties	Solving questions	T1, T2, T4, T8, T14
		Lack of material	T11
		Cathing up with the curriculum	T1
		Question type	T1, T4, T7, T12

As is seen in Figure 3, the participants' views regarding the reflections of skill-based questions on teachers were determined as contribution to professional development and causing professional difficulties. The theme of contribution to professional

development included the emerging codes such as using classroom management effectively (T9,T10), the opportunity to notice the shortcomings (T13), teaching in accordance with constructivism (T5,T13), using new methods and techniques (T3,T5,T12).

In relation to the effective use of classroom management, T9 expressed "*More attention should be paid to classroom management since the student should listen to the lesson more carefully".* T13 used such a statement to explain the opportunity to see the shortcomings as *"The teacher sees his/her own deficiencies and compensates them".* T5's view on teaching in accordance with constructivism was that "*even a teacher who resisted the constructivist system and who did not want to renew himself/herself with skill-based questions had to keep up with the system."* In addition, T5' view on using new methods and techniques was identified as *"the teacher who thinks about how to improve higher mental skills has started to make an effort and to search for a new method".*

The codes such as solving questions (T1,T2,T4,T8,T14), lack of materials (T11), catching up with the curriculum (T1) and question type (T1,T4,T7,T12) emerged under the theme of causing professional difficulties.

T1's view on solving questions was that *"It is challenging for both the teacher and the student. Catching up with the curriculum, dealing with these questions and trying to understand them in the lesson (I can solve a maximum of 3 questions in one lesson in mathematics) are really challenging".* Regarding the lack of material, T11 said, *"The side of skill-based questions that negatively affects me is the lack of resources. All the ministry does about skills-based questions is to publish 6 questions monthly. Neither the curriculum nor the state books support it …".* As for the difficulties experienced in catching up with the curriculum, T11 mentioned that *"Not only is catching up with the curriculum difficult, but it is also challenging for us to deal with these questions and try to understand them in the class".* T7's view on the difficulties related to question type was *"…skill-based questions are usually for high-level students, leading to difficulties in teaching. I assume that simplification of the questions may be more efficient for both the student and the teacher."*

The fourth research question was related to the reflections of the skill-based questions on students. Thus, the findings obtained from the interviews are presented in Table 5.

Table 5. Reflections of Skill-Based Questions on Students

Themes	Category	Codes	Participants
Reflections of skill-based questions on students	In terms of learning skills	Making knowledge meaningful	T1,T9,T11
		Increasing commenting skills	T6,T8,T9,T12,T13
		Reading comprehension	T2,T4,T9,T13
		Graphic interpretation	T5,T12,T13
	Psychologically	Getting bored in class	T10
		The feeling of failure	T1,T2
		Experiencing a sense of achievement	T9
	In terms of mental skills	Developing high-level mental skills	T1,T3,T5,T11
		Developing problem solving skills	T7,T9

As in Figure 4, the participants' views regarding the reflections of the skill-based questions on the students were gathered under the themes of learning skills, psychologically and mental skills. The theme of learning skills holds the codes such as making knowledge meaningful (T1,T9,T11), increasing commenting skills (T6,T8,T9,T12,T13), reading comprehension (T2,T4,T9,T13) and graphic interpretation (T5,T12,T13).

T1' view on making knowledge meaningful was *"skill-based questions are high-level questions to measure knowledge of more than one subject. First comes a story and explanation part, followed by a question. It is unlikely to solve the questions without reading comprehension, interpretation and a good command of subject."* With regard to increasing commenting skills, T12 implicated that *"Being more open-ended and open to interpretation increases the student's interpretation skills".* Regarding the reading comprehension skill, T13 said *"Contributing to the students' reading and comprehension skills. Even if it is a math question, it improves understanding what you read, finding what is asked and developing cognitive skills".* As to graphic interpretation, T13 used the expression *"supporting with visuals reveals the students' visual learning potential ".*

The theme of psychological aspects involves the codes of getting bored in the lesson (T10), feeling of failure (T1,T2 and experiencing a sense of achievement (T9).

T10' view on getting bored in the lesson was determined as such *"The students want to have break time more than the lesson. They get bored in the lesson as the subjects are intense".* With reference to the feeling of failure, T1 said, *"It causes a feeling of fear, prejudice and failure. It also leads to hopelessness and learned helplessness."* T9's view on experiencing a sense of achievement was that *"skill-based questions help students to feel success by breaking the judgment of "I can't do anything". Thus, the learned helplessness of the students gradually disappears."* When it comes to mental skills, the codes of developing mental skills (T1,T3,T5,T11) and developing problem solving skills (T7,T9) emerged. As regards problem solving skills, T7 noted that *"skill-based questions contribute to students' problem solving skills".*

DISCUSSION, RESULT AND RECOMMENDATIONS

This study attempts to examine teachers' views on the characteristics of the skill-based questions that have been used in LGS since the 2017-2018 academic year, the reasons for transition to skill-based questions, and their reflections on teachers and students.

This study revealed that skill-based questions developed students' reading skills and helped to understand what they read. This result of the study is congruent with that of Batur et al., (2019)'s study, indicating that LGS differs from other exams as it requires speed reading and reading comprehension skills. This study also concluded that the students who used time well and had time management in skill-based questions were successful, while those who couldn't manage time failed in completing the questions within the given time. This result is in conjunction with that of Güler et al. (2019)'s study, referring that the students have time problems as 2018 LGS questions are long and challenging, and thus the duration of the exam is increased. The study conducted by Çakıoğlu (2019) confirmed that students have problems in completing the exam within the given time as mathematical questions require many operations and the number of Turkish texts and paragraph questions are long.

The present study suggested that skill-based questions distinguish students who know and those who do not. On the distinctive characteristics of skill-based questions, Güler et al. (2019) found that skill-based questions in 2018 LGS distinguish successful and unsuccessful students as well as intelligent, fast, practical and analytical thinking students.

The results showed that skill-based questions couldn't be solved by heart, and that these questions measured higher-level thinking skills. This result is in line with that of Biber, Tuna, Uysal, and Kabuklu (2018), demonstrating that LGS questions are more distinctive than TEOG questions, and students can be trained in order not to memorize but to interpret and use knowledge with the renewed exam system. The statement that the questions in the 2018 secondary education transition directive in MoNE will measure high-level skills such as reading comprehension, interpretation, inference, problem solving, analysis, critical thinking, and scientific process skills supports the result of the current study.

A significant characteristic of skill-based questions is that they make the lesson pleasing and entertaining when enriched with materials in the learning process. A similar finding emerged in the study carried out by Akıncı (2019). Accordingly, teachers use various methods such as gamification and drama by making use of visual and auditory materials in order to ensure permanent learning.

Participants implied that the reason for the change in the question type was the preparation for international exams. Indeed, numerous research results outlined that the previous questions in LGS exams were at the level of knowledge and comprehension, and that they were incompatible with international exams such as PISA (Aşıcı, Baysal, & Erkan, 2012: Batur & Alevli, 2014: Batur & Ulutaş, 2013). However, skill-based questions include more high-level thinking skills, they require logic and reasoning, and they are related to daily life, which may be an effort to prepare for international exams.

Teachers also stated that skill-based questions provided an opportunity to notice their deficiencies, and that they needed professional development to overcome these deficiencies. This result of the study is in conjunction with that of Çetin and Ünsal's (2019) study, showing that central exams provide teachers an opportunity to see their shortcomings and to feel the need for constant renewal and self-update. Thus, it is most likely that LGS exam, including skill-based questions, contributes to the teachers' professional development. Cizek (2001) noted that central exams have a positive effect on teachers and endorse their professional development.

The participants certified that they learned and started to apply new methods and techniques appropriate for the constructivist educational approach while they were solving skill-based questions, which supported their professional development and contributed to the increase in the students' achievement. Likewise, Çetin and Ünsal (2019) announced that central exams make teachers seek for new methods and techniques. It may be wise to mention that they perform the education and training activities in order to adapt to the transition to skill-based questions.

The current study found that the resources for skill-based questions were insufficient and the content of the books was incompatible with skill-based questions. Similarly, the results of many studies on the textbooks in Turkey unveiled that the scope and structure of the questions in the central exams do not match the ones in the textbooks, that the textbooks are insufficient to prepare them for the central exams, and that the variety and quality of the questions are inadequate (Arslan and Özpınar, 2009; Gün, 2009; Karakelleoğlu, 2007: Özmantar, Dapgın, Çırak Kurt, İlgün, 2017).

The fact that students are prepared for international exams with skill-based questions, interpret knowledge rather than memorizing, establish an analytical relationship between the subjects, and teachers' professional development efforts is acknowledged as positive aspects, while textbooks' lack of quality to support skill-based questions can be considered as a situation open to criticism. Besides, teachers signified that they could not overcome the problems regarding the lack of resources due to the prohibition of additional resource purchase. Although the Ministry of National Education has banned the purchasing of additional resources in public schools for a number of reasons, there is no restriction in private schools. As indicated by Ünsal and Çetin (2019a), it offers an advantage for students learning at private schools to be more successful in central exams, yet it can turn into a disadvantage for students studying in public schools.

A significant professional challenge that teachers encountered was the inadequacy of lesson time to solve skill-based questions. Likewise, Akıncı (2019) concluded that the teachers could not solve enough questions to reinforce the subjects due to the insufficient duration of the lesson. It seems unlikely that the difficulty related to insufficient course duration can be overcome

by increasing the course hours since extra course hours are considered as a problem in the Turkish education system (Özenç, Özcan, Güçlü, & Güney 2016; Şener, 2018). Another way to overcome this difficulty may be increasing teachers' mastery skills in the teaching process and making pre-lesson preparation more effective.

The study results highlighted that skill-based questions had positive and negative effects on students psychologically. The factor that determines this effect is the students' academic achievement. The questions appeal to academically successful students by affecting them positively. However, students with low academic achievement feel a sense of failure and experience learned helplessness as they fail in solving the questions. Similar results emerged in some studies (Akıncı, 2019 and Çakıoğlu, 2019). Support and training course initiated by the Ministry of National Education may provide an important support for students with low academic achievement. Because, as stated by Ünsal and Korkmaz (2016), support and training courses provide students with question-solving skills. Moreover, students' interest in support and training courses can be increased through different activities (Biber, et al., 2018). In line with the results of the study, skill-based questions may be said to have many positive reflections on both the student, the teacher and the education system, still it negatively affects especially the students with low academic achievement and makes teachers face some professional difficulties. Based on the findings, various recommendations were provided:

Considering that students with low academic achievement are adversely affected by skill-based questions, guidance services may be used more effectively for these students.

The content and activities of MoNE resources may be revised to be compatible with skill-based questions.

Alternative plans may be prepared to address the need for additional resources appropriate to skill-based questions.

In-service training courses may be organized to meet teachers' needs after determining their professional development needs for skill-based questions.

This study employed qualitative research design. Quantitative studies may be conducted with a larger sample group.

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We hereby declare that the study has not unethical issues and that research and publication ethics have been observed carefully

Researchers' contribution rate

The first author played an active role in writing the conceptual framework and discussion conclusions of the research, and the second author played an active role in the data collection and analysis process.

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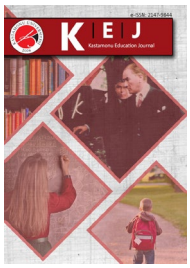

|Research Article / Araştırma Makalesi|

Turkey's Analysis of Cyberbullying and Cyber Victimization of Students in Turkey in Terms of Demographic Variables by Meta-Analysis Method

Türkiye'de Öğrencilerin Siber Zorbalık ve Siber Mağduriyetinin Demografik Değişkenler Açısından Meta-Analiz Yöntemiyle İncelenmesi

Yılmaz SARIER[1]

Keywords

1. cyberbullies
2. cyber victims
3. cyberbullying
4. cyber victimization
5. meta-analysis

Anahtar Kelimeler

1. siber zorba
2. siber mağdur
3. siber zorbalık
4. siber mağduriyet
5. meta-analiz

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Abstract

Purpose: Today, as a result of long-term, unsupervised and unconscious use of students' informatics and communication tools, it is seen that there is a very rapid increase in the number of cyberbullying and cyber victimization incidents. The purpose of this study is to investigate the effects of some demographic variables (gender, grade level, mother education level, and father education level and parent coexistence) in secondary school and high school students in being cyberbully and victim by meta-analysis method.

Design/Methodology/Approach: YOK thesis center and dergipark databases have been screened by the keywords of "cyberbullying", "cyber victimization", "cyberbullying", "virtual victimization" and 37 suitable studies have been reached. The studies included in the research were analyzed by meta-analysis method.

Findings: As a result of the study; ıt was found that male students in Turkey to female students, 8. Grade to 5. grade students t students whose parents were graduate to undergraduates, students whose parents were separated from each other than students whose parents were cohabiting were more likely to be cyber bullies and cyber victims.

Highlights: Families should take close care of their children, especially during adolescence, spend qualified time with them and supervise their time of use of Information Technology. Cyber bullying and cyber victimization are more common in students as grade levels rise, in this context students should be regularly informed about safe and responsible internet use, how to use its tools efficiently and effectively, and about cyber bullying and cyber victimization starting in primary school years.

Öz

Çalışmanın amacı: Günümüzde öğrencilerin, bilişim ve iletişim araçlarını uzun süreli, denetimsiz ve bilinçsiz kullanmaları sonucunda siber zorbalık ve siber mağduriyet olaylarının sayısında çok hızlı bir artışın olduğu görülmektedir. Bu araştırmanın amacı, ortaokul ve lise öğrencilerinin siber zorba ve mağdur olmalarında bazı demografik değişkenlerin (cinsiyet, sınıf düzeyi, anne eğitim durumu, baba eğitim durumu ve ebeveyn birlikte yaşama durumu) etkilerinin meta-analiz yöntemiyle incelenmesidir.

Materyal ve Yöntem: Türkiye'de konuyla ilgili yapılmış çalışmalar, YÖK tez merkezi ve DergiPark veri tabanları üzerinden "siber zorbalık", "siber mağduriyet", "sanal zorbalık", "sanal mağduriyet" anahtar kelimeleri ile taranmış, siber zorbalık ve mağduriyet bağlamında gerçekleştirilmiş, araştırmanın amacına uygun 37 çalışmaya ulaşılmıştır. Araştırma kapsamına alınan çalışmalar, meta-analiz yöntemiyle analiz edilmiştir.

Bulgular: Çalışma sonucunda; Türkiye'de erkek öğrencilerin kız öğrencilere, 8. sınıf öğrencilerinin 5. sınıf öğrencilerine, ebeveyni lisans mezunu olan öğrencilerin ebeveyni ilkokul mezunu öğrencilere, ebeveynleri birbirinden ayrı yaşayan öğrencilerin ebeveynleri birlikte yaşayan öğrencilere oranla daha fazla siber zorba ve siber mağdur oldukları anlaşılmıştır.

Önemli Vurgular: Aileler özellikle ergenlik döneminde çocuklarıyla yakından ilgilenmeli, onlarla nitelikli zaman geçirmeli ve bilişim teknolojilerini kullanma sürelerini denetlemelidirler. Siber zorbalık ve siber mağduriyet öğrencilerde sınıf düzeyi yükseldikçe daha fazla görülmektedir, bu bağlamda öğrenciler güvenli ve sorumlu internet kullanımı, bilişim araçlarının nasıl verimli ve etkin kullanılacağı, siber zorbalık ve siber mağduriyet konularında ilkokul yıllarından başlayarak her yıl düzenli olarak bilgilendirilmelidir.

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INTRODUCTION

As a result of technological developments and advances, the use of information tools has become widespread among all individuals, especially among young people. According to the data of the Turkish Statistical Institute (TÜİK), internet access of households in Turkey -it was 41.6% in 2010, 69.5% in 2015- was determined as 88.3% in 2019. In 2018, it was determined that 97.8% of the houses had at least one smart phone. (TÜİK, 2020). While information and communication technologies make it easier for individuals to reach wisdom and communicate with people, they also create new problems. One of the most important of these problems is cyberbullying. As a result of using information and communication technologies for a long time and without the supervision of their parents, children and young people are faced with cyberbullying (Li, 2008; Soydaş Karlıer, 2011).

Willard (2005) described cyberbullying, which has started to be talked about more than peer bullying in recent years, as deliberately sending harmful and unwanted messages or photos to other people using the internet and communication tools while Shariff (2008) defined as websites, instant messaging, blogs, chat rooms, mobile phones threatening, humiliating or sending sexually explicit pictures and messages to other individuals via phones, e-mails and personal online profiles. The main features that distinguish cyberbullying from traditional bullying are that the individual who engages in bullying can hide himself, does not require physical strength, can be easily reached to the victim, has a wide range of influence, can be easily put under pressure, can be done anywhere, at any time of the day, not just at school (Campbell, 2005; Shariff, 2008; Li, Cross and Smith, 2012).

It is stated that cyberbullying behaviors are frequently exhibited by individuals due to reasons such as the desire to establish control over other individuals, to take pleasure from aggressive behaviors, to gain respectability in the circle of friends, to take revenge, to be less likely to be caught compared to peer bullying, and not to communicate with the victim face to face (Kowalski, Limber ve Agaston, 2008). It was stated that students mostly resort to cyberbullying because of jealousy and envy, and they also show cyberbullying behaviors with the feeling of taking the victim out of the group or taking revenge on him (Hoff and Mitchell, 2009).

Individuals who are exposed to bullying behaviors and harmed by means of technological tools are considered as cyber victims (Betts, 2015). Unlike traditional bullying, in cases of cyberbullying, the effects of cyberbullying may be different, as there is no physical exposure to an action (Watts, et al. 2017). Exposure to cyberbullying often negatively affects the individual socially, emotionally, and psychologically (Şahin, Aydın and Sarı, 2012). It has been stated that students who are cyberbullied feel bad (Hunter, 2012), angry and anxious (Beran and Li, 2005) , experience feelings of exclusion and helplessness (Patchin and Hinduja, 2006), cannot establish social relationships (Tokunaga, 2010), have a high rate of committing crimes (Mitchell et al. 2007), do not want to go to school (Raskauskas & Stoltz, 2007), can not succeed in school and have decreased engagement levels (Schneider et al. 2012), experience many problems that can even reach the level of suicide (Hinduja and Patchin, 2009). Kestel and Akbıyık (2016) imlied that cyber victims of secondary school students experienced feelings of fear, anger and uneasiness and avoided sharing the negative situations they experienced with their environment. Cyberbullying on young people; Negative effects such as resorting to violence, depression, substance abuse, self-harm, suicidal thoughts and suicide have been observed (Perry, 2015).

Many recent studies have emphasized that cyberbullying is a common problem for schools all over the world. (Li, 2008: Raskauskas and Stoltz, 2007). It has been found that cyberbullying incidents in schools have increased in recent years and the rates of cyberbullying differ from country to country (5.1% - 41.4%) (Cantone vd., 2015). As a result of the study conducted by Hinduja and Patchin (2017) in primary and high schools in the United States in 2016, it was determined that the rate of encountering cyber victimization at least once in their lives was 33.8%. Similar to the rest of the world, cyberbullying incidents have increased rapidly in Turkey in recent years. As a result of the study conducted by Eroğlu and Peker (2015) with high school students, the rate of students who are cyberbullies is 9%, the rate of students who are cyber victims is 7%, and the rate of students who are both cyberbullies and cyber victims is 72.2%. In another study, it was stated that 65.5% of adolescents experienced cyber victimization and 56.6% showed cyberbullying behaviors (Uludaşdemir, 2017).

Beale and Hall (2007) reported that it was experienced less in primary school, that it started to rise in secondary school and reached its peak in high school. Cyberbullying incidents in schools are seen as an important problem in many countries. The widespread use of the internet and smart phones in school applications, the fact that students are busy with information and communication technology tools in a very important part of their time and frequently resort to bullying reveal the necessity of examining the issue of cyberbullying as a type of violence in schools.

Researches on cyberbullying are of great importance in reducing the cases of cyberbullying and victimization in schools, in providing children and young people with the skills to cope with negative situations, and in using technology more effectively and safely. It is thought that examining the cases of cyber bullying and victimization, which has become an increasingly common problem both in the world and in Turkey, with extensive research will make an important contribution to the literature and practice. When the literature on the subject in Turkey is examined, it has been observed that the negative situations and prevalence of cyberbullying are frequently investigated with various variables such as gender, age, school type, class level, family attitude, parent education level, parental cohabitation status (Ciminli, 2016; Gencer, 2017; Öztürk, 2019; Sabancı, 2018; Tuğ Karoğlu and Çılğın, 2020). Examining cyberbullying, which is one of the most important problems that may occur in children and

young people, is considered important for Turkey, which has a dense young population. In this context, it is aimed to contribute to a clearer view of the big picture in Turkey by combining the results of studies that reveal the relationship between cyberbullying and victimization with different demographic variables, using the meta-analysis method. It is hoped that the results of this research will supply valuable information to families, educators, experts and researchers about the cyberbullying of secondary and high school students. In this context, the aim of the research is to examine the effects of some demographic variables (gender, grade level, mother's education level, father's education level and parental cohabitation status) on the cyberbullying and victimization of secondary and high school students by meta-analysis method.

METHOD

In this part of the study, the research model, data collection process and data analysis process are presented.

Research Model

This research was designed with the meta-analysis method. The meta-analysis, which is a quantitative method, is the statistical analysis of the data from independent primary studiesstatistically combine the results of the studies produced in the literature on the subject under investigation (Cooper et al. 2009). This method offers researchers the opportunity to summarize the results of various studies and reach a common judgment (Chin, 2007). It has been determined that the data used in the research can be accessed from scientific publications, theses and articles that have appropriate data for meta-analysis have been included in the study. In the study, YÖK thesis database and DergiPark platform were used to reach publications examining students' cyberbullying and victimization levels in terms of various demographic variables. A search was conducted using their English language, and a total of 89 publications related to the research were reached. After examining the studies obtained from the databases, the criteria for including the publications in the meta-analysis were determined as follows; 1. It must be produced in secondary and high schools in Turkey until 01.01.2020. 2. The studies should contain the statistical information (arithmetic mean, standard deviation and number of samples) necessary to calculate the effect size. 3. Access to the full text of the publication 5. Examining at least one of the demographic variables examined in the study (gender, education level, parent education level and parental cohabitation). Inclusion criteria were considered and 37 studies were deemed appropriate to be included in the meta-analysis. The flowchart of the inclusion process of the studies in the meta-analysis study is shown in Figure 1.

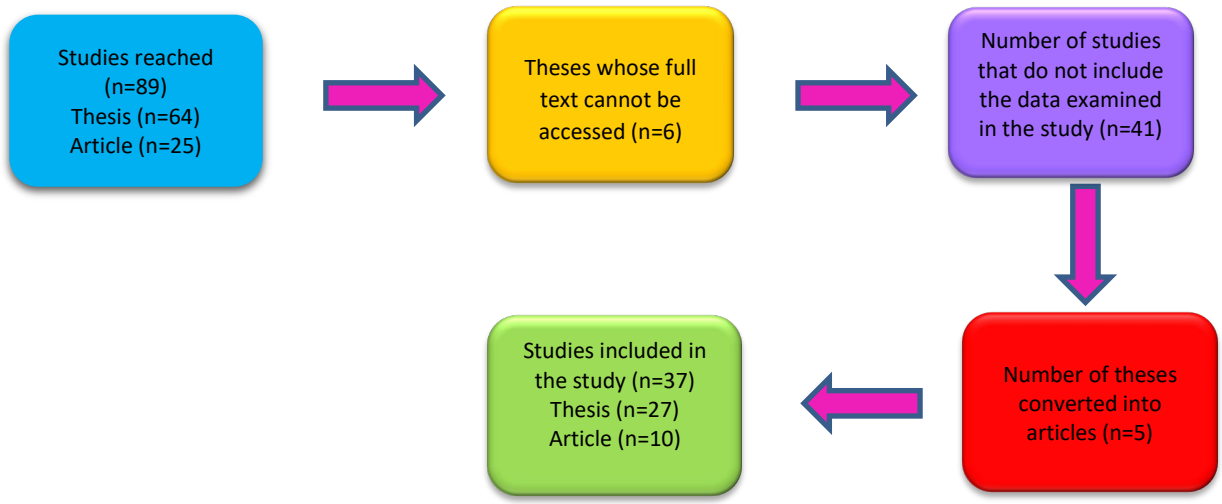

Figure 1. Flow chart

When Figure 1 is examined, it is seen that 89 publications were reached in the study. As a result of the evaluation according to the inclusion criteria, a total of 37 studies, 27 of which were thesis and 10 of which were articles, were included in the study in the last case, and the analyzes were carried out using these studies.

Sample of the Research

The information of 37 studies included in the study was coded according to certain categories (author's name, publication year, number of samples, education level, region of study, mean, standard deviation and sample) using Microsoft Office Excel program. Thus, a coding form containing information about the studies was created. The data included in the study within the framework of the meta-analysis inclusion criteria are presented in Table 1. Table 1 shows the number of these studies, their demographic characteristics and sample sizes.

Table 1. Descriptive statistics of the studies reviewed

Publication year of production								
2010	2012	2013	2014	2015	2016	2017	2018	2019
1	4	5	3	8	6	1	6	3

Geographical region of the study						
Marmara	İç Anadolu	Karadeniz	Akdeniz	Ege	Doğu Anadolu	Güneydoğu Anadolu
22	5	1	1	1	3	3

Release type		**Education Level**	
Thesis	Article	Secondary school	High school
27	10	12	25

		Gender		**Grade (Secondary School)**			**Grade (High School)**		
	n	Male	Female	n	5. sınıf	8. sınıf	n	9. sınıf	12. sınıf
Cyberbullying	35	12479	13324	6	2361	1739	12	2008	1444
Cyber Victimization	23	9289	10125	4	2225	1519	8	1834	1417

		Mother education			**Father education**			**Parent cohabitation**	
	n	University Education	Primary Education	n	University Education	Primary Education	n	Separated parent	Co-parent
Cyberbullying	13	1547	3490	13	2431	2692	9	762	9135
Cyber Victimization	8	968	2316	8	1628	1916	7	675	7092

When Table 1 is examined, it is seen that the highest number of (8) studies were produced in 2015 and 2018. The highest number of studies were produced in the Marmara region, and it was also observed that at least one study was conducted from each region of Turkey. 27 of the examined studies are in the type of thesis and 10 of them are in the type of article. It was seen that 25 of the studies were produced in high schools and 12 of them were in secondary schools. 35 studies were produced for the gender variable for cyberbullying and 23 studies for the cyber victimization and gender variable. While the number of mothers with a primary school education level was 3490, the number of mothers with a bachelor's degree was 1547. For the father's education level, the number of undergraduate and primary school graduate parents was determined to be closer to each other.

Data analysis

In the meta-analysis process, analysis is performed using fixed and random effects models. The fixed effects model calculates all studies with the same degree of impact and weights based on the number of observations given in the study samples (Borenstein, et al. 2009). The random effects model is based on the assumption that the studies examined cannot reach equal results and may be representative of random samples (Cooper et al. 2009). In this model, the effect size value differs due to some demographic characteristics of the samples (Cooper et al. 2009), and this method allows generalization to larger populations (Card, 2011). In meta-analysis studies using published studies as data, the random effects model is recommended (Hunter and Schmidt, 2000; Borenstein et al. 2009). Heterogeneity tests are applied in the model determination process. Meta-analysis was performed using the Comprehensive Meta-Analysis program.

The main purpose of meta-analysis is to calculate the effect size value, which determines the direction and strength of the relationship between two variables (Card, 2011). The effect size value is the basic unit of meta-analysis studies and is the measurement value that shows the size of the relationship between two variables or the application differences. In meta-analysis studies, the effect sizes of the studies examined are calculated separately, and the analysis is made with the help of the calculated values to find the overall effect (Borenstein et al. 2009). In the calculation of the overall effect size value in the study, the mean, standard deviation and sample number values in the studies examined were used. This effect value is used in the comparison of independent group means (Hedges & Olkin, 1985). In this study, the difference between the standardized means (Hedges g index) was calculated as the effect size index and the confidence interval was determined as 95%. For the gender variable in the study, boys as the experimental group and girls as the control group; for the grade level variable, 8th and 12th grade students as the experimental group, 5th and 9th grade students as the control group; for the parents education level variable, those with a bachelor's degree as the experimental group and primary school graduates as the control group; for the variable of parent cohabitation status, parents living separately as the experimental group and living together as the control group were included. A positive effect size in all groups indicates an effect in favor of the experimental group and a negative effect in favor of the control group. In the study, in the interpretation of effect size values, Thalheimer and Cook's (2002) classification $-.15 \leq d < .15$ insignificant; $.15 \leq d < .40$ small effect; $.40 \leq d < .75$ moderate effect; $.75 \leq d < 1.10$ large effect; $1.10 \leq d < 1.45$ extremely large; $1.45 \leq d$ strong effect) was used. During the analysis process, general effect size values were found, and heterogeneity and publication bias analyzes were also made with different methods.

In the study, heterogeneity test was applied to determine the method to be used before data analysis. The level of heterogeneity can be determined by examining the Q, p and I^2 values. If the p value is less than or equal to .05, it is understood that the studies are heterogeneous. In addition, if the I^2 value is less than 25%, the level of heterogeneity is low, if it is 50%, the level of heterogeneity is medium, and if it is greater than 75%, the level of heterogeneity is classified as high (Cooper et al., 2009; Higgins and Thompson, 2002; Pigott, 2012). The results obtained by calculating the Q-test showing the heterogeneity of

the effect sizes of the studies in the meta-analysis and the I^2 value indicating the level of heterogeneity according to the fixed effects model are shown in Table 2.

Table 2. Heterogeneity test results according to the fixed effects model

			K	Degrees of freedom	Q	p	I^2
Cyberbullying	Gender	Male/ Female	35	34	197.37	.00	82.77
	Class	5th grade / 8th grade	6	5	15.84	.01	68.44
		9th grade / 12th grade	12	11	11.21	.42	1.91
	Mother education	University / Primary School	13	12	284.81	.00	95.78
	Father education	University / Primary School	13	12	38.49	.00	68.83
	Parent cohabitation	Co-parent / Separated parent	9	8	29.92	.00	73.26
Cyber Victimization	Gender	Male/ Female	23	22	132.14	.00	83.35
	Class	5th grade / 8th grade	4	3	50.26	.00	94.03
		9th grade / 12th grade	8	7	14.44	.07	44.63
	Mother education	University / Primary School	8	7	19.61	.00	64.29
	Father education	University / Primary School	8	7	26.54	.00	73.62
	Parent cohabitation	Co-parent / Separated parent	7	6	38.14	.00	84.27

According to Table 2, since the I^2 value was calculated as greater than 50% for the variables of gender, mother education, father education, and parental association, medium and high heterogeneity was found, and low heterogeneity was determined for the class variable. It was determined that there was moderate and high level of heterogeneity in the research and it was concluded that it would be appropriate to use a random effects model in the study.

In the study, the publication process (before 2006, the year 2016 and later) and education level (secondary and high school) variables, which are thought to cause differences in the mean effect sizes according to the random effects model, were determined as moderator variables and the analyzes were made using them. Moderator analyzes are performed to determine whether the coded study characteristics (eg year of publication, sample region, study type, etc.) cause differences in effect sizes as a predictor (Card, 2011). In meta-analysis, moderator analysis is planned in line with the purpose of the study and the research process is implemented according to this plan (Littell et al. 2008). The statistical significance of the difference between the moderator variables can be tested with the Q_b value (Hedges and Olkin, 1985). In this method, Q_b tests the homogeneity between groups (Borenstein et al. 2009; Hedges and Olkin, 1985). In the research, evaluations were made by using the Q_b and p significance values in the moderator analysis. In the study, analyzes of publication bias were also made.

Publication bias is based on the possibility that the publications examined within the scope of the research may not be representative of all studies (Rothstein et al. 2005). Inclusion of only statistically significant publications in a meta-analysis study may cause publication bias (Borenstein et al. 2009). Different analysis methods are used to determine publication bias. Funnel Scatterplots are the most widely used of these methods, and then different methods such as Duval and Tweedie's cut and add with Egger's Linear Regression test are used. In this study, Funnel Scatterplots were created in terms of gender variable in order to test publication bias. Then, Duval-Tweedie cut and add with Egger Linear Regression tests were performed. The Funnel Scatterplot showing the gender difference causing publication bias in cyberbully is presented in Figure 2 below.

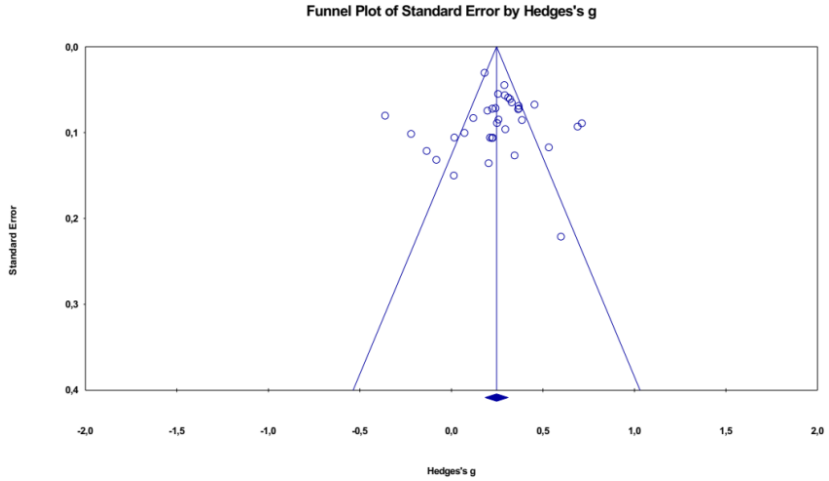

Figure 2. Funnel scatterplot regarding the effect of gender on cyberbullying

In Figure 2, it was seen that the majority of 35 studies included in the study were located at the top of the figure and close to the effect size value. The fact that the studies examined spread symmetrically on both sides of the vertical line showing the overall effect size is an indication of the absence of publication bias (Borenstein et al. 2009). The fact that most of the studies were collected in the lower part of the funnel shape and/or only part of the vertical line indicates publication bias. The resulting

funnel scatter plot showed that there was no publication bias in terms of the studies examined. In Table 3, data on Duval-Tweedie cut and add with Egger Linear Regression tests performed to examine publication bias are presented.

Table 3. Publication bias test data for cyberbullying-examined variables

	Variable		Duval and the Tweedie Method		Egger Regression
			Trimmed Study	Observed/Adjusted	Test (2 tails)
Cyberbullying	Gender	Male/ Female	3	.24 / .21	p=.86
	Class	5th grade / 8th grade	3	.31/ .18	p=.04
		9th grade / 12th grade	4	.05/ .09	p=.06
	Mother education	University / Primary School	1	.17 / .16	p=.62
	Father education	University / Primary School	2	.13 / .07	p=.36
	Parent cohabitation	Co-parent / Separated parent	4	.21 / .03	p=.38

Table 3 shows the data obtained as a result of the Duval-Tweedie cut and add method. This method shows the number of publications that need to be cut to correct the asymmetrical situation in the funnel scatterplot and recalculates the effect size value after the interrupted study. The high difference between the observed value and the corrected value is interpreted as a possible publication bias (Card, 2011). In this study, since the difference between the observed value and the corrected value for the four variables was not statistically significant, it was concluded that there was no publication bias in the study. This means that the effect size of the studies included in the research is symmetrically distributed on both sides of the overall effect size, so there is no publication bias. The difference between the 5th and 8th grades in the grade level variable is high and shows that there may be publication bias. The fact that the Egger regression test was not significant (p>.05) indicates that there is no publication bias in the study (Klassen and Tze, 2014). The p values found in this study showed that there was no publication bias for the variables of gender, mother education, father education, parent association. The Funnel Scatterplot showing the gender difference causing publication bias in cyber victimization is presented in Figure 3 below.

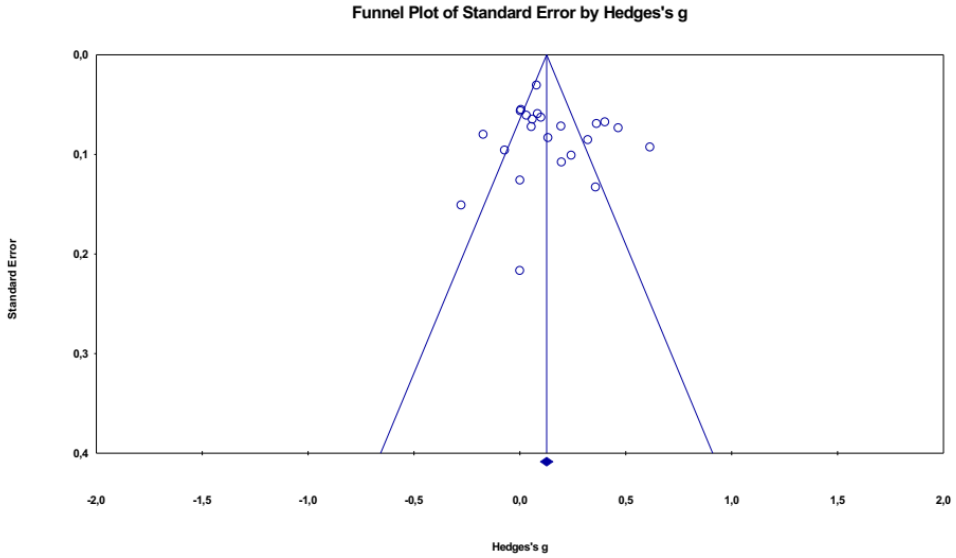

Figure 2. Funnel scatterplot on the effect of gender on cyber victimization

In Figure 3, it is seen that the majority of the 23 publications included in the study are at the top of the figure and are close to the overall effect size value. This Funnel Scatterplot showed no publication bias for the studies reviewed. In Table 4, data on Duval-Tweedie cut and add and Egger Linear Regression tests performed to examine publication bias are presented.

Table 4. Cyber victimization-publication bias test data for the variables examined

	Variable		Duval and the Tweedie Method		Egger Regression
			Trimmed Study	Observed/Adjusted	Test (2 tails)
Cyber Victimization	Gender	Male/ Female	1	.12 / .13	p=.44
	Class	5th grade / 8th grade	2	.19 / .13	p=.01
		9th grade / 12th grade	1	.12 / .09	p=.75
	Mother education	University / Primary School	3	.16 / .25	p=.53
	Father education	University / Primary School	1	.16 / .11	p=.97
	Parent cohabitation	Co-parent / Separated parent	1	.18 / .23	p=.65

Table 4 presents the data found in the Duval-Tweedie cut and add method, which was used to test the publication bias for the variables examined with cyber victimization. In this study, it was concluded that there was no publication bias in the study, since the difference between the observed value for the four variables and the value found after correction was not significant. This means that the effect size of the studies included in the research is symmetrically distributed on both sides of the overall effect size, so there is no publication bias. The difference between the 5th and 8th grades in the grade level variable was high,

indicating that there may be publication bias. In this study, the p values obtained as a result of the Egger regression test showed that there was no publication bias for four variables (gender, mother education, father education, parent association).

RESULTS

The meta-analysis findings regarding the effects of gender, grade level, mother and father education level, and parent cohabitation variables on students' cyberbullies and cyber victims in Turkey are given in this section. Thalheimer and Cook's (2002) classification, which was cited in the method section, was used to interpret the mean effect size. In Table 5, meta-analysis findings regarding the effect of gender variable on students' cyberbullying and cyber victimization are presented.

Table 5. The effect of gender on cyberbullying and cyber victimization

	k	n	Mean effect size (ES)	95% Confidence Interval		z	p
				Lower Limit	Upper Limit		
Cyberbullying	35	25803	.247	.184	.309	7.726	.000*
Cyber Victimization	23	19914	.144	.070	.218	3.824	.000*

According to the meta-analysis results conducted with 35 studies shown in Table 5, the mean effect size value of gender on cyberbullying was calculated between the limits of .184 and .309 (ES: .247) at the 95% confidence interval. Calculated impact valu showed that the effect was significant (z=7.726; p=.000) but small, and that male students did more cyberbullying than female students. According to the meta-analysis results of 23 studies, the mean effect size of gender on cyber victimization was calculated between .070 and .218 limits (ES: .144) at the 95% confidence interval. Calculated impact value showed that the effect was significant (z=3.824; p=.000) and too small, and that male students were victims of cyberbullying relatively more than female students. In Table 6, meta-analysis findings regarding the effect of secondary school grade level (8th and 5th grade) on students' cyberbullying and cyber victimization are presented.

Table 6. The effect of secondary school grade level (8th and 5th grade) on cyberbullying and cyber victimization

	k	n	Mean effect size (ES)	95% Confidence Interval		z	p
				Lower Limit	Upper Limit		
Cyberbullying	6	4100	.317	.176	.458	4.414	.000*
Cyber Victimization	4	3744	.192	-.135	.520	1.151	.250

According to the meta-analysis results given in Table 6, the mean effect size value of the secondary school grade level (8th grade and 5th grade) on cyberbullying was calculated between .176 and .458 limits (ES: .317) at the 95% confidence interval. . Calculated impact value showed that the effect was significant (z=4.414; p=.000) but small, and that 8th grade students did more cyberbullying than 5th grade students. According to the results of the meta-analysis conducted with 4 studies, the average effect size value of the class level (8th and 5th grades) on cyber victimization was calculated between -.135 and .520 limits (ES: .192) in the 95% confidence interval. Calculated impact value; showed that the effect was not significant (z=1.151; p=.250) and was insignificant. Table 7 presents the findings regarding the effect of high school grade level on students' cyberbullying and cyber victimization.

Table 7. The effect of high school grade (12th and 9th grades) on cyberbullying and cyber victimization

	k	n	Mean effect size (ES)	95% Confidence Interval		z	p
				Lower Limit	Upper Limit		
Cyberbullying	11	3452	.056	-.014	.125	1.560	.109
Cyber Victimization	9	3251	.122	.022	.221	2.399	.016*

According to the meta-analysis results given in Table 7, the mean effect size value of high school class level (12th grade and 9th grade) on cyberbullying is between -.014 and .125 limits at the 95% confidence interval (ES: .056). calculated. Calculated impact value; showed that the effect was not significant (z=1,560; p=.109) and insignificant. According to the results of the meta-analysis conducted with 9 studies, the mean effect size value of the class level (12th class and 9th class) on cyber victimization was calculated between .022 and .221 limits (ES: .122) at the 95% confidence interval. Calculated impact value showed that the effect was significant (z=2.399; p=.016) and small and 12th grade students were exposed to cyberbullying relatively more than 9th grade students. In Table 8, meta-analysis findings regarding the effect of maternal education (undergraduate and primary school) on students' cyberbullying and cyber victimization are presented.

According to Table 8, according to the results of the meta-analysis conducted with 13 studies, the mean effect size of the mother's education status on cyberbullying was calculated between the limits of .044 and .311 (ES: .177) at the 95% confidence interval. Calculated impact value showed that the effect was significant (z=2.609; p=.009) and at a small effect, and students whose mothers were undergraduates did more cyberbullying than those whose mothers were primary school graduates.

Table 8. The effect of maternal education status on cyberbullying and cyber victimization

	k	n	Mean effect size (ES)	95% Confidence Interval		z	p
				Lower Limit	Upper Limit		
Cyberbullying	13	5037	.177	.044	.311	2.609	.009*
Cyber Victimization	8	3284	.180	.102	.258	4.532	.000*

According to the meta-analysis results seen in Table 8, the mean effect size of mother's education status on cyber victimization was calculated between .102 and .258 limits (ES: .180) at the 95% confidence interval. Calculated impact value showed that the effect was significant (z=4.532; p=.000) but small, and students whose mothers had a bachelor's degree were more victims of cyberbullying than students whose mothers were primary school graduates. In Table 9, meta-analysis findings regarding the effect of father's education (undergraduate and primary school) on students' cyberbullying and cyber victimization are presented.

Table 9. The effect of father's education status on cyberbullying and cyber victimization

	k	n	Mean effect size (ES)	95% Confidence Interval		z	p
				Lower Limit	Upper Limit		
Cyberbullying	13	5123	.130	.015	.245	2.210	.027*
Cyber Victimization	8	3544	.161	.014	.307	2.149	.032*

According to the meta-analysis results seen in Table 9, the mean effect size of father's education status on cyberbullying was calculated between .015 and .245 limits (ES: .130) at the 95% confidence interval. Calculated impact value showed that the effect was significant (z=2.210; p=.027) but too small and students whose fathers were undergraduates did more cyberbullying than students whose fathers were primary school graduates. According to the results of the meta-analysis conducted with 8 studies, the mean effect size of the mother's education status on cyber victimization was calculated between the limits of .014 and .307 (ES: .161) at the 95% confidence interval. Calculated impact value showed that the effect is significant (z=2.149; p=.032) but small, and students whose fathers had a bachelor's degree were more exposed to cyberbullying than students whose fathers were primary school graduates. In Table 10, meta-analysis findings regarding the effect of parent cohabitation variable (separate and cohabiting) on students' cyberbullying and cyber victimization are presented.

Table 10. The effect of parental coexistence on cyberbullying and cyber victimization

	k	n	Mean effect size (ES)	95% Confidence Interval		z	p
				Lower Limit	Upper Limit		
Cyberbullying	9	9897	.206	.039	.373	2.420	.016*
Cyber Victimization	7	7767	.183	-.053	.419	1.520	.129

According to the meta-analysis results seen in Table 10, the mean effect size of parental cohabitation on cyberbullying was calculated between .039 and .373 limits (ES: .206) at the 95% confidence interval. Calculated impact value showed that the effect was significant (z=2.420; p=.016) but small and students whose parents lived apart did more cyberbullying than students whose parents lived together. According to the results of the meta-analysis conducted with 7 studies, the mean effect size of parental cohabitation on cyber victimization was calculated between the limits of -.053 and .419 (ES: .183) at the 95% confidence interval. Impact value showed that the effect was not significant (z=1.520; p=.129) but small. The moderator analysis results regarding being a cyberbully are given in Table 11.

Table 11. Moderator analysis results about being a cyberbully

Variable	Moderator		k	Mean effect size (ES)	Heterogeneity (Q_b)	p
Gender	Level	Secondary school	11	.199	1.007	.316
		High school	24	.270		
	Year	Before 2016	13	.251	.007	.928
		2016 and later	22	.245		
School level	Level	Secondary school	6	.317	10.646	.001*
		High school	12	.056		
	Year	Before 2016	7	.173	.572	.479
		2016 and later	11	.113		
Mother education level	Level	Secondary school	4	.157	.044	.834
		High school	9	.195		
	Year	Before 2016	4	.006	4.186	.041*
		2016 and later	9	.267		
Father education level	Level	Secondary school	4	.153	.054	.817
		High school	9	.117		
	Year	Before 2016	4	.012	3.035	.081
		2016 and later	9	.198		
Parent cohabitation level	Level	Secondary school	4	.061	3.578	.059
		High school	5	.314		
	Year	Before 2016	2	-.012	9.883	.002*
		2016 and later	7	.295		

According to the moderator analysis results in Table 11, It was found that the determined moderator variables did not cause any differentiation on the calculated general effect size values, except for 3 cases. The differentiation between 8th and 5th grade students being a cyberbully in secondary schools (ES:.317) was significantly different from the differentiation between 12th and 9th grade students' cyberbullying in high schools (ES:.056, Q_b=10.646; p=.001). In two cases, it was seen that the interval of years in which the studies were carried out played a moderator role on the mean effect sizes. Students whose

mother's education level was undergraduate showed more cyberbullying behaviors in 2016 and later years compared to students whose mother's education level was primary school (Q_b=4.186; p=.041). Students with separated parents showed more cyberbullying behaviors in 2016 and later than students whose parents live together (Q_b=9.983; p=.002). The results of the moderator analysis regarding being a cyber victim are given in Table 12.

Table 12. Moderator analysis results on cyber victimization

Variable	Moderator		k	Mean effect size (ES)	Heterogeneity (Q_b)	p
Gender	Level	Secondary school	7	.127	.077	.781
		High school	16	.151		
	Year	Before 2016	11	.043	9.676	.002*
		2016 and later	12	.248		
School level	Level	Secondary school	4	.192	.164	.686
		High school	9	.122		
	Year	Before 2016	7	.096	1.233	.267
		2016 and later	6	.217		
Mother education level	Level	Secondary school	3	.117	.367	.544
		High school	5	.197		
	Year	Before 2016	4	.063	3.404	.065
		2016 and later	4	.291		
Father education level	Level	Secondary school	3	.143	.005	.946
		High school	5	.153		
	Year	Before 2016	4	.045	3.260	.071
		2016 and later	4	.288		
Parent cohabitation status	Level	Secondary school	3	.126	.196	.658
		High school	4	.231		
	Year	Before 2016	2	.012	1.674	.196
		2016 and later	5	.232		

According to the moderator analysis results in Table 12; It was found that the determined moderator variables did not cause a difference in the overall effect size values calculated except for one situation. According to this finding, it was understood that male students showed more cyberbullying behaviors in 2016 and later years compared to female students (Q_b=9.676; p=.002).

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

In this study, the effect of some demographic variables (gender, class, education of the parents, living together with the parents) on the cyberbullying and cyber victimization of secondary and high school students was examined. In this context, in the light of the findings reached in this section, the results are summarized, discussed based on the literature, and suggestions are made.

As a result of the meta-analysis conducted in the research, it was concluded that the status of being a cyberbully (ES=.247) and a cyber victim (ES=.144) in Turkey differed significantly by gender (p=.00). Accordingly, male students in Turkey show more cyberbullying tendencies than female students and are cyber victims. When the literature is examined, similar to the results of the study (Ang and Goh, 2010; Campfield, 2008; Li, 2007; Notar et al. 2013; Wong Chan and Cheng, 2014; Ybarra et al. 2006) male students are more likely to be compared to female students. It has been concluded that they are more cyberbullies and victims. As a result of a meta-analysis of 109 studies produced in 4 continents (Asia, Europe, America and Australia), it was found that gender differentiated cyberbullying in America, Asia and Europe, while gender did not make a difference for Australia (Barlett and Coyne, 2014). In addition, in this study it was determined that the difference in cyberbullying behavior by gender (boy>girl) for Asian countries is higher than that of other continental countries. Contrary to the results of the study in the literature; It was found that the gender variable did not differentiate being a cyberbully (Keith and Martin, 2005; Slonje and Smith, 2008), and that girls were more cyberbullying than boys (Wolak et al. 2007) and cyber-victim (Schneider et al. 2012). In the study, it was seen that male students in Turkey are more cyberbullies and cyber victims. In Turkey, boys use the internet more than girls (Bayraktar and Gün, 2006; TÜİK, 2019), internet addiction is higher (Esen and Siyez, 2016), violent, aggression and bullying levels are higher (Ayas and Pişkin, 2011), it is understood that it is an expected natural result that men are more cyberbullying. It can be said that the social structure and culture are also effective in the prevalence of cyberbullying behaviors in men. The fact that boys are more cyberbullies and victims in Turkish society can be explained by the reason that boys are given a wider range of freedom than girls, and boys are less controlled or more difficult to control than girls. With the thought that cyberbullying is done with information and communication technology tools, It is more common in Turkish society for male students to access the relevant tools and use these devices more than female students. As a matter of fact, studies have shown that the reason why boys are more cyberbullies than girls is that they use information technology tools for a longer period of time and are less supervised (Bayram, 2017; Burnukara, 2009). The fact that boys experience more cyber victimization than girls is related to the fact that boys spend more time in cyber environments (Ayas and Horzum, 2011). It can be said that the protective attitude of the society towards girls may be effective in the lower level of cyberbullying and victimization of girls compared to boys.

In the research, it was concluded that cyber bullying and cyber victimization differ in grade levels at secondary school level in Turkey. According to this, 8th grade students show more cyberbullying behavior and experience cyber victimization compared to 5th grade students in Turkey. However, in the study, it was concluded that the cyberbullying situation did not differ significantly between 9th grade students and 12th grade students. In this context, it can be said that cyberbullying and being a victim are frequently experienced in 8th grade and later grades. When the previous studies are examined, studies that emphasize that the level of cyber victimization increases as the grade level increases (Burnukara, 2009; Campbell, 2005; Metli, 2017; Serin, 2012) supports the conclusion reached in the research. In the study, it was observed that the differentiation between 8th grade and 5th grade students was especially high. As a matter of fact, it has been determined that the most common age range for cyberbullying is 13-15 (Calvete et al. 2010). Tokunaga (2010) stated that the student group in which the tendency to be cyberbully is most common is 7th and 8th grade students. Ybarra and Mitchell (2004) stated that students in the 15-17 age range exhibit more cyberbullying behaviors than students in the 10-14 age group. Kowalski and Limber (2007) stated that the tendency of students aged 11-14 to show cyberbullying increased as the grade level increased. In some studies, it has been concluded that cyberbullying does not differ according to grade levels (Elmas, 2016; Slonje and Smith, 2008).

In the study, it was concluded that with the increase in the grade level, the cases of cyber bullying and cyber victimization also increased. With the increase in class level and age, students' ability to use technology and access to information technology devices increase. In addition, due to the characteristics of the adolescence period, individuals' desire to be more visible in this process, to show themselves as stronger and to attract attention among their friends may be among the reasons why cyberbullying tendencies are widespread, especially during adolescence. It can be interpreted that upper-class students' spending more time on the internet and feeling more free are effective in becoming cyberbullies and victims. Lower grade students, on the other hand, may be more inexperienced and inadequate in the use of information tools, and for this reason, they may be less cyberbullies and cyber victims than upper grade students.

In the study, it was concluded that the status of being a cyber bully and a cyber victim in Turkey differed significantly according to the educational status of the parents (p=.05). Accordingly, in Turkey, students whose parents have a bachelor's degree tend to be more cyberbullying and are more cyber victims than students whose parents are primary school graduates. When the literature is examined, there are studies showing that the higher education level of the parents increases the tendency of adolescents to display cyberbullying behaviors more (Çiftçi, 2015; Dalmaç, 2014; Evegü, 2014; Türkoğlu, 2013). Laftman, Modin and Östberg (2013) stated that the mother's bachelors'degree increases the probability of students being cyberbullies and cyber victims. As a matter of fact, Baykal (2016) stated that adolescents whose mothers have a bachelor's degree are more cyber victims than those whose mothers are graduates of secondary school. However, contrary to the results of the research, Sarak (2012) stated that adolescents with low educational level of parents show more cyberbullying behaviors and experience more cyber victimization than adolescents with higher education level. In some studies, it has been stated that the education levels of parents are not a significant variable in students being cyberbullies (Gencer, 2017; Makri-Botsari and Karagianni, 2014; Ünver, 2016). These adolescents may show more cyberbullying behaviors because the children of parents with career-oriented higher education can have information tools more easily and at an earlier age, and because parents cannot adequately control their children's internet use due to their workload. As a matter of fact, Ybarra and Mitchell (2004) stated that the children of parents with a higher annual income are more involved in cyberbullying.

As a result of the meta-analysis conducted in the research, it was concluded that students' cyberbullying and cyber victimization differed significantly according to their parents' living together (p=.05). Accordingly, it can be said that students whose parents live apart from each other are more cyberbullying and experience more cyber victimization than students whose parents live together. In a study conducted by Öngider (2006), the fact that the adolescents with co-parent parents have difficulty in controlling their impulses and exhibit negative behaviors towards their environment explains the higher cyber bullying and victimization scores of the adolescents with co-parent families compared to the adolescents with married families. Laftman, Modin, and Östberg (2013), as a result of their research, stated that the loss of at least one of the parents increases the probability of students to become cyberbullies or cyber victims.

As a result of the moderator analysis, the differentiation between 8th and 5th grade students' cyberbullying in secondary schools (ES:.317) is significantly different from the differentiation between 12th and 9th grade students' cyberbullying in high schools (ES:.056, Q_b=10.646; p=. 001). In the research, compared to the previous five years in 2016 and later; Students whose mothers graduated from an institution at the undergraduate level showed more cyberbullying behaviors than students whose mothers graduated from primary school, and students whose parents lived separately (Q_b=9.983; p=.002). In addition, boys showed more cyberbullying behaviors than girls in 2016 and later years compared to the previous 5 years (Q_b=9.676; p=.002). In the light of this result, it can be said that cyberbullying incidents have increased since the 8th grade, when it is thought that the opportunity to access technology has increased and a freer life has begun. In addition, it is thought that more variations have been observed since 2016. This situation can be explained by the fact that students have more information and communication tools in recent years and they are busy with these tools for more hours. As a matter of fact, TÜİK (2019) data supports this result.

It would be beneficial to conduct qualified training activities for school administrators, guidance specialists, teachers and parents at regular intervals regarding the causes and consequences of cyberbullying behaviors, the solutions developed for these problems, and the variables affecting cyberbullying. Such activities can be beneficial in raising the awareness of the

relevant masses about cyberbullying, preventing adolescents from showing cyberbullying behaviors and experiencing cyber victimization. Male students are in a higher risk group for cyberbullying than female students. In this context, parents should monitor which websites their children visit, which groups they belong to, negative situations should not be ignored, and they should be more careful in monitoring and protecting their children with the fact that boys are at higher risk. Families should pay close attention to their children, especially during adolescence, spend quality time with them and control the time they use information technologies. The incidence of cyberbullying and victimization is seen more and more as the grade level rises, in this context, students should be regularly informed every year starting from primary school on safe and responsible internet use, how to use information tools efficiently and effectively, and cyberbullying and cyber victimization. One of the reasons for showing cyberbullying behaviors is the boredom that arises from not knowing the value of time and not using it in a qualified manner. In this context, teachers and parents can direct students to courses such as playing instruments, swimming, mind games, theater, folk dances and drama outside the internet. It is important to adopt a holistic approach and produce more inclusive research with different groups in order to reduce the problems related to cyberbullying. It is thought that the design of studies using qualitative methods such as case study, observation and interview, which allows in-depth research, will make important contributions to the solution of the problem.

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Author's Contributions

There is only one author of this article. Yılmaz Sarıer is responsible for all of the work done for this article.

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Note: References marked with an asterisk indicate studies included in the meta-analysis.

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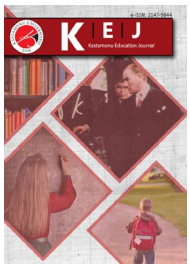

| Research Article / Araştırma Makalesi |

Exploring 7th Grade Students' Lived Experiences About Domestic Waste and Recycling After Attending a Scientific Trip

Bir Bilimsel Gezi Sonrası 7. Sınıf Öğrencilerinin Evsel Atıklar ve Geri Dönüşüme Yönelik Deneyimlerinin İncelenmesi[1]

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Keywords

1. Informal learning
2. Out of school learning
3. Field trip
4. Recycling
5. Recycling facility center

Anahtar Kelimeler

1. İnformal öğrenme
2. Okul dışı öğrenme
3. Alan gezisi
4. Geri dönüşüm
5. Geri dönüşüm tesisi

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Abstract

Purpose: This research study aims to analyze the effects of teaching the subject of domestic waste and recycling, which is included in the Science course curriculum, in informal learning environments on secondary school students' learning.

Design/Methodology/Approach: In the research, the phenomenology design, one of the qualitative research designs, is used. The phenomenology design focuses on a person's first-order experiences about a phenomenon. And, it aims to have in-depth information about the phenomenon. The study group of the investigation consists of 14 secondary school students receiving education at a public school in Aksaray, during the spring semester of the 2019-2020 academic year. The trip evaluation form and the semi-structured interview questions developed by the researcher as data collection tools are used as pre-test and post-test. The data acquired from the investigation were analyzed by content and descriptive analysis methods. Codes, categories, themes, and subthemes were built for the student's answers.

Findings: According to the results obtained from the study, the students observed that recycling is not a simple process that can be applied easily. The students remarked that the recycling facility trip creates awakening and awareness towards the environment and facilitates learning by walking through, seeing, and having fun.

Highlights: Based on this study, it is recommended to arrange field trips in different disciplines to for these trips enable students to gain interesting and catchy experiences.

Öz

Çalışmanın amacı: Araştırmada Fen bilimleri dersi öğretim programı içerisinde yer alan evsel atıklar ve geri dönüşüm konusunun informal öğrenme ortamları ile işlenmesinin ortaokul öğrencilerinin öğrenmeleri üzerine etkisini incelemek amaçlanmaktadır.

Materyal ve Yöntem: Araştırmada nitel araştırma desenlerinden olgubilim deseni tercih edilmiştir. Olgubilim deseni ile bir olgu hakkında kişinin birinci dereceden deneyimlerine odaklanılır ve söz konusu olgu hakkında derinlemesine bilgi sahibi olunması amaçlanır. Araştırmanın çalışma grubunu 2019-2020 eğitim öğretim yılı bahar döneminde Aksaray il merkezindeki bir devlet okulunda öğrenim gören 14 ortaokul öğrencisi oluşturmaktadır. Veri toplama aracı olarak araştırmacı tarafından geliştirilen gezi görüş formu ve yarı yapılandırılmış görüşme soruları ön test ve son test olarak kullanılmıştır. Araştırmadan elde edilen veriler içerik analiz yöntemleriyle çözümlenmiştir. Öğrenci cevaplarına yönelik kod, kategori, tema ve alt temalar oluşturulmuştur.

Bulgular: Araştırmadan elde edilen sonuçlara göre; öğrenciler geri dönüşümün kolaylıkla yapılan basit bir süreç olmadığını gözlemlemişlerdir. Öğrenciler geri dönüşüm tesisi gezisinin gezerek, görerek ve eğlenerek öğrenmeyi kolaylaştırdığını, çevreye yönelik bilinç ve farkındalık oluşmasını sağladığını belirtmişlerdir.

Önemli Vurgular: Yapılan araştırmadan hareketle alan gezilerinin öğrencilere ilginç deneyimler sağladığı için farklı disiplinlerde de alan gezilerinin düzenlenmesi önerilmektedir.

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INTRODUCTION

Education activities are conducted in 3 ways: formal, non-formal, and informal (Miyake, 2017; Obadiora, 2016). Learning can occur anywhere, not only in a school or classroom environment. Everything and every occasion in daily life can provide information for education (Obadiora, 2016). While formal education is conducted in a place, informal and non-formal education occurs outside of school. A place is not always necessary for learning to be achieved. Learning is achieved when it combines with an individual's active learning elements. Informal learning practices outside of school provide education for anybody, anywhere (Miyake, 2017).

It is important that individuals can configure their information for science education to be achieved effectively. When the literature is reviewed, it is also necessary to use informal learning environments and formal learning in this context. Several studies on the use of informal learning environments in science education are increasingly numerous and the positive effects of the process have been observed (Balçın & Topaloğlu, 2019; Erten & Taşçi, 2016; Türkmen, 2018). Learning outside of school has been used as a contribution to formal science education lately, becoming an important part of science teaching. While formal learning is about abstract and generalized information gain; informal learning is about gaining information on subjects that are not restricted by specific content (Edwards, 2015). Informal learning is generally defined by comparison with formal learning by many researchers (Stocklmayer, & Rennie, 2017).

Informal learning, with its instructive aspect, is an example of organizations that occur outside of school as an alternative to formal education and can be participated by many individuals from children to adults. It is also a type of learning method that is full of meaningful activities; consists of individuals' initiatives, interests, and choices instead of external demands and needs, and doesn't need any external evaluation (Rogoff, Callanan, & Gutierrez, 2016). Informal learning is not limited only to children of school age; it interests all individuals regardless of their age, culture, cognitive level, or socio-cultural background. It depends on individuals' motivations, interests, beliefs, prior knowledge, and expectations, meaning that it is performed individually (Behrendt, 2014). Informal learning practices enable students to associate what they learned in daily life and reinforce them (Kubat, 2018), it has fewer restrictions when compared to school systems. In a formal system, the focus is on trying to achieve the goals of the institution and external evaluation. Students' participation and success in informal learning activities are evaluated. Students' information and skill progress is promoted (Rogoff, et al., 2016).

Informal learning can be provided by field trips, zoos, museums, community centers, the internet, or TV (Stocklmayer, & Rennie, 2017). It is aimed to increase students' access to informal learning environments with various programs (Whitesell, 2016). Today, innovative schools, after-school programs, institutions like science centers, and museums can be given as examples of informal learning organizations (Rogoff, et al., 2016). Educational studies about informal learning environments like museums, science centers, zoos, and aquariums have been conducted for over 40 years (Dick, 2014). Informal learning can be provided via field trips, zoos, museums, community centers, the internet, or TV (Stocklmayer, & Rennie, 2017).

Field trips which are among the most important practices of informal learning are valuable educational and social experiences (Achen, Warren, Fazzari, Jorich, & Thorne, 2019). These trips enhance students' information and comprehension of various subjects; and rely on interaction as they require active participation (Stohlmann, 2019). Field trips are ideal education practices that are now being adopted in formal school systems; provide social interaction (Obadiora, 2016); and improve students' research and questioning skills (Patel, 2015). Infield trips, and computer and web-based learning environments can be used and these practices are described as virtual field trips (Mead, et al., 2019). Virtual field trips have been becoming an alternative to actual field trips to achieve some goals (Stohlmann, 2019).

Informal learning environments contain open-ended, learner-centered, research-based, and questioning-based practices (Stewart, & Jordan, 2016). A rich informal learning environment should consist of cognitive, emotional, physical, and social aspects of the experience. It should foster students' interest in science (Behrendt, 2014). A successful field trip should contain critical features like socio-cultural interaction, cognitive development, and effects on learning (Patrick, Matthews, & Tunnicliffe, 2013). In the formal school system, cooperative learning activities are under the supervision of a teacher. But, in outside school environments like field trips and museums; students discover new information by using cooperative learning practices in groups (Braund, & Lelliott, 2017).

In informal learning environments, students create information in a social way by engaging with friends and teachers. Informal learning environments enhance peer communication with each other. Students interact with each other via opportunities like question answers, visual interaction, and modeling (Stewart, & Jordan, 2016). Social interaction shines out in informal learning environments. Social interaction and guidance on practices are important in informal learning. Individuals obtain new information and skills by using their already existing information. Students get included in scientific and cultural practices belonging to society. Students contribute to achieving actual productive goals using individual and cooperative group activities. Informal learning environments motivate individuals to learn by their inherent, voluntary, free choice features (Rogoff, et al., 2016).

The effectiveness of field trips to informal learning environments is dependent on teachers' ability of managing trips. Teachers play a great role in students' sharing their out-of-school experiences (Dick, 2015). Activities to be done before, during, and after trips provide opportunities for students to think analytically and critically. Activities to be done before, during, and after trips should be related to each other. Teachers should be aware of classroom interaction and students' prior knowledge before trips and plan effective field trip practices by paying attention to interaction, concentration, and responses. Before a trip, learning goals are emphasized by classroom activities. Before a trip, students should be given a map of activities, an explanation about activities

should be made and information about places that students will visit should be given (Patrick, Matthews, & Tunnicliffe, 2013). Activities before field trips should contain warm-ups for students to improve their observation skills (Richardson, 2011.) Infield trip practices and learning goals should be determined; student assessment and risk calculations along with trip plans should be made (Patel, 2015). If teachers visit areas before, they help students to have more effective field trips. Teachers should determine critical situations for each activity in field trips. Teachers should prepare essential items like field trip maps, student group lists, and worksheets before field trips (Scott, & Matthews, 2011). During field trips, teachers should provide meaningful cognitive and affective experiences to students. During field trips, activities should provide opportunities for students to think analytically and critically. Students improve their cooperative skills in groups by interacting with each other (Patrick, et al., 2013). On-field trips, teachers divide students into groups and ask them to perform some tasks. Students improve their communication skills together on field trips. Field trips enable schools to connect to the outside world. They make it easy for students to synthesize their information (Obadiora, 2016). Using worksheets in informal learning environments makes learning outside of school more effective. Worksheets that contain useful practices support students' cognitive learning outcomes outside of school learning environments (Dick, 2014). Post-visit activities are important for field trips. Post-visit activities help to determine the knowledge that students obtain during field trips. Not doing post-visit activities prevents linking theory and practice (Patrick, et al., 2013). Educators should be very attentive to the assessment of field trips to determine and achieve learning goals and create a link between fields and daily life (Jolley, et al., 2019). Educators should give feedback to students on activities that they have done and be aware of the epistemological effects of fields. Field trip diaries can be used when assessing students during field trips (Patel, 2015).

Informal learning environments have great benefits for students. In informal learning environments, questions to ask students provide rich learning experiences using positive social interaction (Braund, & Lelliott, 2017). In informal environments like museums and zoos, individuals perform active practices like intentional observation, reading instructions, and touching (Miyake, 2017). Students can gain information on various subjects by contacting friends, teachers, and guides in informal learning environments. At the same time, students can share information on various disciplines and experiences in groups. Sharing information helps students to configure new information (Stocklmayer, & Rennie, 2017). Informal learning programs boost students' motivation for learning by enhancing their intrinsic motivation (Salmi, et al., 2016). Besides that recent studies have shown that informal learning environments help to achieve education goals containing positive affect and social experiences, they also have given a new perspective on learning environments outside of school (Dick, 2014). Informal learning environments make learning interesting and fun (Edwards, 2015). Educational organizations outside of school have the benefits of social and personal improvement, academic success, and physical activities for students. Education outside of school provides scientific learning outcomes related to nature, an increase in physical activities, leadership, and improvement of skills related to nature (Becker, Lauterbach, Spengler, Dettweiler, & Mess, 2017). Outside of school practices other than ordinary classroom activities influence students' affective traits positively (Avcı & Gümüş, 2019). Informal learning practices provide information to students directly. They make knowledge longer-lasting (Katırcıoğlu, 2019). Learning outside of school environments are settings that enable students to associate their knowledge with daily life and consolidate it. Each student can learn according to his/her traits in informal learning environments. Such environments help students to improve their communication and self-confidence skills (Kubat, 2018).

Field trips as informal learning environments have certain benefits to students. During field trips, students are included in experience-based learning. Students carry out peer learning by interacting with their peers and discussing their learning outcomes. Field trips are made, learning interesting and interactive, and build a positive attitude towards trip concepts (Behrendt, 2014; Richardson, 2011). Field trips create active learning environments for students. Field trips enable students to spend more time and effort learning and improving themselves (Achen, et al., 2019; Kaewkitipong, et al., 2016). Students learn how to make systematic observations and classifications during field trips (Mead, et al., 2019). Field trips act as a bridge between theory and practice. Field trips enable students to interact with different locations, cultures, and individuals (Mead, et al., 2019; Patel, 2015). Field trips are effective learning tools that reduce academic differences between students. Field trips provide enriched educational experiences to students. It is stated that informal learning environments assist learning inside and outside of school. Field trips provide critical learning opportunities to students, especially to those disadvantaged (Whitesell, 2016). Field trips motivate students through rich experiences, interest in science and business ethics, cognitive learning outcomes like conceptual understanding and reasoning skills along with affective gains (Whitesell, 2016; Richardson, 2011). Field trips give students meaningful social interaction opportunities by providing a fun time in nature (Tal, Alon, & Morag, 2014). Field trips improve students' descriptions and interpretation skills (Whitesell, 2016). Organizing field trips to places like museums ensure achieving important educational goals (Bursztyn, 2017) and supports scientific literacy (Dick, 2014). Field trips depend on beneficial information sharing and cooperative learning. Field trips facilitate learning concepts in their context (Kaewkitipong, et al., 2016; Obadiora, 2016; Stohlmann, 2019).

Many organizations state that informal learning environments are important practices for updating and improving information and skills in the 21st century (Lai, 2018). Informal learning ensures that informal learning practices prevail in schools in the 21st century by assisting students to learn inside and outside of school (Rogoff, et al., 2016). School curriculum programs enable informal learning practices to be used in science classes. As informal learning environments provide students with opportunities to learn in different ways from usual, it is suggested that informal learning environments are used during the teaching process, in education programs (Miyake, 2017). This is a limited number of research on the design, effect, and evaluation aspects of informal learning environments in literature (Tal, Alon, & Morag, 2014). Little research has been conducted on science teaching in informal

environments when compared with science teaching in school environments (Salmi, Thuneberg, & Vainikainen, 2016). Studies that have been continuing for over 20 years emphasize learning in museums and social learning theories (Richardson, 2011). In recent years, international research has been conducted on primary and secondary education students, guardians, and the public in a broad context (Stocklmayer, & Rennie, 2017).

New generation individuals don't spend enough time in informal environments such as natural parks. Individuals spend time at home without seeing nature's beauty by isolating themselves from the world and nature (Falgoust, 2017). The time students spend outside in nature has become limited to minutes (Borsos, Borić, & Patocskai 2018). While informal learning environments provide students with significant learning opportunities, few types of research have been conducted on the importance of learning environments outside of school (Achen, Warren, Fazzari, Jorich, & Thorne, 2019). Even if field trips are an important part of the educational process, there are limits and limitations to performing them (Mead, et al., 2019). Field trips have critical importance as they increase the motivation of students, provide students with various experiences of sensing places, having an interest in career planning and changing situations. On-field trips, students can have rich interaction with their friends, field experts, and environment independently. (Jolley, et al., 2019). Today, schools can't give place to field trips in education practices because of financial difficulties and time problems. Even though students are more interested in activity-based learning practices, they have to continue performing learning practices in traditional classrooms contractedly (Stohlmann, 2019). Even though education outside of school has an undeniable effect, teachers don't include education practices outside of school sufficiently in the education process because of limitations of time and transportation (Borsos, Borić, & Patocskai 2018). Teachers don't use outside-of-school practices in the education process sufficiently because of factors like planning, responsibility, and costs (Katırcıoğlu, 2019).

Field trips are an important component of the education system. Even though field trips are important for education, few types of research have been conducted on the effects of field trips on students' academic learning (Whitesell, 2016). Many schools ignore field trips with the thought that they do not affect academic success. Yet, field trips to informal learning environments such as museums and zoos have special academic goals besides the entertaining aspect (Whitesell, 2016). Many educators and students ignore the benefits of field trips by thinking that they take too much time and are hard to organize (Kaewkitipong, Chen, & Ractham, 2016). Even though field trips are reliable methods to attract students to disciplines like geology, in practice, they are not used often. Field trips have started to take apart in education rarely because of transportation problems, decreasing financial and administrative support (Bursztyn, 2017). Moreover, educators' interest in field trips has been diminished because they require too much preparation and official procedures and because of financial problems. Many teachers don't prefer field trips because of a lack of funds and too many risks (Obadiora, 2016). It is debated that field trips cost too much, especially for students (Patel, 2015). Quantitative research on affective and cognitive learning outcomes provided by field trips is limited (Whitesell, 2016). It is not fully understood students' interactions on trips and how students' performances in informal science learning can be improved (Chen, Xin, & Chen, 2017).

When researching informal learning environments of different grades in related literature are reviewed; Dick (2014) has concluded in his research that students' debate on trips and worksheets used during trips assist cognitive and affective learning of students. Avcı and Gümüş (2019) have remarked in their research done in social studies lessons that field trips provide active and permanent learning via learning by doing and experience. Also, they state that outside-of-school activities improve students' sense of wonder, enable learning through seeing and touch and reinforce knowledge. Whitesell (2016) has determined in his research with secondary students that field trips improve students' academic success. Tal and friends (2014) in their research with secondary students have concluded that good communication between teachers and guides out outside-of-schooling environments improves the quality of trips as it increases environments in that students can interact with each other and discover by musing bling active learning and psychomotor activities.

Katırcıoğlu (2019) in his research with secondary students has concluded that field trips support knowledge gained in the classroom and increase the use of knowledge of students. Behrendt (2014) in his research with secondary students on biology field trips has stated that interaction makes trips deeper, friends and peers are an important part of the trips, and teachers should encourage students to ask questions and answer, and support students' feedback. Achen and friends (2019) in their research have concluded that field trips with graduated students help students to get hold of content and increase their preparedness in related disciplines. Jolley and friends (2019) in their research with university students have concluded that field trips provide knowledge fundamentally, allow students to put their knowledge into practice, improve student problem-solving skills by giving them responsibilities, and help enhance student-student and student-educator interaction.

Falgoust (2017) in his he has found that university students want to spend time in informal environments. However, they don't use informal environments because of constraints such as time, material, transportation, and technology. Mertoğlu (2019) in his study, he has concluded that teacher candidates provide permanent learning by doing in out-of-school learning environments. Bostan Sarıoğlan and Küçüközer (2017) in their research have deduced that teacher candidates point out informal environments aid permanent learning. Gürsoy (2018) in his study has concluded that teacher candidates explain out-of-school learning environments contribute to students' cognitive, affective and lifelong skills. Kubat (2018) found that in his study with science teachers, they specify informal learning environments provide permanent learning with firsthand experiences, but these environments have disadvantages such as excessive legal procedures. Çiçek and Saraç (2017) in their research on science teachers said that out-of-school learning environments provide useful knowledge in daily life and this environment offers teaching

opportunities, according to individual differences, but it has disadvantages such as transportation and discipline. Doğan and his friends (2018) in their study with a science teacher concluded that field trips enable students to put knowledge into practice and also increase motivation and permanent learning. Richardson (2011) in this study with adults, they have found that field trip improves scientific curiosity and provides scientific reasoning.

It is also possible to come across studies on online trips in the literature. Chen and his friends (2017) in their research they investigated the effect of a mobile system that will increase the students' interaction with the trip. They stated that mobile systems will have great potential in informal learning environments in the future (Chen, Xin, & Chen, 2017). Lai (2018) in his study with adults found that online informal learning environments increase individuals' knowledge acquisition and development of online communication skills. Mead and his friends (2019) in research with high school students they have concluded that virtual field trips promoted with online provide active and authentic learning and he found significant differences in students' knowledge acquisition. Kaewkitipong and his friends (2016) in their study, used social media to increase field trips and they have found that social media increased students' satisfaction if field trips promote with social media, it will be more beneficial for students with less time and effort.

If we seek studies on recycling in the literature Katırcıoğlu (2019) found that field trip with recycling supports 7^{th}-grade students learning. Bakar (2013) concluded that science and arts center students have a low level of knowledge about the damage caused by plastic to the environment. Islam and his friends (2019) found that in their study waste should not be seen as a resource and we can be obtained from waste, environmental and economic benefits, reduction in CO2 emissions, and using energy will be decreased with recycling. Harman and Çelikler (2016) found that in their research with university students, although students know the meaning and purpose of recycling, s students' awareness of recycling is low. Mrema (2008) concluded that in her study students learn the importance of recycling at school or at home, attitudes, and behaviors toward recycling depend on a wide variety of factors.

Research generally focuses on the advantages and disadvantages of informal learning environments in the literature and there is limited information on how to increase the interaction of students during the trip. Moreover, how the trip affected students' consciousness and awareness of environmental concepts was not discussed in detail.

In this research, we investigate developing students' ideas about how the recycling process works, we want to figure out the environmental effects of recycling and try to answer the questions what is recycling? What can be recycled? How do clear students misconceptions about recycling? How to increase their learning? In addition, we aim to increase student learning by processing the "Domestic Waste and Recycling Unit" in the science curriculum with informal learning environments, and we will guide teachers and other researchers with this research and contribute to the literature on how science education can be carried out in informal learning environments. Furthermore, once we share research results with another researcher, it will contribute to the literature and guide future studies.

Problem Statement

What is the effect of household waste and recycling in informal learning environments on the learning of 7th-grade students?

Purpose of the study

This study aims to increase student learning by processing household waste and recycling units in the science curriculum with informal learning environments, guiding teachers and other researchers about recycling matter, and contributing it to the literature on science education in informal learning environments.

The research also aims to examine the effect of processing domestic waste and recycling in the science curriculum with informal learning environments on student learning.

The rationale of the Study

When the literature on informal learning environments is examined, it is seen that studies that draw attention to the positive and negative aspects of teaching in these environments have gained intensity. In addition, it is stated that the number of researchers performing field trips is low due to various limitations. There is limited information on research on how to increase students' learning by increasing their interaction in informal learning environments and it is not known how to create attitudes, behaviors, and consciousness in this direction in students.

Recycling center trips are considered informal learning activities. With this research, it is thought that students will learn about recycling facilities and what recycling is, what can be recycled, and how the recycling process and eliminate misconceptions and increase learning about recycling. The study, it is aimed that students to understand the environmental effects of recycling activities and increase their awareness about recycling. In addition, it is thought that it will contribute to teachers, researchers, and the literature, and will guide further studies with the results of this research.

METHOD/MATERIALS

In this part of the research, it is explained the research model, the study group of the research, data collection tools, and data analysis.

Model of the Research

In the research, it was used the phenomenology design, one of the qualitative research designs. The phenomenology design focuses on a person's first-order experiences about a phenomenon. And, it aims to have in-depth information about the phenomenon (Creswell, 2007). In this study, researchers are focusing on the students' experiences with household waste and recycling.

Study Group of the Research

The study group of this research consists of 14 secondary school students studying in a public school in the city center of Aksaray in the spring term of the academic year 2019-2020. When choosing the study group, it was chosen easily accessible case sampling methods which kind purposive sampling methods. In an easily accessible situation sampling, the researcher chooses a situation that is easy to access and adds speed and practicality to the study (Yıldırım & Şimşek, 2016).

Data Collection Tools

In the research, the data were collected through a field trip opinion form and semi-structured interview questions, which were about domestic waste and recycling topics and developed by researchers, including open-ended questions. The trip opinion form was applied to the students before and after the trip. In the process of developing data collection tools, firstly was made literature review in the national and international areas and trip interview form, and semi-structured interview questions were prepared. For the content validity of the questions, expert opinion was taken from 2 experts in the field of science education. After this process, it was determined opinion form and the scope of the interview questions were. The forms were applied as a pilot to 10 middle school 7^{th}-grade students to determine whether the items in the draft form are clear and understandable. Necessary corrections were made and the final form was given to the trip interview form and semi-structured interview questions.

Field Trip Opinion Form

A trip opinion form was used which was developed by the researcher to learn the opinions of the students about the recycling facility, which is an informal learning environment. The field trip opinion form consists of 10 open-ended questions. The form was applied to the students participating in the trip as pre-test and post-test. In the form, there were questions such as “What does the recycling facility evoke for you?” and “What are your expectations from the recycling center trip?”

Semi-structured interview questions

Semi-structured interviews were conducted with the students participating in the trip to determine the effect of processing household waste and recycling in informal learning environments on student learning. Semi-structured interview questions consisting of 8 open-ended questions were prepared by the researchers. Semi-structured interview questions were presented to field experts. Corrections were made according to feedback and the interview questions were given their final form. Semi-structured interviews were carried out by the students who participated in the field trip. In semi-structured interview questions, there were questions such as “what are the benefits of teaching in out-of-school settings?”, “What interested you most about the recycling facility trip?” and “what are your thoughts on making such trips in your science classes?”

Analysis of Data

The study examined students’ answers to the semi-structured interview questions with the trip opinion form. Content and descriptive analysis were used in the analysis of students' answers. Codes, categories, themes, and sub-themes were constructed with the given answers. Firstly, notes for the trip, student answers, and audio and video recordings were made into written documents. While the content analysis process; codes, categories, themes, and sub-themes were created for student answers. Similar codes of answers are grouped in categories and themes and frequency tables of the codes were made. In the descriptive analysis part, student answers are given by quoting directly without comment. In addition, correlations were made between the themes determined in the content analysis. The analysis of the data was done by 2 researchers and compared. According to Miles and Huberman's (1994) internal consistency formula, the percentage of agreement between researchers was calculated as 85%.

Field Trip Process

We planned to learn what is recycling? What can be recycled? How do clear students misconceptions about recycling? How to increase their learning? And get cognitive acquisitions with "Domestic Waste and Recycling" 7th grade Science lesson curriculum unit in field trip about recycling. Before the trip, students were informed about the trip and necessary permissions were obtained from the parents’ students and the school administration. Before the trip, students answered questions such as what is recycling. What is recycling used for? Which materials can be recycled? In the school. A meeting was held with Aksaray Recycling Center officials before the trip and center officials were informed about the student trip 3 weeks ago.

The recycling center is located in the Aksaray city center. Some of the material can be recycled at the center. Products such as packaging waste, plastic, metal, glass, and wood can be recycled at the Recycling Center. Students can view the recycling of plastic, packaging waste collection, and separation by visiting the metal and glass recycling departments on trips. The staff of the center provided information to the students about their work by guiding the students throughout the trip. Students learn what stages waste packaging goes through in the recycling center, respectively, and which products can be recycled, what are the contributions of recycling to the country's economy? During the trip, audio and video recordings, photographs, and observer notes were used to collect information about the trip. After the trip, the form with questions about recycling was applied to the students again. Interviews were held with volunteer students so that students could share their experiences about the trip. Student interviews were recorded with the video. The data for the trip are presented in the findings section.

FINDINGS

In this part of the research, the findings regarding the answers given to the trip interview form and semi-structured interview questions are included to learn the thoughts of secondary school students about teaching the recycling facility as an informal learning environment, the subject of household waste, and recycling.

Findings of the Trip Opinion Form Pre-Test

In the research, it is included the findings of the opinions of the students on the trip before the recycling center trip. The question what do you think recycling is? Student answers were presented in Table 1.

Table 1. Findings regarding the answers given by the students about what recycling is

Answer	F
Reusing materials	4
Loving the environment	2
Not wasting	2
Investing in society	1
Economic gain	1
Environmental cleanliness	1

Students gave different answers to the question of what recycling is before the trip. Students explained recycling as reusing materials at the highest rate (f=4). Students exemplify recycling benefits such as loving the environment (f=2), not wasting (f=2), environmental cleanliness (f=1), and economic gain (f=1). Before the trip, the students mentioned the contribution of recycling in nature; they did not mention the relation of recycling with raw material. The question which materials do you think can be recycled? Student answers were presented in Table 2.

Table 2. Findings regarding the answers given by the students about which substances can be recycled

Answer	F
Paper	10
Plastic	10
Glass	10
Battery	3
Metal	3
Bottle	1
Everything	1

When table 2 was examined, students (f=10) said that paper, glass, and plastic are recyclable materials. Students (f=3) explained that batteries and metals can be recycled. Student (f=1) thinks that all materials can be recycled. They frequently answered such as paper, plastic, and glass, recyclable materials, but they seldom mentioned substances such as batteries and metals. Before the trip, the students did not agree on oil, electronic waste, and medical and chemical wastes among recyclable materials. The question which why is recycling done? Students' answers were presented in Table 3.

Table 3. Findings regarding the answers given by the students regarding the purpose of recycling

Answer	F
Prevent environmental pollution	6
Not harm the environment	4
Prevention of waste	3
Prevent cutting of trees	2
Get income	1

When table 3 was analyzed, the students (f=6) stated that recycling was done to prevent environmental pollution, while students (f=4) stated that recycling was done to not harm the environment. Students (f=3) explained that recycling was done prevention of waste. Students (f=3) stated that recycling was done to prevent cuts to trees and student (f=1) recycling was done to get to income. Students explained the purpose of recycling as preventing environmental pollution and not harming nature. The question is asked students how they think recycling takes place. And student answers were presented in Table 4.

Table 4. Findings on student responses about how recycling is done

Answer	F
Collecting items one by one	5
With recycling bins	3
Through several stages	2
Physical and chemical method	2
I don't know	2

When table 4 was examined, students explained that students (f=5) think recycling was done by collecting items one by one. Students (f=3) explained that recycling of wastes was done with recycling bins. Students (f=2) stated that recycling was done through several stages and by physical and chemical methods. Students (f=2) answered this question as I don't know. Students think that recycling wastes are collected separately with recycling bins and made with certain physical and chemical processes. The question is asked to students what does the recycling, institution mean for you. And it was presented their answers in table 5.

Table 5. The findings of the concepts that the trip evokes in students

Answer	F
New products from waste	4
Factory	2
Renovation	2
Saving	1
Reuse	1
Nature	1
Change of state of matter	1
Economic development	1
Prevention of environmental pollution,	1
Sustainable development	1
Environment	1
Machinery	1

When table 5 was analyzed, it is seen that the subject of recycling evokes quite a lot of concepts in students. The students (f=4) stated that the trip to the recycling plant with make new products from waste. Students (f=2) think that the trip was related to the issue of factory and renovation. Students (f=1) explained that the trip was related to the issue of saving, reuse, nature, change of state, economic development, prevention of environmental pollution, sustainable development, environment, and machinery. Students associated recycling with concepts such as obtaining new products by reusing wastes, saving, factory and machinery. The question is asked students what their expectations from the recycling center trip are. And student answers were presented in Table 6.

Table 6. Findings regarding students' expectations from the trip

Answer	F
Get information about recycling	7
View recycling process	5
Prevent environmental pollution	1
Learn new things and	1
Distinguish substances from each other.	1

When table 6 was examined, students (f=7) explained that expectations get information with recycling center trip. Students (f=5) think they would view the recycling process. Students (f=1) stated that they hope to prevent environmental pollution, learn new things, and distinguish substances from each other. When students' answers are analyzed, it is seen that they have expectations such as obtaining information about recycling learning earning new information and viewing the recycling event more closely. The question is asked students what topics in science class they think the recycling center trip might be about. And student answers were presented in Table 7.

Table 7. Findings of the subject of the trip

Answer	F
Energy conversions	5
Environmental science	4
Sustainable development	3
Substance and industry	2
Global warming	1
Domestic waste	1
Change states of matter	1
Physics	1
Chemistry	1
Simple machines	1
Chemical reactions	1
States of matter	1

When table 7 was analyzed, it has been observed that students associate the recycling event with a large number of subjects in science. The students (f=5) stated that the recycling center trip might be about energy conversions. The students (f=4) think recycling center trips might be environmental science. Students (f=3) explained that the trip will be about sustainable development. Students (f=2) said that trips could be related to substance and industry. Students (f=1) stated that recycling center trips might be global warming, domestic waste, phase change, physics, chemistry, simple machines, chemical reactions, and states of matter.

Findings of the Trip Opinion Form Post-Test

After the trip, the trip opinion form was applied as a post-test to learn the opinions of the students about the trip after the recycling center trip. The question is asked what you think recycling is. And it is presented their answers in table 7.

Table 8. Findings of the answers given by the students about what recycling is

Answer	F
Make substances reusable	12
Recycling of waste to nature	4
Protect nature	1
Contribute to the economy	1
Providence	1
Separate substances	1

When table 8 was examined, students (f=12) said that recycling is a kind of process to make substances reusable. The students (f=4) stated that the recycling center is identified of recycle waste. Students (f=1) explained that recycling is protect nature, contributes to the economy, providence, and separates substances. When student answers were analyzed, the students defined the recycling event as providing raw materials to nature so that the materials can be reused and contribute to the economy by protecting nature. The question is asked to students what topics in science class materials do you think can be recycled. And it is presented their answers in table 9.

Table 9. Findings regarding the answers given by the students about which substances can be recycled

Answer	F
Paper	13
Plastic	13
Glass	13
Battery	10
Metal	10
Electronic waste	8
medical and chemical substances	6
Oil	6

When the students' views about substances that can be recycled were examined after the rip in table 9, students (f=13) think that paper, glass, and plastic can be recycled. The students (f=10) stated that batteries and metals can be recycled. The students (f=8) involve in electronic waste recycling too. The students (f=6) indicate that medical and chemical substances and oil can be recycled. With The trip, the students realized that they can be reused by recycling many substances that were not non-disposable

such as batteries, oil, and electronic and chemical waste. Students answered the questions for what purpose is recycling done. Students' answers were presented in table 10.

Table 10. Findings regarding the answers given by the students regarding the purpose of recycling

Answer	F
Reducing raw material use	10
Prevent environmental pollution	8
Providence	6
Reusing of waste materials	6
Contributing to The economy	6
Use country resources efficiently	5
Protect nature	5
Decrease global warming	4

When table 10 was examined; the students (f=8) stated that recycling was done to prevent environmental pollution while students (f10) stated that recycling was done to reduce the raw material. Students (f=6) stated that recycling was done for providence, reusing waste materials, and contributing to the economy. Students (f=5) think that recycling was done to use the country's resources efficiently and protect nature. Students (f=4) stated that recycling was done to decrease global warming. Students think that it is provided with recycling by reducing the use of raw materials, and efficient use of natural resources and thus, they think that it is aimed to generate an income by practicing economy. The question is asked to students how did you recycle? And it is presented their answers in table 11.

Table 11. Findings on student responses about how recycling is done

Answer	F
The materials by separating from each other	12
Heating the waste materials in the oven	10
Forming	10
Lessen with press	10
Through some process	8

When table 11 was examined; student (f=12) stated that recycling occurred the materials by separating from each other. Students (f=10) think recycling was done by heating the waste materials in the oven, melting, forming, and lessening with a press. Students (f=8) explained that recycling waste was done by going through some phrases. Students stated that in the recycling process wastes were collected separately from each other.

Table 12. Findings of the subject of the trip

Answer	F
Human and environment	10
Energy transformations	10
Sustainable development	9
Domestic wastes	8
Global warming	6

When table 12 was examined; students (f=10) associated the trip to the recycling plant with the subjects of human and environment and energy transformations in the science course. Students (f=9) think that the trip was related to the issue of sustainable development. Students (f=8) explained that the trip was related to the issue of domestic waste. Students (f=6) stated that the recycling plant trip was related to the issue of global warming. The students stated that the recycling trip was mostly about environmental issues.

While students gave limited information about what recycling was and for what purpose and did not associate the recycling event with the environment before the trip, the students explained the recycling event in detail and talked about the environmental and economic effects of the recycling event after the trip. In the pre-application of the trip opinion form, while the students were explaining that certain materials such as paper, plastic, and glass were recycled, after the trip, they stated that in addition to these items, battery, metal, medical and chemical waste, and liquid oil could be recycled. While students thought that the recycling activity was done by going through some simple stages with the recycling boxes before the trip, they explained that the recycling was done by separating the materials from each other, reducing the wastes by pressing, heating, and melting in the oven and shaping stages after the trip.

Findings Regarding Semi-Structured Interview

Semi-structured interviews were conducted with 10 students who participated in the trip to learn more about the opinions of the students after the recycling facility trip. What are your thoughts on the recycling trip you took? The students stated that they had a good day and learned new information they did not know. To this question, student A; we had a different day than the days at school. The recycling plant was a huge place. There were many machines in the facility. We were very interested in the harmonious operation of the machines, she replied. Student E; during the tour, the guide responsible for the facility accompanied us. She answered all the questions we had. She replied that she learned a lot of new information about recycling. Another student M; used to do science lessons at school by writing, reading books, and working on the smartboard. Today we went on a trip to the recycling plant. We learned by traveling, seeing, and having fun. It was seen that the student answers given to this question gained intensity in codes such as interest, fun, happiness, curiosity, and excitement, and student answers were grouped under the theme of motivation. On a different day, gaining experience, and adventure answers are classified as experience themes. The theme of learning new things, gaining knowledge, and elaborating what has been learned was determined.

It is asked to students ''did your recycling trip meet your expectations? '' while % 78.57 of the students answered yes, % 22.43 students answered no, the trip did not meet our expectations. The students explained the reasons for meeting their expectations of the trip by learning by traveling and seeing, working with employees diligently, and answering all the questions that were asked. Student B; the trip met my expectations. Because I have seen gigantic machines. I answered all the questions that came to my mind. Student D; the trip met my expectations. I learned about recycling by traveling and seeing. The students stated as the reason why the trip did not meet their expectations it should have been given more time and the trip area was small. Student F expressed that I can't say that the trip met my expectations. Because I thought there was a separate facility for each item. It is not as I thought.

Another interview question was “what interested you most about the recycling facility trip?'' The students answered genera that that plastic is a recycling process and the machines consist of a recycling facility. While student D answered that the raw material of the plastic was very interesting. This caught my attention on the trip. Then, I watched the melting of the plastic curiously. Another student A; machines separate substances from each other. This caught my attention. He/she stated that thousands of papers are turned into raw materials in machines. When the students' responses were examined, it was explained that the most interesting event of the trip was the pressing of wastes, the raw material of plastic, shaping the products, and huge machines.

The other question is '' what he t can be the benefit of this kind of extra scholastic activity?'' Students answered that the trip provided many benefits. Student I; Thanks to the trip, I learned better in the open air. I am not interested in science but now I am. Student E; the trip made it easier to learn for us. Thanks to the trip, I learned the correct form of many subjects. Student K; I learned different, detailed, and interesting information during the recycling facility trip today. Student A; I have learned that recycling is not as easy as, and waste materials go through many stages. I was conscious of recycling. I think thanks to such trips, people behave consciously. The answers given to this interview question were grouped under the themes of interest, curiosity, interesting and exciting, affective theme, easy and permanent learning, and educational theme by reinforcing what was learned and creating environmental awareness and awareness, environmental sensitivity, and environmental impact. ''What did you observe about recycling during your trip to the recycling facility?'' Student M; I observed that a recycling facility is a place where everything happens regularly. Student D; in the trip, I had the chance to examine the operation of machines that function like a factory. Student A answered that we examined the stages of recycling in detail. Recycling can be done through difficult processes. That's why we need to behave well in the environment we live in.

“Did you have the opportunity to correct your misinformation during your trip to the recycling facility? '' % 35.71 of students answered that yes, I corrected my wrong information. % 64.29 of them answered that no, the trip did not provide the opportunity to correct my misinformation. Student K; before the trip, I thought recycling was simple. However, there were many stages of recycling. Student A; stated that I didn't know how papers were separated. Thanks to the trip, I learned that.

“What are your thoughts on arranging such a trip in your science classes?'' Students expressed their satisfaction with the trip and they demanded arranging more excursions. Student F; thanks to the trip, we understood better. In other lessons, the excursions should be arranged on other subjects, especially on subjects that we did not understand. Student B; Thanks to the trip, our curiosity about the lesson increased. We reinforced what we learned easily. Student I; with the trip, we had lessons based on experiments and observation. The excursions should be arranged frequently. While the answers were grouped under the sub-themes of understanding the lesson, understanding the subject, thinking about the environmental effects of waste and mental effects in science lesson via a trip, doing an experiment and making an observation, data collection, observing the process were classified under the theme of conducting research.

''What kind of suggestions do you have so that this trip can be more effective?'' Students expressed different opinions. Student B; I would like to see the recycling process of different materials apart from recycling. Student E; we should have been given more time to visit the recycling facility comfortably. Student M; during the trip, there should have been an atmosphere where students could easily ask the teacher and guide in charge of everything students sent a state that samples could be given to the students about the products formed as a result of recycling.

DISCUSSION

In the study, the effect of the recycling facility tour on the learning of secondary school students was investigated and the findings were compared with other research findings in the literature.

The student's interest and curiosity about the lesson increased with the visit to the recycling facility. The trip provided for students to easily reinforce the knowledge they learned. The students stated that they had an interesting day, they found it was more different than at school, and that they had fun on the recycling facility trip. Students want to arrange excursions in other disciplines, especially on subjects that they did not understand. It is possible to encounter studies with similar results in the literature. In the study conducted by Öner and Öztürk (2019) with teacher candidates, Students stated that they found the trip interesting, different, and fun. In the study conducted by Avcı and Gümüş (2019) primary school students in the Social Studies course, Students stated that out-of-school activities develop students' sense of curiosity, provide learning by seeing and touching, and help reinforce the learned information. Mrema (2008) stated in his/her research that recycling based on environmental activities will increase students' awareness with entertainment and motivation about recycling and its environmental effects. Richardson (2011) concluded in his study with adults that field trips increase interest in science and science and provide scientific reasoning. Becker and his friends (2017) stated that informal learning environments increase students' social and academic learning. In the study of Bostan Sarıoğlan and Küçüközer (2017), teacher candidates stated that informal learning environments increase the interest of students and increase permanent learning. Demirel and Özcan (2020) students think that the trip is interesting and helps to reinforce the knowledge learned in the lesson about the butterfly garden trip in their study.

Secondary school students defined the recycling event together with the trip as providing raw materials to nature so that they can be reused and contribute to the economy by protecting nature. After the trip, the students realized that many items such as batteries, oil, electronic and chemical wastes are not disposable but can be reused by recycling. Students think that by reducing the use of raw materials by recycling, efficient use of natural resources is ensured, and thus, it is aimed to make a profit by practicing economy. Thanks to the trip, students' cognitive learning about domestic waste and recycling increased. There are studies which similar findings in the literature. Harman and Çelikler (2016) stated teacher candidates explained the purpose of recycling as reducing the use of raw materials and preventing environmental pollution in their research. Also, students stated that wastes such as paper, plastic, plastic bottles, batteries, and glass can be recycled. In the study of Aksan (2016), students stated that recycling provides reducing the need for raw materials, protects natural resources, and practices the economy. Dick (2014) concluded that the field trip supports students' cognitive and emotional learning in his study. Whitesell (2016) concluded that field trips increased secondary school students' academic achievement. Katırcıoğlu (2019) concluded that the field trip on recycling increased secondary school students' learning. Jolley and his friends (2019) made firm that field trips increased university students' knowledge in their studies.

After the trip, the students learned that recycling is not as easy as they thought, and that waste materials go through many stages. They think that the trip has provided them with the awareness and consciousness of recycling. It is possible to encounter studies with similar results in the literature. In his study, Mrema (2008) explained that to increase the participation of students in the recycling activity, the environmental benefits of recycling should be emphasized and the students should understand the importance of taking part in the recycling event. Katırcıoğlu (2019) stated that he conducted with secondary school students on environmental behavior and awareness increased about recycling in the study. Stohlmann (2019) found that students' awareness levels increased on agriculture in his study. Behrendt (2014) concluded that secondary school students had positive attitudes and awareness toward the concepts of travel about biological parks. Bakar (2013) stated that science and arts center secondary school students do not have enough behaviors to use the recycling bin, and environmental education is important for the prevention of environmental problems, environmental awareness, and attitude in his research. Aksan (2016) stated that recycling education increased the awareness of science teacher candidates about recycling and recyclable products in her study.

CONCLUSION AND RECOMMENDATIONS

This research, it was aimed to increase student learning by processing domestic waste and recycling units with informal learning environments, and some results were obtained based on the findings.

With the field trip to the recycling facility which is an informal learning environment of the students' interest and curiosity increased in the science course? The field trip increased the interest of the students and facilitated their learning. The trip made it possible for the students to easily reinforce the knowledge they learned. Students provided permanent learning thanks to the recycling facility trip.

While the students thought that the recycling of paper, glass, and plastic products, which were commonly recycled could be done before the trip, except for paper, plastic, and glass; they realized that many other materials such as batteries, oil, electronic and chemical wastes could be recycled. The students stated that they had a different day and it was so fun for them compared to school days about the recycling facility trip. They think that the trip made them create awareness of recycling.

After the trip, the students learned that recycling is not as easy as they thought, waste materials go through many stages and become raw materials again, thanks to recycling, natural resources are used more efficiently and recycling contributes to the country's economy.

Concerning research, it is seen that informal teaching practices should be given more place informal teaching environments. To increase the frequency of field trips arranged by teachers to informal learning environments, transportation, financial limitations, and legal procedures should be eased. It is thought that arranging field trips related to different disciplines will ease students' learning. Field trips can be used to increase students' awareness of the environment.

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Statements of publication ethics

We hereby declare that the study has no unethical issues and that research and publication ethics have been observed.

Examples of author contribution statements

A.B. and B.C. conceived of the presented idea. A.B. developed the theory and performed the computations. C.D. and D.E. verified the analytical methods. B.C. encouraged A.B. to investigate [a specific aspect] and supervised the findings of this work. All authors discussed the results and contributed to the final manuscript.

Researchers' contribution rate

The study was conducted and reported with the equal collaboration of the researchers.

Ethics Committee Approval Information

With the decision of Aksaray University Ethics Committee dated 24.04.2020 and numbered 2020/03-08, it has been seen that the study by ethical principles.

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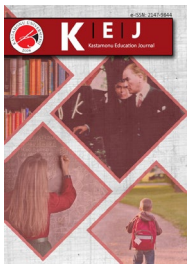

| Research Article / Araştırma Makalesi |

Analyzing of Researches on Gifted in Science Education in Turkey From 2018 to 2020

2018-2020 Yılları Arasında Türkiye'de Özel Yeteneklilerde Fen Bilimleri Eğitimi Alanında Yapılan Çalışmaların İncelenmesi[1]

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Keywords

1. Science education
2. Gifted
3. Content analysis

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Abstract

Purpose: This research aims at analyzing graduate theses and articles made on gifted individual in science education in Turkey through content analysis.

Design/Methodology/Approach: In the research, 16 theses (10 master's and six PhD theses) and 37 articles made between January 2018 and July 2020 were analyzed with content analysis. The studies were accessed from The Council of Higher Education National Thesis Center and Google Academic database.

Findings: In the studies in which content analysis made, current issues were determined as STEM education, curriculum studies, and teaching material development. In most of the studies, qualitative research method was used and "case study" among qualitative research and "survey" among quantitative research models were frequently used. A limited number of experimental researches have shown that learning approaches such as STEM Education, Brain Based Learning, Differentiated Teaching, Argumentation Based Learning, Project Based Learning, Computer Based Learning have positive results on self-regulated learning strategies, attitude towards science, scientific process skills, problem solving skills, creativity and critical thinking skills.

Highlights: It has been concluded that more experimental studies with different variables are needed on science education in gifted. Making studies on entrepreneurial skills, use of technology and different education levels are recommended.

Öz

Çalışmanın amacı: Bu araştırma, Türkiye'de özel yeteneklilerde fen bilimleri eğitimi üzerine yapılan lisansüstü tezlerin ve makalelerin incelenmesi amaçlamaktadır.

Materyal ve Yöntem: Araştırmada, 2018 Ocak ayından 2020 yılı Temmuz ayına kadar yapılmış 16 tez çalışması (10 yüksek lisans ve altı doktora tezi) ve 37 makale içerik analizi ile analiz edilmiştir. Çalışmalara YÖK Ulusal Tez Merkezi ve Google Akademik veri tabanından ulaşılmıştır.

Bulgular: İçerik analizi yapılan çalışmalarda güncel konular; STEM eğitimi, öğretim materyali geliştirme ve müfredat çalışmaları olarak tespit edilmiştir. Yapılan çalışmaların çoğunda nitel araştırma yöntemi kullanılmış ve nitel araştırma türlerinden "durum çalışması", nicel araştırma türlerinden "tarama" modeli sık kullanılan modeller olmuştur. Sınırlı sayıdaki deneysel çalışmalarda; STEM Eğitimi, Beyin Temelli Öğrenme, Farklılaştırılmış Öğretim, Argümantasyon Tabanlı Öğrenme, Proje Tabanlı Öğrenme, Bilgisayar Destekli Öğrenme gibi öğrenme yaklaşımlarının öz düzenleyici öğrenme stratejileri, fene yönelik tutum, bilimsel süreç becerileri, problem çözme becerileri, yaratıcılık ve eleştirel düşünme becerileri üzerinde olumlu sonuçları olduğu görülmüştür.

Önemli Vurgular: Özel yeteneklilerde fen bilimleri eğitimi üzerine farklı değişkenlerle daha fazla deneysel çalışma yapılmasına ihtiyaç olduğu sonucuna ulaşılmıştır. Özel yeteneklilerde girişimcilik becerileri, teknoloji kullanımı ve farklı öğretim seviyeleri ile ilgili çalışmalar yapılması önerilmektedir.

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INTRODUCTION

In today's world, it is essential to raise individuals who can keep up with the 21st century in order to be an advanced society in science and technology (Dönmez & Idin, 2017). The most influential class that will determine the future of a society in international competition is gifted individuals (Alfaqeer & Baioumy, 2019). In this century, it is aimed to raise individuals who can use information in their daily lives, not individuals who memorize information (Kanlı & Emir, 2009). For this reason, countries were asked to pay attention to this category and meet their needs in various fields because gifted individuals play an important role in development and progress by presenting their creative features and abstract ideas (Alfaqeer & Baioumy, 2019). In other words, when looking at gifted individuals, it is seen that they have above-average creativity, ability and task responsibility characteristics (Çepni, Gökdere & Küçük, 2002). In addition, gifted individuals have cognitive abilities such as understanding quickly, learning before their peers, and producing solutions to complex problems (Heller & Hany, 2004). Considering these abilities, it is of great importance to identify gifted individuals and train them in line with the needs of today's societies (Kurnaz & Barışık, 2018; Dönmez & İdin, 2017). However, it is clear that one of the most important problems in the education of gifted students is the inability to provide them with an environment where they can express their talents correctly (Kılıç, 2018). However, gifted individuals need a different education because they have their own characteristics (Kanlı & Emir, 2009). In this context, it is important to systematically develop the talents of gifted individuals within a program so that they can use their talents in the best way (Çepni, Gökdere & Küçük, 2002; Cho & Paik 2006).

In the 21st century, science education has become very important in many aspects (Kanlı & Emir, 2009). In this century, individuals are expected to develop their skills such as problem solving and critical thinking, to be more curious and to develop an attitude based on research and inquiry. Individuals with these skills and attitudes are individuals who are scientifically literate (MEB, 2006). Most gifted individuals have an intense interest in science (Ülger, Uçar & Özgür, 2014; Kunt, 2012). In addition, studies in the field of science increase the curiosity of gifted students and encourage them to do research (Şahin, 2018). In this respect, the special interest of gifted students in science enables them to be seen as the strongest candidates for being a scientist and doing science (Göz, 2019). Therefore, guiding these individuals correctly to pursue a career in science is very important for the progress of today's societies (Kanlı & Emir, 2009).

Although it has been seen that the steps related to the education of gifted individuals in our country have gained momentum recently, it is actually quite late (Kunt, 2012). Today, within the body of Science and Art Centers (BİLSEM), it is ensured that gifted students both continue their education with their peers and develop their skills (Ülger, Uçar, & Özgür, 2014). In addition, structuring learning and teaching environments according to gifted students are only possible thanks to teachers who have a good command of this field (Tüzün & Tüysüz, 2018). In this context, teachers' planning their lessons in line with the characteristics of gifted students will make the process more efficient (Şenol, 2011).

In order to provide appropriate and higher quality education to gifted students, they must first be defined correctly (Heller and Hany, 2004). In addition, there should be developed literature in this field in order for gifted individuals to be properly trained, policymakers to make the right decisions, and researchers to determine appropriate methods and techniques (Kırmızı, 2017). When the international literature is examined, it is seen that in the research analyzed studies on gifted from the 1980s to 2017 (Alfaqeer & Baioumy, 2019; Dai, Swanson & Cheng, 2011; Eunice, de Alencar & de Souza, 2018; Hernández-Torrano & Kuzhabekova, 2020; Jolly & Kettler, 2008; Lee & Choi, 2015; Lee ve Kim, 2018; Warne, Lazo, Ramos v Ritter, 2012), meta-synthesis and meta-analysis studies in the field of science education for gifted students are limited. (Kang, 2010; Yoon & Seo, 2016). Kang (2010), as a result of the analysis of the articles published from 1999 to 2009, has been determined that the number of articles has increased since 2005, the studies are mostly conducted with secondary school students, the studies are made on characteristics of the gifted, the curriculum for the gifted and the science education programs, the method is used mostly in research is questionnaires followed by experimental studies. Yoon and Seo (2016) have found to be related that research articles on cognitive characteristics made between 2010-2015 include perceptions, thinking ability, scientific argumentation, science inquiry; researches on social and emotional characteristics also include motivation, creativity, self-efficacy, etc. In this context, it has been observed that the studies conducted in Turkey have also examined the articles and theses prepared on the subjects of "gifted" at different times from 1973 to 2017. (Ayvacı & Bebek, 2019; Coşkun, Dündar & Parlak, 2014; Dönmez & İdin, 2017; Guçin & Oruç, 2015; Kardeş, Akman & Yazıcı, 2018; Koç & Saranlı, 2017; Özenç & Özenç, 2013; Yilmaz,2018). According to these studies; It has been revealed that there has been a decrease in the number of theses and articles on "science education" and "gifted" in recent years (Ayvacı & Bebek, 2019; Dönmez & İdin, 2017), but there has been a significant increase in the number of theses published in recent years on gifted. (Güçin & Oruç, 2015). It has been stated that the number of PhD theses in this field in Turkey is quite limited and more master's theses are made. (Ayvacı & Bebek, 2019; Coşkun, Dündar & Parlak, 2014; Koç & Saranlı, 2017; Özenç & Özenç, 2013). It has been seen that current approach such as argumentation, STEM and research-questioning are not included in the studies (Dönmez & İdin, 2017), the existing situations of master's theses and PhD theses are aimed at the education of gifted (Güçin & Oruç, 2015). Again, it was determined that scale adaptation studies were carried out to identify gifted children (Koç & Saranlı, 2017) and although there were studies to identify gifted children in early childhood, there were no studies on the quality of the education they received (Yılmaz, 2018). In the studies, it has been revealed that the secondary school level is mostly preferred as a sample (Schreglmann, 2016), and BİLSEMs are the centers where studies are carried out on the gifted (Kardeş, Akman & Yazıcı, 2018). It has been observed that quantitative research methods are mostly preferred in studies (Ayvacı & Bebek,

2019; Coşkun, Dündar, & Parlak, 2014; Kardeş, Akman, & Yazıcı, 2018). In addition, it has been revealed that studies in the field of special talents often consist of papers (Güçin & Oruç, 2015).

Although studies on the education of gifted students in Turkey are frequently examined, it is seen that there are limited studies on science education in gifted students (Ayvacı & Bebek, 2019; Dönmez & İdin, 2017). From this point of view, it is important to determine the new trends by examining the researches in the field of education at certain time intervals, in terms of guiding the researchers who will work in these fields (Cohen, Manion & Morrison, 2007). Since there is no current study examining the studies on science education of gifted students in Turkey since 2018, it is thought that this study will contribute to eliminating the deficiency in the literature.

Purpose of the research

The aim of the research is to examine the current postgraduate thesis studies and articles from various aspects within the scope of science education on gifted in Turkey between January 2018 and July 2020, with content analysis.

For this purpose, answers to the following research questions were sought;

1. How is the distribution according to type, years, universities where it is published, titles of advisors, department and type of bibliography on postgraduate theses in science education on gifted students in Turkey?
2. How is the distribution according to journal name, journal type, journal class and publication year on articles prepared in science education on gifted students in Turkey?
3. How is the distribution according to the subject, sample, sample size, research method, data collection tools and data analysis method on studies (articles and postgraduate theses) in science education on gifted students in Turkey?
4. What is the distribution of the results and suggestions obtained from the experimental studies prepared in science education on gifted students in Turkey?

METHOD/MATERIALS

The content analysis method was used in the research. Content analysis is the detailed, systematic examination and interpretation of certain material in order to identify concepts and themes (Berg & Lune, 2015). In content analysis, the researcher sometimes assigns numbers and sometimes words to the material s/he is examining. Thus, it makes its data more understandable with the determined codes (Patton, 2014).

Data Collection

In order to determine the studies to be included in the research, articles and theses published between January 2018 and July 2020 were scanned from the National Thesis Center of the Council of Higher Education and Google Academic databases. The terms "science education, science teaching, special education, education in gifted, BİLSEM" were searched as keywords and related postgraduate theses and articles were listed. Among the 14 postgraduate theses and 35 articles listed, the studies that would be suitable for the subject and purpose of the research were selected by criterion sampling, one of the non-probabilistic (purposive) sampling types.

The criteria determined for the selected studies;

1. Published in Turkey between January 2018 and July 2020,
2. The scope of the study is in the field of science (biology, physics, chemistry and science) teaching
3. In the journals and databases that are open to access,
4. Studies with a clearly stated method are preferred.

In line with the criteria, 16 theses (10 master's and 6 PhD theses) and 37 articles were included in the research. Information about the studies included in the research is given in Appendix-1.

Data collection tools

The studies were analyzed with the "Analysis Form (Appendix-2)", which was prepared by taking the opinion of a science expert. Analysis form; It is based on the "Paper Classification Form" created by Çiltaş, Güler and Sözbilir (2012). The form consists of seven components: the definition of the study, the subject of the study, the methods used in the study, the data collection tools used, sampling and sample sizes, data analysis methods, results and recommendations for experimental studies. This prepared form allowed the researchers to standardize the process and make an evaluation according to the same criteria.

Analysis of Data

The data obtained in the research were analysed in the following seven stages (Creswell, 2013; Merriam, 2015).

1. Preparation and organization of data for analysis: Data analysis was performed using keywords in databases, and 53 studies were reached.
2. Coding the data: The studies included in the research were coded according to predetermined criteria using the "Analysis Form".
3. Establishing the themes: The themes were determined according to the research problems by using the main themes of the study subject, study method, data collection tools, sampling and sample sizes, data analysis methods, results and suggestions for experimental studies.
4. Arrangement of data according to themes and codes: The coding, which was made independently by two different researchers, was arranged by taking the opinions of a science field expert.
5. Arrangement of sub-themes: Sub-themes in the Analysis Form were used and arranged.
6. Interpretation of the data: The data obtained from the studies were interpreted in the light of the studies in the literature.
7. Presentation and visualization of the findings: In order to make the findings more understandable, the findings are presented through tables and graphs.

Validity and Reliability

In order to ensure the validity and reliability of the research; the purpose and research questions were clearly stated, and the data collection method, inclusion and exclusion criteria were explained in detail for the validity of the findings. The studies reached on the subject and the number of those included in the analysis are specified, and their methodology, field, sample, data collection technique and data analysis methods are specified. The process of analyzing the data and establishing common themes is explained in detail (Brantlinger, Jimenez, Klingner, Pugach, & Richardson, 2005).

The process of determining the common themes was made by two researchers who are experts in the field of science education. The reliability percentage of the data (Reliability = Consensus/ (Agreement + Disagreement) x100) was calculated as 78.5%, and the consistency between the coders was tried to be ensured. A reliability percentage above 70% means that the data is reliable (Miles & Huberman, 1994; Yıldırım & Şimşek, 2018). In order to increase the credibility of the research, sections from the findings of the studies examined are also presented.

FINDINGS

Findings related to the sub-problems of the research are given below.

Findings Regarding the First Sub-Problem

The first sub-problem of the study was examined under six themes: the distribution of postgraduate theses in science education for gifted students in Turkey according to the type, years, universities in which they were published, titles of advisors, department and type of bibliography.

Table 1. Distribution of theses by year and type

Year	f	Thesis type	
		Master's (f)	PhD (f)
2018	5	1	4
2019	10	8	2
2020	1	1	-
Total	16	10	6

According to Table 1, it is seen that one of the five theses conducted in 2018 is a master's thesis, four of them are PhD thesis, eight of the 10 theses conducted in 2019 are in the type of master's thesis, two of them are PhD thesis, and in 2020 there is only one master's thesis. It has been determined that the theses prepared on science education for gifted students are mainly master's thesis.

Table 2. Distribution of theses according to the universities published

Univercity	Master's (f)	PhD (f)	Total (f)
Amasya University	-	2	2
Balıkesir University	-	1	1
Boğaziçi University	1	-	1
Erzincan Binali Yıldırım University	1	-	1
Hacettepe University	1	1	2
Kırşehir Ahi Evran University	1	-	1
Kocaeli University	1	-	1
Muğla Sıtkı Koçman University	-	2	2
Necmettin Erbakan University	1	-	1
Pamukkale University	1	-	1
Recep Tayyip Erdoğan University	1	-	1
Sakarya University	1	-	1
Uludağ University	1	-	1

According to Table 2; it is seen that postgraduate thesis studies on science education in gifted have been prepared in 13 universities. Only at Hacettepe University both master's (f=1) and PhD thesis (f=1) were made.

Table 3. Distribution of theses according to the department published

Univercity	Master's (f)	PhD (f)	Total (f)
Department of Mathematics and Science Education	7	1	8
Department of Primary Education	3	4	7
Department of Basic Education	-	1	1

Looking at Table 3; It is noticed that the most master's thesis (f = 7) was done in the Department of Mathematics and Science Education, and the most PhD thesis (f = 4) was made in the Department of Primary Education. However, it is seen that the most postgraduate thesis (f=8) was done in the Department of Mathematics and Science Education.

Table 4. Distribution of theses according to the Titles of lecturers

Title	Master's (f)	PhD (f)	Total (f)
Professor	1	3	4
Associate professor	9	2	11
PhD Member	-	1	1

According to Table 4; It is understood that postgraduate theses are mostly carried out by faculty members with the title of associate professor (f=11).

Table 5. Distribution of theses by type of bibliography

Research code	Research type	Bibliography type		Total (f)
		National (f)	International (f)	
R13	Master's thesis	57	80	137
R14	PhD thesis	111	128	239
R15	PhD thesis	85	73	158
R16	PhD thesis	87	141	228
R17	PhD thesis	23	505	528
R18	PhD thesis	98	330	428
R19	Master's thesis	44	23	67
R20	Master's thesis	47	9	56
R21	Master's thesis	57	59	116
R22	Master's thesis	93	28	121
R23	Master's thesis	4	97	101
R24	PhD thesis	80	288	368
R25	Master's thesis	45	57	102
R26	Master's thesis	68	24	92
R27	Master's thesis	96	34	130
R28	Master's thesis	49	26	75

According to Table 5; It is seen that the number of bibliography used in PhD theses (R14 (f=239), R16 (f= 228), R17 (f=528), R18 (f=428), R19 (f=328), R24 (f=368)) is higher than those used in master's theses. It is understood that the number of international

bibliography is generally higher in PhD thesis (R14 (f=128), R16 (f=141), R17 (f=505), R18 (f=330), R24 (f=288)) than in master's theses.

Findings Regarding the Second Sub-Problem

In line with the second sub-problem of the research, articles prepared in science education for gifted students in Turkey were examined under four themes: journal name, journal type, journal class and publication year.

Table 6. Distribution of articles by journal name, journal type and class

Journal name	Journal name	Class	f
Necatibey Eğitim Fakültesi Elektronik Fen ve Matematik Eğitimi Dergisi (EFMED)	National	ULAKBİM	3
Üstün Zekâlılar Eğitimi ve Yaratıcılık Dergisi (ÜZEYAD)	National	Diğer	2
Turkish Journal of Primary Education (TUJPED)	International	Diğer	2
Mehmet Akif Ersoy Üniversitesi Eğitim Fakültesi Dergisi	National	ULAKBİM	2
Milli Eğitim	National	ULAKBİM, Diğer	2
İnönü Üniversitesi Eğitim Fakültesi Dergisi	National	ULAKBİM	2
Bartın Üniversitesi Eğitim Fakültesi Dergisi	National	ULAKBİM	1
Bilim, Eğitim, Sanat ve Teknoloji Dergisi (BEST Dergi)	National	The other	1
Eğitim ve Bilim	International	SSCI	1
Journal of Education in Science, Environment and Health (JESEH)	International	ERIC	1
Eğitimde Nitel Araştırmalar Dergisi- ENAD	International	ULAKBİM	1
Journal of Baltic Science Education	International	SSCI	1
Eğitimde Kuram ve Uygulama	International	EBSCO	1
Eğitim ve Toplum Araştırmaları Dergisi/JRES	National	ULAKBİM	1
Pamukkale Üniversitesi Eğitim Fakültesi Dergisi	National	ULAKBİM	1
Science Education International	International	ERIC	1
Trakya Üniversitesi Eğitim Fakültesi Dergisi	National	ULAKBİM	1
Trakya Üniversitesi Sosyal Bilimler Dergisi	International	EBSCO, ULAKBİM	1
Maarif Mektepleri Uluslararası Eğitim Bilimleri Dergisi	International	The other	1
MANAS Sosyal Araştırmalar Dergisi	National	ULAKBİM	1
Elementary Education Online	International	ULAKBİM, The other	1
TURAN-SAM Uluslararası Bilimsel Hakemli Dergisi	International	ULAKBİM	1
Anemon Muş Alparslan Üniversitesi Sosyal Bilimler Dergisi	National	ULAKBİM	1
International Journal of Science and Research (IJSR)	International	The other	1
Türk Üstün Zekâ ve Eğitim Dergisi	National	ULAKBİM, Diğer	1
Anadolu Öğretmen Dergisi	National	The other	1
Abant İzzet Baysal Üniversitesi Eğitim Fakültesi Dergisi	National	ULAKBİM	1
Kastamonu Eğitim Dergisi	National	ULAKBİM	1
Uşak Üniversitesi Eğitim Araştırmaları Dergisi	National	The other	1
YYÜ Eğitim Fakültesi Dergisi	National	ULAKBİM, The other	1

When Table 6 is examined; it is seen that articles published in Necatibey Education Faculty Electronic Science and Mathematics Education Journal (EFMED), Gifted Education and Creativity Journal (UZEYAD), Turkish Journal of Primary Education (TUJPED), Mehmet Akif Ersoy University Education Faculty Journal, National Education and İnönü University Education Faculty Journal are more than other journals.

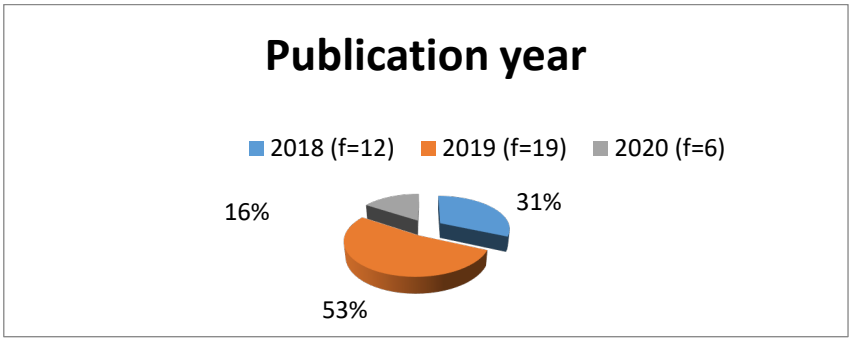

Figure 1. Distribution of articles by years

According to Figure 1, more studies were conducted in 2019 (f=19) than in 2018 (f=12) and 2020 (f=6).

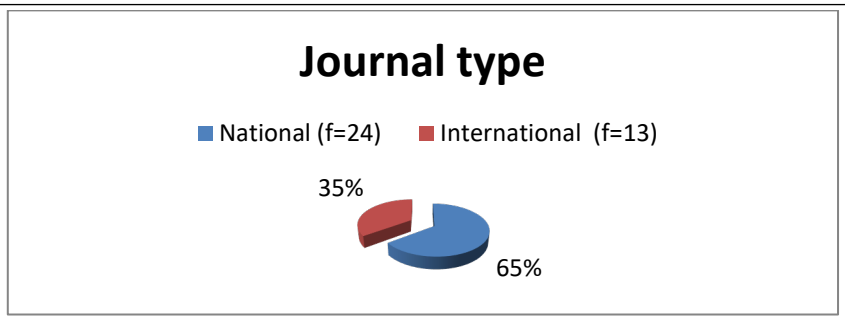

Figure 2. Distribution of articles by journal type

As seen in Figure 2, the number of publications in national journals (f=24) is more than international journals (f=13).

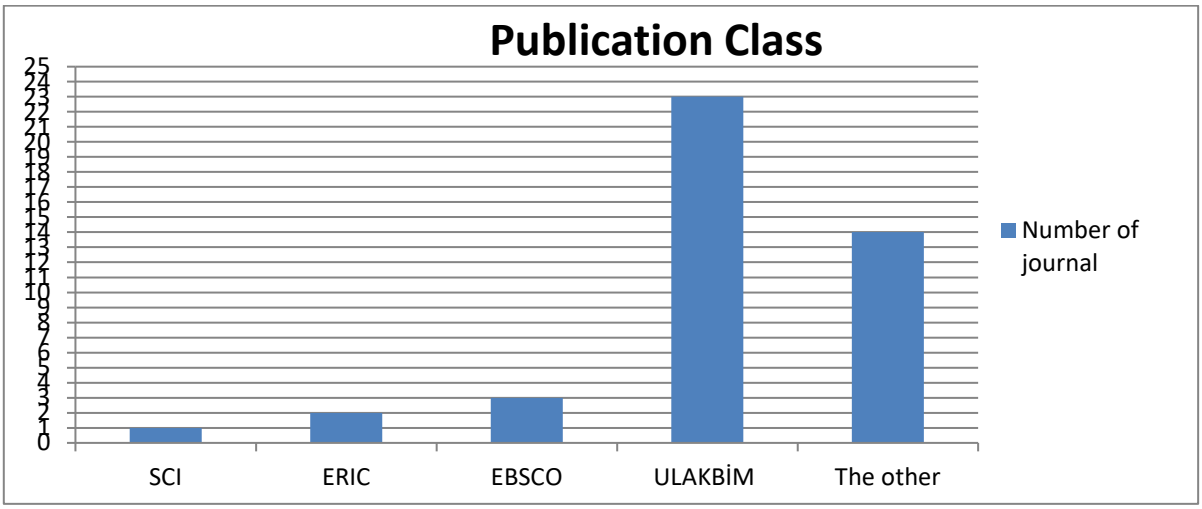

Figure 3. Distribution of articles by publication class

According to Figure 3; the most journals (f=23) are indexed in the ULAKBİM database. While two of the journals are indexed in SSCI, two in ERIC and both in EBSCO, the number of journals indexed in other databases is 14.

Findings Regarding the Third Sub-Problem

The third sub-problem of the study was examined under seven themes namely the distribution of studies (articles and postgraduate theses) in science education for the gifted according to the subject, sample, sample size, research method, data collection tools and data analysis method.

Table 7. Distribution of studies by subject

	Subject	f
Learning Method/ Technique/Strategy	STEM	12
	Differentiated instruction	7
	Project-based learning	4
	Problem-based learning	2
	Argumentation	2
	Computer assisted learning	2
	STEAM	1
	5E	1
	Brain-based learning	1
	İnquiry-based learning	1
	Concept learning	1
	Social learning	1
	EGS (Equality-Requirement-Inquiry) based teaching	1
	Self-learning	1
	Mobile learning	1
	Robotic coding training	1
	Educational game	1
The impact of teaching	Motivation towards science	6
	Creativity	5
	Self-efficacy	4
	Critical thinking skill	3
	Problem solving skill	3
	Self-regulation skill	2
	Academic success in science	2
	STEM attitude	2
	STEM interest	1
	STEM career interest	1
	Opinion on STEM activities	1
	Environmental awareness/sensitivity	1
	Perception of the science-pseudo-science distinction	1
	Self-monitoring-perception of self and task	1
	Perception of socioscientific issues	1
	Perception towards the concept of biology	1
	Attitude towards science	1
	Informal thinking skill	1
	Astronomy success	1
	Attitude towards BİLSEM	1
	Motivation towards BİLSEM	1
	Scientific creativity	1
	Engineering skill	1
	Science process skill	1
	Science self-assessment	1
	Inquiry learning skills	1
	Metacognitive awareness	1
	Unit and symbol knowledge level	1
Opinion	Students' views on BİLSEM biology activities	1
	Students' and teacher views on BİLSEM biology project studies	1
	Student's views on Science-Technology-Society	1
	Student's views on the UYEP curriculum model	1
	Teacher's views on science education given to gifted students	1
	Teacher's views on STEM	1
	Student's views on mobile application	1
	Students' views on problem-based science activities	1
Teaching material study		15
Curriculum studies		14
Scale-test development-translation		5
Concept analysis		4
Comparison of gifted and non-gifted		3
Theoretical article		3
Teacher candidate training		2
Educational problems		1
Teacher training		1

When Table 7 is examined; It is understood that the most used learning method/technique/strategy in studies is STEM (f=12) and the effect of applied teaching on motivation toward science (f=6) has been investigated. Among the studies, it is seen that teaching material (f=15) and curriculum (f=14) studies are more studied than other subject areas.

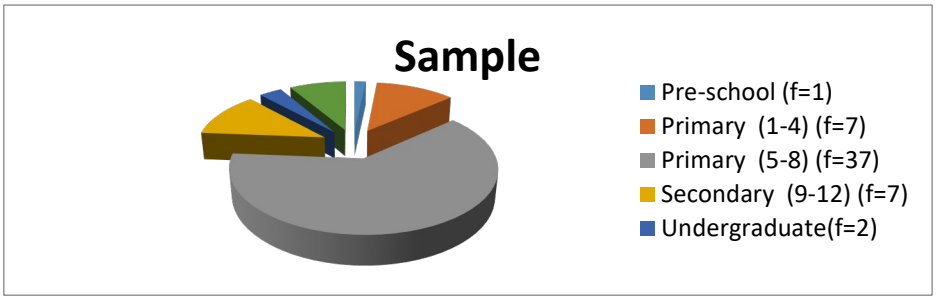

Figure 4. Distribution of studies by sample type

In the studies presented in Figure 4; It is understood that the sample consisted of 7 of them 5-8 grade primary education, 7 of them 1-4 grade primary school students, 7 of them secondary school (9-12) students, 5 of them teachers, 2 of them undergraduate students and only one of them preschool students.

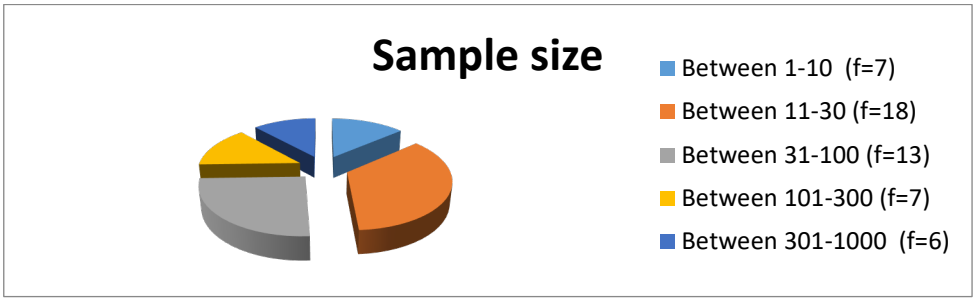

Figure 5. Distribution of studies by sample size

In Figure 5, it is noticed that the most studied sample sizes in the studies are between 11-30 (f=18) and 31-100 (f=13).

Table 8. Distribution of studies according to research method

Research Method	Research Model	f
Quantitative method	Survey	10
	True-experimental	3
	Quasi-experimental	2
	Weak-experimental	1
	Comparative	3
	Correlational	3
Qualitative method	Case study	17
	Phenomenology	4
	Action research	2
	Basic qualitative study	1
Mixed method	Explanatory (Quantitative → Qualitative)	2
	Variation (Quantitative + Qualitative)	5

According to Table 8; it is seen that the qualitative method (f=24) is used more than the quantitative method (f=22) and mixed method (f=7). In addition, İt is understood that the survey model of the quantitative method (f=10) and the case study model of the qualitative method (f=17) are more preferred.

Table 9. Distribution of studies according to data collection tools

Data collection tools	Tool type	f
Questionnaire	Likert	14
	Open-ended	9
Interview	Semi-structured	24
	Non-structured	1
Observation	Participatory	6
	Non-participatory	8
	Focus group	1
Achievement test	Open-ended	1
	Multiple choice	5
Perception/interest/Attitude/Talent/Personality etc. tests		11
Documents		17

According to the findings obtained from Table 9; It is understood that the most used data collection tools in studies are semi-structured interviews (f=24), documents (f=17) and Likert type questionnaires (f=14).

Table 10. Distribution of studies according to data analysis method

Data analysis method			f
Quantitative analysis	Descriptive	Frequency/percentage table	14
		Mean/standard deviation	19
		Graphical representation	2
	Predictive	t-test	12
		Correlation	3
		Factor analysis	5
		Regression	2
		ANOVA/ANCOVA	6
		Non-parametric	9
		Path analysis	1
Qualitative analysis		Content analysis	25
		Qualitative descriptive analysis	19

According to Table 10; In the analysis of the studies, it is seen that the mean/standard deviation (f=19) and frequency/percentage tables (f=14) are used more in the descriptive analysis, and the t-test (f=12) and non-parametric tests (f=9) are used more in the predictive analysis.

Findings Regarding the Fourth Sub-Problem

In order to determine the distribution of articles and postgraduate theses prepared by using the experimental method in science education for gifted students in Turkey, according to the results and suggestions, two sub-themes, namely conclusions and suggestions, were created.

Table 11. Distribution of studies prepared using experimental method according to the results

Results	f
Positive impact of STEM education	3
Positive increase in self-regulated learning strategies	2
Positive increase in critical thinking skills	2
Positive increase in attitude towards science	2
Positive increase in science process skills	2
Positive increase in problem solving skills	2
Positive increase in creativity	2
Positive increase in motivation towards science learning	2
Positive increase in academic achievement	2
Positive increase in self-confidence	1
Positive increase in scientific creativity	1
Positive increase in epistemological beliefs	1
Positive increase in engineering skills	1
Positive effect of differentiated science activities	1
Increased motivation towards self-regulation	1

Results	f
The positive effect of learning argumentation-based science	1
Positive effect of programming education in visual environments	1
The positive effect of the enriched program	1

When Table 11 is examined; It is seen that the results obtained are positive. It is understood that more experimental studies have been conducted on gifted students' self-regulated learning strategies, attitudes towards science, scientific process skills, problem solving skills, creativity and critical thinking skills, and STEM education.

Table 12. Distribution of studies prepared using experimental method according to recommendations

Recommendations	f
Conducting teacher candidates and teacher trainings	5
Working with different teaching levels	4
Making curriculum studies for gifted	3
Comparing gifted and non-gifted students	3
Ensuring cooperative learning	2
STEM activities and lesson plan preparation	2
Making longitudinal studies on gifted	2
Setting up STEM education centers	1
Establishing a science center for gifted	1
Prepare brain-based differentiated activities	1
Including STEM education in BİLSEM activity books	1
Information sharing with STEM festivals for BİLSEMs	1
Ensuring parent participation in STEM activities	1
Preparing STEM product evaluation tools	1
Planning differentiated events	1
Ensuring school administration-teacher-student communication	1
Ensuring the accessibility of differentiated programs in the digital environment (website, program, etc.)	1
Determining student readiness	1
Development of verbal and nonverbal tests in preschool period	1
Conducting studies in different socioeconomic and sociocultural regions	1

According to the findings in Table 12; In experimental studies, it has been seen that suggestion such as more pre-service teacher and teacher training (f=5), working with different teaching levels (f=4), making curriculum studies for gifted students (f=3), comparing gifted and non-gifted students (f=3), ensuring cooperative learning (f=2), making longitudinal studies in special gifted (f=2), STEM activities and lesson plan preparation (f=2) are made.

DISCUSSION AND CONCLUSION

In order to guide future education programs, teaching methods and techniques for gifted individuals, 16 theses (10 masters and 6 PhD) and 37 articles published between January 2018 and July 2020 in the field of science education were examined in detail. The results of this review were discussed in the light of the literature and suggestions were made.

Theses prepared on science education for gifted students are mostly master's theses and they were prepared in the Department of Mathematics and Science Education. There are many studies supporting this result (Ayvacı & Bebek, 2019; Koç, & Saranlı, 2017; Gülçin & Oruç, 2015; Coşkun, Dündar, & Parlak, 2014; Özenç & Özenç, 2013). As the reasons for this situation; the fact that studies on special talents are new in Turkey (Gülçin & Oruç, 2015), the purpose of master's theses is to specialize more, and the purpose of PhD theses is to contribute to universal knowledge (Ayvacı & Bebek, 2019); entry requirements for doctorate are more difficult than masters, the economic/psychological burden of the doctorate process is higher than the master's process and it requires more time; the scarcity of expert who can do a doctorate in the field of gifted throughout the country (Coşkun, Dündar, & Parlak, 2014; Özenç & Özenç, 2013) can be shown. In addition, the combination of Special Education Teaching Undergraduate Programs (Education Programs for the Visually Impaired, Mentally Impaired, Hearing Impaired and Gifted/Talented) in the 2016-2017 academic year may have an effect on the preparation of theses mostly in the Department of Mathematics and Science Education. Combining the programs has led to problems in lecturers (Filiz, Şahin, Tufan, & Karaahmetoğlu, 2018). For this reason, it may have led to a decrease in the possibility of gifted education graduates studying for many programs to turn to the field of science academically and that the research in this specific field is met by the Department of

Mathematics and Science. Considering the impact of academic studies on education policies, it can be suggested that students and academics should be encouraged to increase the number of PhD theses, which require a more comprehensive study and provide more data than master's theses.

Most of the theses made in 13 universities on science education for gifted students were prepared by faculty members with the title of associate professor. In their study, Dönmez and İdin (2017) concluded that although there are science teaching departments in 70 universities in our country, studies are carried out in very few universities and most of them are consulted by associate professors. Based on this, it is thought that the workload on Associate Professors will be reduced if the theses consultancy were distributed proportionally between Professors, Associate Professors and PhD Faculty Members.

Among the graduate thesis studies, the number of references used in PhD theses is higher than the references used in master's theses. Considering that PhD theses are more comprehensive studies, this is an expected result. In addition, it is seen that the number of international bibliographies used in PhD theses is higher. This result coincides with the results of Coşkun, Dündar, and Parlak (2014), who reported that the number of international bibliographies is higher in PhD theses. This situation may have been caused by the fact that many universities do not require foreign language scores for entry to master's programs according to the postgraduate education and training regulations, and that there is a foreign language score requirement for entry to PhD programs. In order to ensure that the studies conducted throughout Turkey contribute more to the international literature, graduate students can be encouraged to examine the international literature and to use foreign resources in their theses.

More studies were conducted in 2019 and article studies were generally published in national journals. In order to reach the studies in a healthy way, the compatibility between the titles and keywords of the publications related to science education for the gifted can be examined. The most widely used learning method/technique/strategy in studies is STEM education. On the contrary, Dönmez and İdin (2017) reported that they did not find any studies on STEM education in their study. The updating of the science course curriculum by the Ministry of National Education in 2017 may have caused this situation. In the updated program, the "Science and Engineering Applications" field in the knowledge learning area of the science course, and the "Science and Engineering Applications" area in the skill learning area have been added. With these added fields, it is aimed to integrate science with technology, engineering and mathematics (MEB, 2017).

At this point, the new MEB teaching policy may have led researchers to focus mostly on STEM education. Yıldırım and Altun (2015) also reported that STEM education has become a subject that researchers want to work on in the last three years, considering that it brings together various disciplines and provides effective and permanent learning and develops high-level thinking skills in individuals. At this point, since it is a new field of study, more research can be done on STEM education with the gifted. In addition, it has been noticed that in the researches, skill learning areas (scientific process skills, problem solving skills, creativity and critical thinking) are generally studied. The field of "Science and Engineering Applications" in the 2017 curriculum was organized as the "Science, Engineering and Entrepreneurship Applications" field in the 2018 science curriculum (MEB, 2018). Researchers can be advised to study on the entrepreneurship skills of gifted students.

Among the studies, it was seen that teaching materials and curriculum studies were studied more than other subject areas. Yoon and Seo (2016) also stated that were focused on curriculum studies. Considering that the studies conducted in Turkey on the education of gifted students are new, it is understandable situation that there is an effort to develop materials and present them in a curriculum for teaching students. This result is in parallel with the result of Kardeş, Akman, and Yazıcı (2018) that the scale development and adaptation studies are limited. In this respect, more studies can be conducted to identify and evaluate the gifted.

Postgraduate theses and articles were mostly -studied with 5-8 grade students, with a sample size of 11-30 and 31-100. This result may have been caused by the fact that the science course is taught between the fifth and eighth grade levels in our country and that the researchers have the research in their own classrooms. Schreglmann (2016), Yoon and Seo (2016) also found that similar samples are generally used in studies. Researchers may be advised to conduct studies with different samples. In the studies examined, it was noticed that the studies on the preschool period were quite limited. It is noteworthy that there are few studies on the pre-school period, which is the most active period for the individual physically, emotionally and socially, in which brain development and mental functions are at the highest level. However, the most important period for discovering gifted students and making early interventions is early childhood, and this period also affects their future education (Koç & Saranlı, 2017). Similarly, Yılmaz (2018), Koç, and Saranlı (2017) concluded that studies in early childhood are limited. For this reason, various scientific/applied studies can be conducted to identify and support special talents at an early age. Another result is the limited number of studies with undergraduate students and teachers. Likewise, Özenç, and Özenç (2013) stated that practices are usually done with students and that teachers, parents, etc. emphasized the need to diversify the participants by ensuring their participation.

Quantitative, qualitative and mixed methods were used in the studies. The existence of these three research methods has provided diversity in scientific research methods. While it is the most preferred qualitative method, mixed method studies are very few compared to the others. The fact that the mixed method is less preferred may be due to the fact that this research method is newly adopted in our country or that it requires mastery of both quantitative and qualitative research methods. Although the result obtained is similar to the result of Ayvacı and Bebek (2019), which states that the use of mixed method is limited, it does not match the result that mostly quantitative studies are made. On the other hand, Koç and Saranlı (2017) reported that the studies were mostly carried out with quantitative or mixed-methods. Kardeş, Akman, and Yazıcı (2018), Bolat and Tekin (2017) also reported that more quantitative studies were conducted. The fact that more qualitative methods were used in the studies examined in this research is an important development in terms of understanding the concept of giftedness and increasing the belief in providing rich data for gifted individuals. More qualitative and mixed method studies can be recommended in order to interpret the data in multiple ways for future research.

In the studies, the survey model, which is one of the non-experimental quantitative methods, was preferred. Özenç and Özenç (2013) also determined that the most used research model in studies is the survey model. The advantages of the survey model such as the economy and fast data collection may have been a factor in its preference (Creswell, 2012). It has been observed that experimental quantitative methods are used less frequently in studies, but it contributes to the diversity of designs by making use of full, semi and weak experimental designs. The difficulty in reaching the samples of gifted individuals and the fact that they were educated with different programs may have been caused experimental quantitative methods are less preferred in the research of gifted. In our country, the education of gifted individuals is carried out through various programs only in Gifted Education Programs (ÜYEP), after-school programs in Science and Art Centers (BİLSEM), or in special classes in private schools such as science high schools, conservatories and sports high schools. It is understood that the inadequacy of government policies for gifted students and the absence of a standard program is an obstacle to the enrichment of educational practices (Sak, Ayas, Sezerel, Öpengin, Özdemir, & Gürbüz, 2015). In addition, because of the fact that students studying in these centers, where studies are concentrated, are frequently exposed to an experimental study that they do not volunteer to participate in these studies may also be a reason. At this point, it can be suggested to the program makers that the programs implemented are evaluated and they contribute to creating a study area for the researchers.

In the studies examined, the case study model was preferred more than the qualitative methods. In the case study, which is one of the qualitative research methods, it is aimed to collect comprehensive data by examining a limited system in depth (Creswell, 2012). The fact that the studies are more focused on situation determination is important in terms of understanding how gifted behave in study environments. Dönmez and İdin (2017) also concluded that the theses prepared in the field are experimental and case studies. Since there are more case studies, a meta-analysis can be done by examining the case studies on science education of gifted students.

The most used data collection tools are documents and semi-structured interviews. Semi-structured interview technique, which is the most used technique among interview techniques, is generally preferred more because it does not limit the researcher and offers the freedom for the participants to elaborate their answers more (Cohen et al., 2007). It can be cited as the reason for the frequent use of documents is that they can be obtained at the end of interviews and observations. Again, Likert type questionnaires were mostly used in studies. It can be said that Likert-type measurement tools are frequently preferred in studies because being easy to prepare and apply (Spector, 1992). Dönmez and İdin (2017), Özenç and Özenç (2013) and Kang (2010) also concluded that questionnaires were highly utilized in the studies and emphasized that the use of qualitative measurement tools would provide access to more in-depth information. More experimental studies were conducted on self-regulated learning strategies, attitudes towards science, scientific process skills, problem solving skills, creativity, critical thinking skills of gifted students. It has been understood that learning approaches such as STEM education, Brain-Based Learning, Differentiated Teaching, Argumentation-Based Learning, Project-Based Learning and Computer Based Learning have positive effects on these variables.

More experimental studies have been conducted on self-regulated learning strategies, attitudes towards science, scientific process skills, problem solving skills, creativity, critical thinking skills of gifted students. It has been understood that learning approaches such as STEM education, Brain-Based Learning, Differentiated Teaching, Argumentation-Based Learning, Project-Based Learning and Computer Based Learning have positive effects on these variables. International literature also supports these findings (Kim & Kim, 2018; Kim & Jhun, 2018; Wilson, 2018; Han & Shim, 2019; Morris, Slater, Fitzgerald, Lummis, & van Etten, 2019; Yoon & Seo, 2016). When the international literature is examined, it has been seen that the studies on the use of technology in intelligence games, creative applications, coding and STEM applications among gifted have increased in recent years (Uzunboylu, Ozcinar, Kolotushkin, Kalugina, & Zulfugarzade, 2019). At this point, it can be suggested to focus on using technology in the education of the gifted.

It has been noticed that the experimental studies examined, more pre-service teachers and teacher trainings, curriculum studies for special talents, working with different teaching levels, STEM activities and lesson plan preparation, providing collaborative learning, comparison of gifted and non-gifted students, and longitudinal studies with gifted has been recommended. It is an expected result that being more educational researches in this field considering that there is a need for education programs that are different from normal school programs in order for gifted individuals to be beneficial to society. These results can also be found in the international literature. In the findings obtained by Alfaqeer and Baioumy (2019) via comparing countries in order to determine the needs of gifted students; They drew attention to the necessity of preparing special enrichment programs that meet the needs of the students, develop their talents and skills, reveal their creativity tendencies and enable collaborative study. Eunice, de Alencar, and de Souza (2018) reported that in the studies conducted for gifted students in Brazil, it is recommended to conduct teacher candidates and teacher training, provide school-family communication, and conduct studies on early childhood. He said that when compared to the researches on achievement, discrimination, intelligence and teaching-learning programs for gifted children, research studies on gifted psychological counseling that deal with the psychological and justice development of gifted children are less. With the growth and development of gifted students, he suggested that current selection, identification and program-centered research on cognitive aspects and research on future psycho-emotional development aspects should be done more actively. In line with these suggestions, in parallel with the international literature, it can be suggested that researches involving the families of gifted students in our country (for example, taking part in science festivals together) should be carried out.

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Statements of publication ethics

We hereby declare that the study has not unethical issues and that research and publication ethics have been observed carefully.

Examples of author contribution statements

S.A. and G.Ç.N. conceived of the presented idea. M.Y. developed the theory. S.A. performed the computations. M.Y. and G.Ç.N. verified the analytical methods. M.Y. encouraged S.A. and G.Ç.N. to investigate [a specific aspect] and supervised the findings of this work. All authors discussed the results and contributed to the final manuscript.

Researchers' contribution rate

The study was conducted and reported with equal collaboration of the researchers.

Ethics Committee Approval Information

Since the study was not experimentally designed, an "Ethics Committee Report" was not presented.

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APPENDIX-1. Information on the studies included in the research

	Authors and Publication Year	Publication Type	Publication Name
R1	Kılıç (2018)	Article	"Üstün Yetenekli Çocukların Fen Eğitiminde Bilim Deney Merkezlerinin Rolü"
R2	Ayaydın, Ün, Acar Şeşen, Usta Gezer ve Camcı Erdoğan (2018)	Article	"Özel Yetenekli Öğrencilerin Çevre Farkındalık ve Duyarlılıkları: "Bilim ve Sanat Kâşifleri Doğada""
R3	Akbaş ve Çetin (2018)	Article	"Üstün Yetenekli Öğrencilerin Çeşitli Sosyobilimsel Konulara İlişkin Argümantasyon Kalitesinin ve İnformal Düşünme Becerisinin İncelenmesi"
R4	Erdoğan (2018)	Article	"Üstün/Özel Yeteneklilerde Atomun Yapısı Konusunun Öğretiminde Bütüncül Yaklaşımla Program Farklılaştırma"
R5	Açıkgül Fırat ve Köksal (2018)	Article	"Özel Yetenekli Öğrencilere Yönelik Fen Bilimlerine Özgü Uzamsal Akıl Yürütme Becerisi Testinin Geliştirilmesi"
R6	Kurnaz ve Şentürk Barışık (2018)	Article	"Üstün Zekâlı Öğrencilerin Fen Bilimlerinde Motivasyonel İnançları ve Yaratıcı Düşünme Becerileri Arasındaki İlişkilerin İncelenmesi"
R7	Özarslan ve Çetin (2018)	Article	"Gifted And Talented Students' Views About Biology Activities İn A Science And Art Center"
R8	Özçelik ve Akgündüz (2018)	Article	"Üstün/Özel Yetenekli Öğrencilerle Yapılan Okul Dışı STEM Eğitiminin Değerlendirilmesi"
R9	Saraçoğlu, Şengül Yıldırım ve Bektaş (2018)	Article	"Üstün Yetenekli Öğrenciler ile Normal Gelişim Gösteren Öğrencilerin Fen Öz-Yeterliklerinin Sınıf Düzeyine Göre İncelenmesi"
R10	Şahin (2018)	Article	"Argümantasyon Tabanlı Bilim Öğrenme Yaklaşımının Üstün Yetenekli Öğrencilerin Fen Bilimleri Derslerindeki Akademik Başarılarına Etkisi"
R11	Şahin ve Kabasakal (2018)	Article	"STEM Eğitim Yaklaşımında Dinamik Matematik Programlarının (Geogebra) Kullanımına Yönelik Öğrenci Görüşlerinin İncelenmesi"

	Authors and Publication Year	Publication Type	Publication Name
R12	Tüzün ve Tüysüz (2018)	Article	"Özel Yetenekli Bireylerin Öğretmenleri İçin STEAM Eğitimi"
R13	Akpınar (2018)	Master's Thesıs	"Üstün Yetenekli ve Zekâlı öğrencilerde Stem Eğitiminin Öz düzenleme, Fen'e Yönelik Motivasyonları ve Epistemolojik İnançlarına Etkisinin İncelenmesi"
R14	Ayverdi (2018)	PhD Thesis	"Özel Yetenekli Öğrencilerin Fen Eğitiminde Teknoloji, Mühendislik, Matematiğin Kullanımı: Fetemm Yaklaşımı"
R15	Kaymakçı (2018)	PhD Thesis	"Ortaokul Bilsem Öğrencilerine Yönelik Fen Eğilimi Öz-Değerlendirme Ölçeği'nin Geliştirilmesi ve BİLSEM Öğrencilerinin Fen Öğrenmeye Yönelik Motivasyonlarının Belirlenmesi"
R16	Kutlu Abu (2018)	PhD Thesis	"Üstün Yetenekli Öğrencilerin Kaynaştırılmasına Yönelik Farklılaştırılmış Fen Etkinliklerinin Değerlendirilmesi"
R17	Şen (2018)	PhD Thesis	"Mühendislik Tasarımı Odaklı Bütünleşik STEM Etkinliklerinde Üstün Zekâlı ve Yetenekli Öğrencilerin Kullandığı Beceriler"
R18	Akkanat (2019)	PhD Thesis	"Bilim ve Sanat Merkezlerine Devam Eden Öğrencilerin Fen Yeteneklerini Okul İklim ve Akademik Katılımın Yordaması Üzerine Bir Model Çalışması"
R19	Barış (2019)	Master's Thesis	"Bilsem'de Görev Yapan Fen Bilimleri ve Matematik Öğretmenlerinin STEM Eğitim Uygulamalarının Araştırılması"
R20	Dağlı (2019)	Master's Thesis	"Üstün Yetenekli Öğrencilere Verilen Fen Eğitimine Yönelik Fen Bilimleri Öğretmenlerinin Görüşleri"
R21	Eker (2019)	Master's Thesıs	"Bilim Sanat Merkezlerinde Görev Yapan Öğretmenlerin Bilim, Teknoloji, Mühendislik ve Matematik Eğitimi Algıları"
R22	Göz (2019)	Master's Thesis	"Özel Yetenekli Öğrencilerin Fen-Teknoloji-Toplum Hakkındaki Görüşleri"
R23	Koçoğlu (2019)	Master's Thesis	"Investigation Of Self-Regulated Learning (Srl) Strategies Used By Gifted Students While Learnıng Science"
R24	Okulu (2019)	PhD Thesis	"Stem Eğitimi Kapsamında Astronomi Etkinliklerinin Geliştirilmesi ve Değerlendirilmesi"
R25	Taktat Ateş (2019)	Master's Thesis	"Özel Eğitim Öğretmenlerinin Fen Bilimlerine Yönelik Öz Yeterlik İnançları"
R26	Seren (2019)	Master's Thesis	"Üstün Yetenekli Öğrencilerle STEM Etkinliklerinin Tasarlanması ve STEM Etkinliklerinde 3 Boyutlu Teknolojilerin Kullanılması"
R27	Yurtkulu (2019)	Master's Thesis	"Özel Yetenekli Öğrenciler ve Akranlarının Görsel Okuryazarlık Düzeyleri ve Fen Dersindeki Görselliğe İlişkin Görüşleri"
R28	Elmas (2020)	Master's Thesis	"Üstün Yetenekliler Eğitim Programları Müfredat Modeli Kullanılarak Zenginleştirilen ve Hızlandırılan "Madde ve Doğası" Konu Alanı ile İlgili Öğrenci Görüşleri: Bursa PÜYED Örneği"
R29	Alkan (2019)	Article	"Özel Yetenekli Öğrencilerin Programlama Dili Öğretiminde Kodu Game Lab Yazılımının Problem Çözme Becerileri Düzeyine Etkisi"
R30	Barış ve Ecevit (2019)	Article	"Özel Yetenekli Öğrencilerin Eğitiminde STEM Uygulamaları"
R31	Bildiren ve Kargın (2019)	Article	"The Effects Of Project Based Approach İn Early Intervention Program On The Problem Solving Ability Of Gifted Children"
R32	Camci Erdogan (2019)	Article	"How Do Prospective Elementary And Gifted Education Teachers Perceive Scientists And Distinguish Science From Pseudoscience?"
R33	Can ve İnel Ekici (2019)	Article	"Üstün ve Özel Yetenekli Öğrencilerin Probleme Dayalı Fen Etkinliklerine İlişkin Görüşlerinin Değerlendirilmesi"
R34	Dolu ve Ürek (2019)	Article	"Kimyasal Değişim Temalı Etkinliklerin Özel Yetenekli Öğrencilerin Kimyasal Değişim-Işık İlişkisini Kavramsal Anlama Düzeylerine Etkisinin İncelenmesi"
R35	İkikat (2019)	Article	"Zenginleştirilmiş Fen Bilimleri Dersi ile Çocuklarda Yaratıcılık Geliştirme"
R36	Karahan ve Ünal (2019)	Article	"Üstün Yetenekli Öğrencilerin Çevre Dostu STEM Projeleri Tasarımı"
R37	Mutlu ve Nacaroğlu (2019)	Article	"Examination Of Perceptions Of Gıfted Students About Climate Change And Global Warmıng"
R38	Nacaroğlu ve Arslan (2019a)	Article	"Bilim ve Sanat Merkezlerinde Yürütülen Proje Çalışmalarına İlişkin Öğrenci Görüşlerinin Değerlendirilmesi"
R39	Nacaroğlu ve Arslan (2019b)	Article	"Özel Yetenekli Öğrencilerin Fen Bilimleri ve Matematik Derslerinde Kullanılan Sembol ve Birimlere Yönelik Bilgi Düzeylerinin İncelenmesi"
R40	Nacaroğlu ve Bektaş (2019)	Article	"Fen Bilimleri Dersindeki Madde ve Değişim Ünitesine Yönelik Geçerli ve Güvenilir Başarı Testi Geliştirme: BİLSEM Örneği"

	Authors and Publication Year	Publication Type	Publication Name
R41	Özarslan (2019a)	Article	"Üstün Zekâlı ve Yetenekli Olan ve Üstün Zekâlı ve Yetenekli Olmayan Öğrencilerin Biyolojiye İlişkin Algılarının Karşılaştırılması: Metaforik Çalışma"
R42	Özarslan (2019b)	Article	"Özel Yetenekli Öğrencilerin ve Biyoloji Danışman Öğretmenlerinin BILSEM Biyoloji Proje Çalışmaları Hakkındaki Görüşleri"
R43	Özdemir ve Gürlen (2019)	Article	"Üstün Yetenekli Öğrencilere Yönelik Zenginleştirilmiş Fen Bilimleri Öğretim Programına İlişkin Eylem Araştırması"
R44	Subaşı ve Özay Köse (2019)	Article	"Üstün Yetenekli Öğrencilere Bağışıklık Sistemi Konusunun Öğretiminde Egs Tabanlı Öğretim Yönergesinin Etkisi"
R45	Tiryaki, Çakıroğlu ve Yaman (2019)	Article	"The Effects Of The Program Including Differentiated Stem Applications Based On The Parallel Curriculum Model On The Critical Thinking Skills, Creativity And Attitudes Of Gifted And Talented Students"
R46	Yaman ve Emir (2019)	Article	"Beyin Temelli Öğretiminin Özel Yetenekli Öğrencilerin Yaratıcılıklarına ve Eleştirel Düşünmelerine Etkisi"
R47	Yıldırım ve Saraçoğlu (2019)	Article	"Normal Gelişim Gösteren ve Üstün Yetenekli Ortaokul Öğrencilerinin Fen Bilimleri Öz yeterlikleri ve Öz yeterliklerine Cinsiyetin Etkisi"
R48	Ayverdi ve Öz Aydın (2019)	Article	"Özel Yetenekli Öğrencilerin Eğitiminde Fetemm"
R49	Bircan ve Köksal (2020)	Article	"Özel Yetenekli Öğrencilerin Stem Tutumlarının ve STEM Kariyer İlgilerinin İncelenmesi"
R50	Karataş ve Solak (2020)	Article	"Böcekleri Takım Düzeyinde Teşhise Yönelik Geliştirilen Mobil Uygulamanın Özel Yetenekli Öğrenciler Açısından Etkililiğinin Değerlendirilmesi"
R51	Kılıçkıran, Korkmaz ve Çakır (2020)	Article	"Robotik Kodlama Eğitiminin Üstün Yetenekli Öğrencilere Katkısı"
R52	Kutlu Abu ve Gökdere (2020)	Article	"Üstün Yeteneklilere Yönelik Farklılaştırılmış Fen Öğretim Modülü Hakkında Sınıf Öğretmeni Adaylarının Kavramsal Algıları ve Değerlendirmeleri"
R53	Yılmaz, Üçüncü ve Arık (2020)	Article	"Özel Yetenekli Öğrencilerde Habitat Parçalanmasına Yönelik Farkındalık Oluşturma: Müzikli Sandalye Oyunu"

APPENDIX-2. Analysis Form

WORK IDENTITY	
Author/s (with titles)	
	Turkish Foreign Mixed
Journal	**Name:**
	Keywords:
	Year: **Volume:** **Issue:** **Page:**
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WORK IDENTITY		
1. Learning method/ technique/ strategy Brain Based Learning Problem-Based Learning Inquiry-Based Learning Web-Based Learning Social Learning STEM 5E Differentiated Learning Method comparison **Other: .....**	**2. The Effect of Teaching** **a. Success (name: .....)** **b. Attitude (name: .....)** **c. Motivation (name: .....)** **d. Interest (name: .....)** **e. Perception (name: .....)** **f. Skill (name: .....)** Self-regulation/ Self-efficacy Creativity Epistemological belief Critical Thinking Skill Scientific Process Skills Mental Risk Taking Inquiry Learning Skill **Other: .....**	**3. Teacher training** Teacher candidate training In-service training teacher opinion Teacher self-efficacy **Other: .....** **4. Education/training issues** **5. Studying teaching material** **6. Comparison of gifted and non-gifted** **7. Scale-Test Development-Translation** **8. Research method studies** **9. Curriculum studies** **10. Concept analysis** **11. Other: .....**

METHOD				
QUANTITATIVE		**QUALITATIVE**		**MİXED**
Experimental	**Non-experimental**	**Interactive**	**Non-interactive**	Explanatory (Quantitative → Qualitative) Explorer (Qualitative → Qualitative) Variation (Quantitative + Quantitative)
True-experimental Quasi-experimental Weak experimental Single subject	Descriptive Comparative Correlational Survey Secondary data analysis	Culture analysis Phenomenology Case Study Theory building Critical studies	Historical analysis Concept analysis Compilation Meta-analysis Other	

DATA COLLECTION TOOLS		SAMPLE	
Name:		**Sample**	**Sample Size**
1. Questionnaire: Open-ended Likert Other **2. Achievement test:** Open-ended Elective Other **3. Perception/interest/Attitude/Talent/Personality etc. tests** **4. Interview:** Structured Semi-structured Unstructured Focus group **5. Observation:** Participant Non-participant **6. Alternative evaluation studies (**Diagnostic test, Concept map, Portfolio etc.) **7. Documents** **8. Other**		**1.**Pre-school **2.** Primary education (1-4) **3.** Primary education (5-8) **4.** Secondary education (9-12) **5.** Undergraduate **6.** Graduate **7.** Teacher **8.** Managers **9.** Parents **10.** Other	1. Between 1-10 2. Between 11-30 3. Between 31-100 4. Between 101-300 5. Between 301-1000 6. More than 1000

DATA ANALYSIS METHOD		
QUANTITATIVE DATA ANALYSIS QUALITATIVE DATA ANALYSIS		**QUALITATIVE DATA ANALYSIS**
Descriptive	**(Inferential)**	**Qualitative analysis**
Frequency/percentage table Mean/standard deviation Graphical representation Other.....	t-test Correlation ANOVA/ANCOVA MANOVA/MANCOVA Factor analysis Regression Non-parametric Other.....	Content analysis Qualitative descriptive analysis Other .....

CONCLUSIONS IN EXPERIMENTAL STUDIES	
Conclusion:	Positive: ..... Ineffective: ..... Negative: .....
Suggestion:	

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|Research Article|

An Analysis of University Students' Fear of Mobile Phone Deprivation (Nomophobia) and Levels of Happiness

Üniversite Öğrencilerinin Mobil Telefon Yoksunluğu (Nomophobia) ve Mutluluk Düzeylerinin İncelenmesi

Bayram GÖKBULUT[1]

Keywords

1. Nomophobia,
2. Happiness,
3. Smartphone addiction

Anahtar Kelimeler

1. Nomofobi,
2. Mutluluk,
3. Akıllı telefon bağımlılığı

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Abstract

Despite the undeniable fact that smartphones make our lives easier, their excessive use can have negative consequences leading to nomophobia and unhappiness. In this regard, this study aims to determine the nomophobia and happiness levels of preservice teachers studying at the faculty of education at a public university in the West Black Sea Region, Turkey. The data were collected from 424 preservice teachers through the Oxford Happiness Questionnaire and the Nomophobia Questionnaire. Descriptive statistics, independent samples t-test and one-way analysis of variance (ANOVA) were used in the analysis phase of the study conducted by the survey method. The relationship between nomophobia and happiness levels of preservice teachers was determined with the Pearson Correlation Coefficient (r). As a result of the study, the nomophobia and happiness levels of the preservice teachers were found moderate. No statistical significance was observed between the gender and levels of happiness of the preservice teachers, whereas a significant difference was observed between the levels of nomophobia, which were found higher in the female preservice teachers than those of the men. Similarly, no significant difference was found between the class levels and the nomophobia levels of the preservice teachers, while a significant difference was found between the class levels and the happiness levels. Considering the difference at the class level, it appeared that the happiness levels of the third-year students were higher than those of the first and second-year students. A high positive correlation was observed between the preservice teachers' levels of nomophobia and its sub-factors (Lack of Access to Information, Relinquishing the Comfort, Failing to Communicate, Loss of Online Connection), whereas no significant relationship was found between nomophobia and happiness levels.

Öz

Akıllı cep telefonları hayatımızı kolaylaştırdığı gibi, aşırı kullanımları kişiler üzerinde nomofobi, mutsuzluk gibi olumsuz etkilere neden olabilmektedir. Yapılan bu araştırma ile Batı Karadeniz Bölgesinde bir devlet üniversitesi eğitim fakültesinde öğrenim gören öğretmen adaylarının nomofobi ve mutluluk düzeylerinin belirlenmesi amaçlanmıştır. Araştırmada, *Oxford Happiness Ölçeği* ve *Nomophobia Ölçeği* kullanılarak 424 öğretmen adayından veriler toplanmıştır. Tarama yöntemiyle gerçekleştirilen çalışmanın analiz aşamasında betimsel istatistikler, bağımsız örneklem t-testi ve tek yönlü varyans analizi (ANOVA) kullanılmıştır. Öğretmen adaylarının nomofobi ve mutluluk düzeyleri arasındaki ilişki Pearson Korelasyon Katsayısı (r) ile belirlenmiştir. Araştırma sonucunda, öğretmen adaylarının nomofobi ve mutluluk düzeylerinin orta düzey olduğu görülmüştür. Öğretmen adaylarının cinsiyetleri ile mutluluk düzeyleri arasında anlamlı bir farka rastlanamazken, nomofobi düzeyleri arasında anlamlı bir farka rastlanmış olup, kadın öğretmen adaylarının nomofobi düzeylerinin erkeklerden daha yüksek olduğu görülmüştür. Öğretmen adaylarının öğrenim gördükleri sınıf düzeyleri ile nomofobi düzeyleri arasında anlamlı bir farka rastlanamazken, sınıf ve mutluluk düzeyleri arasında anlamlı bir farka rastlanmıştır. Sınıf düzeyinde bu fark, 3. sınıfta öğrenim gören öğretmen adaylarının mutluluk düzeyleri, 1. ve 2. sınıfta öğrenim görenlerden daha yüksek olduğu görülmüştür. Öğretmen adaylarının nımıfobi ve alt faktörleri (Bilgiye Erişememe, Rahatlıktan Feragat Etme, İletişim Kuramama, Çevrimiçi Bağlantıyı Kaybetme) arasında pozitif yönlü yüksek düzey bir ilişki bulunurken, nomofobi ile mutluluk düzeyleri arasında anlamlı bir ilişkiye rastlanılmamıştır.

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INTRODUCTION

Developments in mobile phone technology have had a great impact on people's use of mobile phones, eventually making mobile phones an integral part of daily life. The fact that smartphones provide access to the Internet from anywhere and have the capacity to serve as a computer has been effective in making them indispensable (Chóliz, Pinto, Phansalkar, Corr, Mujjahid, Flores, & Barrientos, 2016). As an expected consequence, smartphones have begun to replace computers, especially with their functions of sending and receiving e-mails, opening and editing documents as well as scanning them, besides online shopping, which used to be performed only with desktop computers (Alfawareh & Jusoh, 2014; Thomée, Härenstam & Hagberg, 2011). In addition to these, the number of smartphone users continues to increase day by day due to such conveniences as taking pictures, listening to music, video talking, playing games, and using social media, besides facilitating e-government and banking transactions. This figure has increased by 2.4% every year in the world and reached 5.19 billion people today (We Are Social, 2020). In a similar manner, today, the number of people who are using mobile phones is 31 million that constitute 38% of the population in Turkey, which ranks 17th in the world in terms of using mobile phones (Information and Communication Technologies Authority, 2018). Despite the existence of clear differences between communities, societies and cultures around the world, smartphone use has become a global phenomenon (Chóliz et al., 2016). Having become so widely used, smartphones present a number of positive features such as accessing information, communicating and socializing, as well as giving the sense of freedom to individuals, but when used excessively, they are likely to cause addiction (Roberts, Yaya & Manolis, 2014). Addiction is not only a biopsychosocial process or a behaviour limited to drug use, but any kind of excessive behaviour can be an indicator of addiction (Griffiths, 2005). One of such addictive behaviours is smartphone addiction despite not having an intoxicating aspect (Yıldırım & Kişioğlu, 2018). Addiction is defined as the loss of control over an object or an action that a person uses and the inability to live without it (TBM, 2015). In the digital age, the first type of addiction that comes to mind is technology addiction or Internet addiction. Recently, since access to the Internet via smartphones has become easier, the Internet addiction has been directed towards smartphone addiction (Kuyucu, 2017). Similar to other behavioural addictions such as pathological gambling and playing video games, the ease of access to the Internet via smartphones increases the likelihood of addiction (Chóliz et al., 2016; Thomée, Härenstam & Hagberg, 2011). Besides this, smartphones can easily make people become addicted by enabling them to experience a sense of temporary relief (Kim, Seo & David, 2015). A type of social network addiction (Kuss & Griffiths, 2017), nomophobia is a mental disorder in the form of feeling anxious, tense, and uneasy that emerge as a result of being unable to access digital technologies such as via mobile phones and computers (Bragazzi, & Del Puente, 2014), or the fear of being deprived of a smartphone connection (Bhattacharya, Bashar, Srivastava & Singh, 2019). Smartphone addiction causes psychological problems such as feeling loneliness and anxiety, as well as sleep disorders (Beranuy, Oberst, Carbonell, & Chamarro; Ezoe & Toda, 2013; Jenaro, Flores, Gomez-Vela, Gonzalez-Gil, & Caballo, 2007; Lu, Watanabe, Liu, Uji, Shono & Kitamura, 2011; Park, 2005; Sánchez-Martínez & Otero, 2009; Thomée, Härenstam & Hagberg, 2011). Especially during adolescence, the release of growth and other hormones depend on regular sleep; therefore, excessive use of mobile phones during this period can cause various health problems due to sleep disorders (Gezgin, 2018; Punamäki, Wallenius, Nygård, Saarni, & Rimpelä, 2007). The consequences of excessive use of smartphones include sudden reactions, withdrawal syndrome, intolerance, and relational problems (Chóliz, Pinto, Phansalkar, Corr, Mujjahid, Flores & Barrientos, 2016). Such negative consequences can result in low motivation and unhappiness in people. Accepted as the basic component of a good life, happiness means pleasure, life satisfaction, positive emotions, and making sense of life (Çankaya & Meydan, 2018).

According to the 2018 Youth Report by the Turkish Statistical Institute, young people's Internet usage rate has risen to 93%. As a source of happiness of the young people participating in the study, health came first and success the second, while the rate of the young people who said they were happy was 55.4% (Press Advertising Agency, 2019). According to those data, 44.6% of the young people could not define themselves as happy. However, in general, individuals who define themselves as happy have positive emotions, which bring along various benefits (Genç, Şahin, & Altuntaş, 2020). The emotional state of a human that is regarded a whole with feelings, thoughts and behaviours end up affecting his/her behaviours and thoughts (Can & Cantez, 2018). Happy individuals also have higher self-efficacy (Hampton, 2004). They appear to be successful in many aspects, including marriage, friendship, income, job performance, and health; their happiness is the basis of their success (Lyubomirsky, King & Diener, 2005). Happiness is the condition that an individual feels good, enjoys life and maintains it (Wodehouse, 2005). In psychology, subjective well-being is the scientific term used as the equivalent of the term happiness, and is an individual's evaluation of his/her life to express a judgment about his/her feelings (Eryılmaz, 2011). Happiness includes various concepts such as life satisfaction of individuals as well as their pleasure, mood, and positive impacts (Diener, 1984). As the happiness levels of individuals increase, their psychological resilience increases (Can, & Cantez, 2018).

Feeling happy or being happy is likely to trigger people to give out positive energy. Especially in the classroom environment, not only teachers' eagerness to increase the motivation of students towards the lesson and create an interactive classroom environment, but also their happiness is of great importance in increasing the quality of education. However, beyond their intended purpose, the excessive use of smartphones, which are offered to us as a blessing of technology, causes an addiction called nomophobia. The literature shows that smartphone addiction is the source of a variety of mental problems such as anxiety, loneliness, sleep disorders, sudden reactions, and intolerance. It is very likely that in the event of teachers and preservice teachers

displaying such behaviours in the classroom, they will negatively affect educational activities. On the contrary, in the cases that teachers smile, are highly motivated, and spread positive energy, in short, when they are happy in the classroom, they will be more likely to increase the quality of educational activities. Nomophobia, the disease of our digital age, may stop teachers from feeling happy. It is, therefore, necessary to investigate the relationship between nomophobia and the extent of happiness of teachers and preservice teachers. The given literature on nomophobia and happiness shows that there are studies in which the two concepts are discussed separately and others in which the relationships between the separate components are investigated, but no study exists to discuss nomophobia and the concept of happiness together.

The present study has aimed to reveal the relationship between nomophobia and happiness levels of preservice teachers, and answers to the following questions were sought accordingly:

What are the nomophobia and happiness levels of the preservice teachers?

Is there a statistically significant difference between the nomophobia and happiness levels of the preservice teachers, in relation to their gender and their class levels?

Is there a correlation between preservice teachers' nomophobia and happiness levels?

METHOD

Research Model

The current study has aimed to explore the difference between the happiness and nomophobia levels of the preservice teachers according to gender and class levels, and the relationship between nomophobia and happiness levels. To this end, descriptive and relational screening models were used in the study (Fraenkel & Wallen, 2005). The screening model is often used to make a general judgment about the target population. The happiness and nomophobia levels of prospective teachers were identified with the single screening model. Relational screening models are, on the other hand, used to determine the change between two or more variables (Karasar, 2017). This study was, therefore, conducted in line with the relational screening model in order to find out the differences between the happiness and nomophobia levels of the preservice teachers according to gender and class level variables. The relationship between happiness and nomophobia levels was examined using the Spearman Correlation Coefficient (r).

Population and Sample

The study population consists of preservice teachers studying at the education faculty of a public university in the West Black Sea Region, Turkey. Convenience sampling method was used, and the data were obtained from 424 preservice teachers in the 2019-2020 academic year. Some of the data were collected via Google Forms and some of them by using printed forms. Figure 1 presents the demographic characteristics of the preservice teachers participating in the study.

Table 1. Demographic information of the participants

		N	%
Gender	Male	126	29.7
	Female	298	70.3
Class	Year 1	108	25.5
	Year 2	215	50.7
	Year 3	41	9.7
	Year 4	60	14.2
Total		**424**	**100**

Data Collection Tools

The *Nomophobia Questionnaire* used in the study was developed by Yildirim & Correia (2015) and consisted of 20 items and 4 factors. The first factor, *Lack of Access to Information*, consisted of 4 items, the second factor, *Relinquishing the Comfort,* of 5 items, the third factor, *Failing to Communicate*, of 6 items, and the fourth factor, *Loss of Online Connection*, of 5 items. The lowest score obtained from the 7-point Likert scale was 20, while the highest score was 140. The mean score obtained was considered as "None" when it was 20 for the general scale, "Mild" when between 21-59, "Moderate" when between 60-99, and "Excessive" when between 100-140 (Yildirim, & Correia, 2015). If the mean score obtained from the *Lack of Access to Information* was 4, it was considered as "None", if between 5-12 as "Mild", if between 13-20 as "Moderate", and if between 21-28 as "Extreme". If the mean score for the *Relinquishing the Comfort* and *Loss of Online Connection* factors was 5, it was considered as "None", if between 6-15 as "Mild", if between 16-25 as "Moderate", and if between 26-35 as "Excessive". If the mean score obtained from the *Failing to Communicate* factor was 6, it was considered as "None", if between 7-18 as "Mild", if between 19-30 as "Moderate", and if between 31-42 as "Excessive". For the overall scale, the internal consistency coefficient, that is, the Cronbach's alpha coefficient, was .92, and the Cronbach's alpha values for sub-factors were .90, .74, .94, and .91, respectively. The internal consistency coefficient of Cronbach's alpha was .93, and Cronbach's alpha values for the sub-factors were .84, .80, .89 and .94, respectively.

The second scale used in the study is the *Oxford Happiness Questionnaire*. The original version of the scale, the shorter form of which was developed by Hills and Argyle (2002), has a single factor, 8 items, and a 6-point Likert-type rating. Adapted to Turkish by Doğan and Çötok (2016), the scale consisted of a single factor, 7 items, and a 5-point Likert rating. The lowest score that could be obtained from the scale was 7, while the highest score was 35. The internal consistency coefficient of the scale (Cronbach's alpha) was .74. The same Cronbach's alpha = .74 value was obtained as the internal consistency coefficient obtained in this study. High scores obtained from the scale were interpreted as high levels of happiness (Doğan & Çötok, 2016).

Data Analysis

Descriptive statistics were used to determine the nomophobia and happiness levels of the preservice teachers. The normality test of the data was examined through the Kolmogorov-Smirnov test. The results of the Kolmogorov-Smirnov test conducted to ensure the normality of the data obtained from the nomophobia scale indicated p>.05. According to that result, the data were considered to show normal distribution. The Kolmogorov-Smirnov test results of the happiness scale indicated p <.05. The Skewness-Kurtosis test results were examined from among the happiness scale test results in order to decide the normality value. According to the results, Kurtosis value was found as -0.14 and Skewness value as 0.091. When Kurtosis and Skewness values are between -1.5 and +1.5, the data can be considered as normally distributed (Tabachnick & Fidell, 2013).

Independent sample t-test was applied in order to determine whether there was a statistically significant difference in nomophobia and happiness levels of preservice teachers according to gender. One-way analysis of variance (ANOVA) was conducted to determine the statistical difference between the scores obtained from the nomophobia and happiness questionnaires and their class levels.

The relationships were determined with the Pearson Correlation Coefficient (r) according to the scores obtained from the responses given to the happiness and nomophobia questionnaires. SPSS.21 software was used in the analysis of the data. The hypotheses of the study were interpreted at a 0.95 confidence interval (p = 0.05).

RESULTS

Table 2 shows the descriptive statistics obtained from the respondents in the nomophobia and happiness questionnaires

Table 2. Arithmetic Means of Nomophobia and Happiness Levels

Questionnaires	Factor	N	Minimum	Maximum	$\underline{X}$	Ss	Level
Nomophobia	Lack of Access to Information	424	4.00	28.00	18.08	5.99	Moderate
	Relinquishing the Comfort	424	5.00	35.00	20.17	7.50	Moderate
	Failing to Communicate	424	6.00	42.00	26.28	10.07	Moderate
	Loss of Online Communication	424	5.00	35.00	14.41	7.65	Mild
	Nomophobia (Total)	424	20.00	140.00	78.95	25.16	Moderate
Happiness		424	7.00	35.00	22.89	5.10	Moderate

As seen in Table 2, according to the arithmetic mean of the scores obtained from the nomophobia questionnaire, *Lack of Access to Information* ($\underline{X}$=18.08), *Relinquishing the Comfort* ($\underline{X}$=20.17), *Failing to Communicate* ($\underline{X}$=26.28), and *Nomophobia*-Total ($\underline{X}$=78.95) seem to be moderate. On the other hand, the mean score of the variable, *Loss of Online Connection* ($\underline{X}$=14.41), appears to be mild. Based on the happiness questionnaire, the preservice teachers ($\underline{X}$=22.89) seem moderately happy.

Table 3 presents the independent sample t test results between nomophobia and its sub-factors and happiness levels according to the gender of university students.

Table 3. The t test results for nomophobia and happiness scores according to gender

			N	$\underline{X}$	Ss	Sd	t	p
Nomophobia	Lack of Access to Information	Male	126	18.33	6.16	422	.56	.57
		Female	298	17.97	5.92			
	Relinquishing the comfort	Male	126	18.65	7.53	422	-2.72	.00*
		Female	298	20.82	7.41			
	Failing to Communicate	Male	126	23.00	10.20	422	-4.37	.00*
		Female	298	27.67	9.70			
	Loss of Online Connection	Male	126	13.95	7.98	422	-0.80	.42
		Female	298	14.60	7.51			
	Nomophobia (Total)	Male	126	73.93	26.26	422	-2.61	.01*
		Female	298	81.08	24.42			
Happiness		Male	126	22.96	5.87	422	0.16	.87
		Female	298	22.87	4.74			

*p<0.05

As can be seen in Table 3 showing the differences between the Nomophobia Questionnaire and its sub-factors according to gender variable, no statistically significant difference was found according to gender in the following factors: Lack of Access to Information [t (422) = 0.57; p> .05] and Loss of Online Connection [t (422) = - 0.80; of p> .05]. Nevertheless, the factors named Relinquishing the comfort [t (422) = 0.00; p <.05], Failing to Communicate [t (422) = 0.00; p <.05] and Nomophobia-Total [t (422) = 0.01; p <.05] were found to present a statistical significance according to gender, and as to these three dimensions, female preservice teachers were found to be at a higher level than males.

According to the data obtained from the Happiness Questionnaire, no significant difference was found between male and female preservice teachers [t (422) = - 0.87; p> .05].

One-way analysis of variance (ANOVA) was applied to identify whether the nomophobia levels of university students differ according to their class levels, and the test results are given in Table 4.

Table 4. ANOVA results regarding the nomophobia scores of the preservice teachers according to class levels

	N	$\underline{X}$	Source of Variance	Total Sum of Squares	sd	Mean Squares	F	p	Difference
Year 1	108	77.74	Inter-groups	624.14	3	208.04	.327	.80	---
Year 2	215	80.07	Intra-groups	267310.17	420	636.45			
Year 3	41	78.97	Total	2679334.31	423				
Year 4	60	77.15							
Total	**424**	**78.95**							

As shown in Table 4, no significant difference [F (3.420) = .327, p> .05] was found in the nomophobia levels of preservice teachers according to their class levels.

One-way analysis of variance (ANOVA) was used to identify whether the happiness levels of the preservice teachers differ according to their class levels, and the test results are given in Table 5.

Table 5. ANOVA results regarding the happiness scores of the preservice teachers according to class level

	N	$\underline{X}$	Source of Variance	Total Sum of Squares	sd	Mean Squares	F	p	Difference
Year 1	108	22.32	Inter-groups	240.16	3	80.05	3.12	.02	1-2*
Year 2	215	22.60	Intra-groups	10766.47	420	25.63			2-3*
Year 3	41	24.80	Total	11006.63	423				
Year 4	60	23.68							
Total	**424**	**22.89**							

*p<0.05

The ANOVA test presented a statistically significant difference (p <.05) between the classes attended and preservice teachers' happiness levels. The Scheffe's test, which is one of the Post Hoc Tests, was applied in order to determine between which classes the difference could be observed; however, it was not clear in the test results. The LSD test was, therefore, applied, according to whose results [F (3.371) = 3.12, p <.05] the preservice teachers studying in year 3 were found to feel happier ($\underline{X}$=24.80) than those studying in year 2 ($\underline{X}$=22.60), whereas those studying in year 2 turned out to feel themselves happier ($\underline{X}$=22.60) than those studying in year 1 ($\underline{X}$=22.32).

In the current study, Pearson Correlation Coefficient analysis was conducted to determine whether there was a significant relationship between the nomophobia levels and its sub-factors and happiness levels of university students. Analysis results can be seen in Table 6. The absolute value being between 0.70-1.00 was considered as high, between 0.70-0.30 as moderate, and between 0.30-0.00 as a low correlation (Büyüköztürk, Akgün, Demirel, Karadeniz & Kılıç-Çakmak, 2012) .

Table 6. Correlation coefficient results between students' nomophobia and happiness levels

	1	2	3	4	5	6
Lack of Access to Information	1					
Relinquishing the comfort	.516**	1				
Failing to Communicate	.456**	.654**	1			
Loss of Online Connection	.386**	.573**	.512**	1		
Nomophobia (Total)	.692**	.857**	.860**	.772**	1	
Happiness	-.077	-.103*	.052	-.058	-.046	1

*p<0.05, **p<0.01

As can be seen in Table 6, statistically significant correlations were observed between nomophobia and its sub-factors. In this context, there appeared a moderate positive correlation between the nomophobia levels and *Lack of Access to Information* variable (r=.692, p <.05), in addition to a high positive correlation with the *Relinquishing the Comfort* variable (r = .857, p <.05), a high positive correlation with the *Failing to Communicate* variable (r=.860, p <.05), and a high positive correlation with the *Loss of Online Connection* variable (r=.772, p <.05).

On the other hand, no significant correlation was observed between the happiness and any factors of nomophobia, except for the *Relinquishing the Comfort* factor (r=-.103, p<.05), which presented a low negative correlation with the level of happiness.

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

Nomophobia, which came out along with smartphones and became an integral part of our lives with technology, has negative emotional consequences such as anxiety, worry, and communication breakdown. Such negative emotions are also likely to affect people's motivation and happiness. This study has attempted to reveal the relationship between the nomophobia and happiness levels of preservice teachers studying at education faculties.

Nomophobia levels of preservice teachers appeared to be moderate in the current study. In particular, the nomophobia level was mild (close to moderate) in the subfactor of *Loss of Online Connection*, while it was found moderate in the other subfactors called the *Lack of Access to Information*, *Relinquishing the Comfort*, and *Failing to Communicate*.

Among the studies conducted with university students in the literature are those in which the feelings of nomophobia are above the average (Adnan & Gezgin, 2016; Akıllı & Gezgin, 2016; Gezgin & Şahin, 2017; Burucuoğlu, 2017; Yılmaz, Köse & Doğru, 2018). According to a study conducted with associate degree students by Sırakaya (2018), the researcher pointed out that as the frequency of checking on the smartphone increases, so does nomophobia.

A study conducted with medical faculty students reported that the prevalence of nomophobia was as high as 71.39% (Myakal & Vedpathak, 2019). Similarly, another study conducted with patients admitted to university hospitals revealed that the level of nomophobia was above the average (Kocabaş & Korucu, 2018). Moreover, a study conducted with teachers found that teachers' nomophobia levels were also observed above the average (Ercan & Tekin, 2019). A comparative study with young adults in different countries noted that the highest rate of addiction was among the Irish youth, followed by young people in Pakistan, India, Spain, Mexico, Guatemala, and Peru (Chóliz et al., 2016). A metaphor study conducted with preservice teachers in Turkey showed that smartphones are presented with connotations indicating that they are considered vital like "a friend, an organ, food, a need, or a lover" (Gezgin, Hamutoğlu, Sezen-Gültekin, & Yıldırım, 2019). Given this fact, various studies have been carried out in different countries with young people, university students, teachers, and adults. It seems clear that nomophobia is not only a problem of a country or a certain age group, but a global problem, and appears to pose a risk for all age groups.

This study found a significant relationship between nomophobia and its sub-factors: *Relinquishing the Comfort* and *Failing to Communicate* according to the gender variable of the preservice teachers, while no significant relationship was found in the subfactors of *Lack of Access to Information* and *Loss of Online Connection*. Female preservice teachers' nomophobia levels turned out to be higher than those of the male preservice teachers in relation to nomophobia and two of its sub-factors, namely, *Relinquishing the Comfort* and *Failing to Communicate*. In a way that supports our findings, other academic studies conducted with university students reported that nomophobia levels of female participants were observed to be higher than those of males' (Burucuoğlu, 2017; Gezgin, Şumuer, Arslan & Yıldırım, 2017; Yılmaz, Köse, & Doğru, 2018). Contrary to these research findings, there are also studies in which the nomophobia levels of males were found higher (Myakal & Vedpathak, 2019). In a study conducted with teachers, it was observed that male teachers had higher nomophobia levels compared to female teachers, and those who were younger had higher nomophobia tendencies than those who were older (Ercan & Tekin, 2019). There are also studies in the literature where there is no significant difference between gender and nomophobia (Adnan & Gezgin, 2016; Demir, Kutlu, & Kaya, 2016; Turgut & İnce, 2022). In a comparative study with young people from different countries, the smartphone addiction levels of females in Peru, Guatemala, Mexico and Spain were higher than those of males, while no significant difference was found among the Irish, Pakistani and Indian participants (Chóliz et al., 2016). The distress caused by nomophobia in individuals also varies according to gender. Thomée, Härenstam and Hagberg (2011) reported that females had higher levels of stress, sleep disorders and depression than males in their study conducted with 4156 young participants. Considering the findings of this study and other studies together, it is seen that nomophobic tendencies tend to differ according to gender in different countries and to whether the participants are students, teachers, or adolescents.

In this study, no significant difference was found between the happiness levels of university students and their gender. There are other studies in the literature in which no significant relationship was found between gender and happiness, supporting the findings of this study (Akyüz, Yaşartürk, Aydın, Zorba & Türkmen, 2017; Can & Cantez, 2018; Çankaya & Meydan, 2018; Öztürk, Meral & Yılmaz, 2017; Yeter, 2019). Similarly, in another study conducted with teachers, no significant difference was found according to gender (Genç, Şahin, & Altuntaş, 2020). According to these results, it can be asserted that gender is not a determining factor for people to feel happy.

As a result of the study, no significant difference was found among the levels of nomophobia according to the students' class levels. In a study by Adnan and Gezgin (2016), the researchers did not find a statistically significant difference according to the class level, supporting the results of this study. Apak and Yaman (2019) stated in their study that no significant difference was found between the class levels of male students and nomophobia, while the nomophobia levels decreased as the class levels of female students increased. Ramazanoğlu (2020) reported that year one and year four preservice teachers had higher levels of nomophobia than those of preservice teachers studying in other classes. In a study conducted with university students, Taştan (2020) concluded that the second-year students had the highest nomophobia levels, while first-year students had the lowest.

The study revealed a statistically significant difference between the class level of university students and their level of happiness. The difference is that while third-year students appeared to feel happier than second-year students, second-year students appeared to feel happier than first-year students. It can be assumed that as the class level increases, the happiness level of the preservice teachers increases as well. Aksoy, Aytar, and Kaytez (2017) obtained a number of results that support the research findings in this study. The reason for this is that the students who have just started university feel unhappy due to such reasons as leaving the family, changing the living environment, adapting to school, finding friends, having accommodation problems, and starting to live with people they do not know, while on the other hand, students in upper classes have a lower school stress, which may stem from graduation excitement and students' dreams about possessing a profession. Yeter (2019), on the contrary, did not come up with a result indicating a clearly significant difference between class levels in a study with university students.

According to the last finding obtained in the study, no statistically significant relationship was found between the nomophobia and happiness levels of preservice teachers. Only a low negative correlation was found between happiness levels and a sub-factor-the *Relinquishing the comfort*. In relation to this, it can be assumed that no relationship exists between the happiness levels of university students and their symptoms of nomophobia. While there are very few studies examining the relationship between nomophobia and happiness in the literature, there are also many other studies conducted with different variables. In a study conducted with secondary school students by Yıldırım (2019), the researcher concluded that there is a low negative correlation between nomophobia and happiness. In another study conducted with associate degree students by Aşık (2018), the author concluded that there is a weak and opposite correlation between the sense of belonging and nomophobia. Büyükalim (2020) concluded in a master's degree research conducted with university students that the sense of belonging has a predictive effect on nomophobia and life satisfaction. Apak and Yaman (2019) detected a low positive relationship in their study examining the relationship between nomophobia and social phobia. In another study conducted with athletes, a moderate positive correlation was found between nomophobia and Internet addiction (Yıldız, Kurnaz, & Kırık, 2020). According to a study examining the happiness, self-efficacy and psychological resilience of university students, the psychological resilience of the students appeared to increase as their happiness levels increased (Açıkgöz, 2016; Can & Cantez, 2018). A study conducted with adolescents found that as loneliness increases, happiness decreases (Demir, Kutlu, & Kaya, 2016), and a sense of hope significantly suggests happiness (Çankaya & Meydan, 2018). Furthermore, another study conducted with university students suggested that optimism positively affects happiness and life satisfaction (Gülcan & Bal, 2014; Sapmaz & Doğan, 2012). In a similar sense, a study conducted with teachers concluded that happiness positively affects optimism (Genç, Şahin, & Altuntaş, 2020). Happiness influences participatory humour and self-enhancing humour in a positive way, while affecting aggressive and self-destructive humour in a negative way (Açıkgöz, 2016). The feeling of happiness has been observed to positively indicate the values of power, achievement, hedonism, stimulation, self-direction, traditionalism, conformity, security, universalism, and benevolence (Özdemir & Koruklu, 2011). In a study conducted with managers, it was observed that the innovation management self-efficacy levels of managers with positive emotional states were higher than those with negative moods (Mürtezaoğlu, 2015).

Recommendations

This study is limited to students studying at the education faculty in a public university in the West Black Sea Region, Turkey. It is recommended that this study be conducted in the faculties of education and other departments in other regions of Turkey to contribute to the relevant literature. The sample group in this study consisted of preservice teachers. Such a study can also be carried out with students studying in teaching departments with high probability of being appointed and those with low probability of being appointed. Thereby, the impacts of being appointed as a teacher on students' happiness and nomophobia levels can be revealed. In the literature, most of the studies have been conducted with university students. Today, the use of smartphones has dropped to elementary school levels. A similar study can, therefore, be carried out especially for secondary and high school students. The source of spiritual activities such as happiness, sadness, and joy may differ according to people and the culture in which they are raised. Consequently, further intercultural comparative studies involving different cultures and nations can be conducted to contribute to the relevant literature.

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Statements of publication ethics

We hereby declare that the study has no unethical issues and that research and publication ethics have been observed carefully.

Researchers' contribution rate

The article has a single author. The contribution rate of the first author is 100%.

Ethics Committee Approval Information

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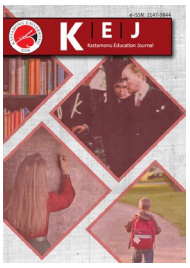

| Research Article / Araştırma Makalesi |

Comparison of the Effects of Live Reader and Computerized Reading on the Test Achievement of Visually Impaired Students[1]

Canlı Okuyucu ve Bilgisayar Destekli Okumanın Görme Engelli Öğrencilerin Test Başarıları Üzerindeki Etkilerinin Karşılaştırılması

Ersoy Karabay[2]

Keywords

1. Visually impaired students
2. Read aloud accommodation
3. Computerized test
4. Pass from Basic Education to Secondary Education

Anahtar Kelimeler

1. Görme engelli öğrenciler
2. Sesli okuma uyarlaması
3. Bilgisayar ortamında test
4. Temel eğitimden ortaöğretime geçiş

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Abstract

The aim of this study is to investigate whether the reading of the Turkish and math tests prepared by the Ministry of National Education for students with visual impairment within the scope of the transition from basic education to secondary education (TEOG) makes a significant difference in the performance of individuals with visual impairments in the computerized and by the live reader. The study is of quantitative research type and in semi-experimental design. Research group consists of 48 students who are studying in a total of five visually impaired schools in Ankara, Istanbul and Konya. These students are those who receive reader support in exams and do not have any disabilities other than visual impairment. Within the scope of the research, the Voice Test Application Tool in Computerized (BOSTA), which can be used by students with visual impairments, was developed and the effectiveness of the test applied in computerized against this live reader application was tested using this tool. Turkish and mathematics tests were given to 24 of the students in the study group were selected randomly, in computerized and the other 24 were given by a live reader. In order to compare the Turkish and mathematics achievements of the students in the experimental and control groups within the scope of the research, independent samples t-test was applied. As a result of the analysis, no significant difference was found in both tests (between the test in the reading aloud application performed in computerized and the test read by the live reader). This finding shows that the test performed in the computerized is as effective as the test performed with the live reader and can be used in exams. In the research, it was concluded that the test application tool developed within the scope of this study can be used in national exams. It was also stated that the proofs of validity of the accommodations made in the tests should be presented.

Öz

Bu araştırmanın amacı, Milli Eğitim Bakanlığı tarafından temel eğitimden ortaöğretime geçiş (TEOG) sınavı kapsamında görme engelli öğrencilere yönelik hazırlanan Türkçe ve matematik testlerinin bilgisayar ortamında ve canlı okuyucu tarafından sesli okunmasının görme engelli bireylerin performansında anlamlı fark yaratıp yaratmadığını araştırmaktır. Çalışma nicel araştırma türünde ve yarı deneysel desendedir. Araştırma grubu; Ankara, İstanbul ve Konya'da toplam beş görme engelliler okulunda öğrenim görmekte olan sekizinci sınıfta okuyan 48 öğrenciden oluşmaktadır. Bu öğrenciler sınavlarda okuyucu desteği alan ve görme engeli dışında herhangi bir engelleri bulunmayan öğrencilerdir. Araştırma kapsamında görme engelli öğrencilerin sınavlarda kullanabilecekleri Bilgisayar Ortamında Sesli Test Uygulama Aracı (BOSTA) geliştirilmiş ve bu araç kullanılarak bilgisayar ortamında uygulanan testin canlı okuyucu uygulaması karşısındaki etkililiği test edilmiştir. Türkçe ve matematik testleri çalışma grubunda yer alan öğrencilerden seçkisiz olarak belirlenen 24 öğrenciye bilgisayar ortamında, yine 24 öğrenciye canlı okuyucu ile verilmiştir. Deney ve kontrol gruplarında yer alan öğrencilerin araştırma kapsamındaki Türkçe ve matematik başarılarını karşılaştırmak amacıyla bağımsız örneklemler için t-testi uygulanmıştır. Yapılan analiz sonucunda her iki testte (bilgisayar ortamında uygulanan sesli okuma uygulamasındaki test ile canlı okuyucu tarafından okunan test arasında) anlamlı farklılık bulunmamıştır. Bu bulgu, bilgisayar ortamında yapılan testin canlı okuyucu ile uygulanan test kadar etkili olduğunu ve sınavlarda kullanılabileceğini göstermektedir. Araştırmada, bu çalışma kapsamında geliştirilen test uygulama aracının ulusal sınavlarda kullanılabileceği sonucuna varılmıştır. Ayrıca testlerde yapılan uyarlamaların geçerlik kanıtlarının da sunulması gerektiği ifade edilmiştir.

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INTRODUCTION

Students are subjected to various tests throughout their education life. The scores obtained from some of these tests are used to make important decisions about students. An example of these can be the exams used to enter high schools and universities (Başpınar Can, Dereboy, & Eskin, 2011). It is expected from test applications to have validity, reliability and usefulness (Tekin, 2004; Turgut & Baykul, 2010), and the applications to be carried out in standard environments. However, standard application of tests with other students prevents visually impaired students from revealing their real performance (Bolt, 2004). Various alternative test adaptations are offered for students with disabilities in order to overcome the obstacles that arise in test applications (Government Accountability Office, 2011).

In order for disabled students to show their real performance, accommodation, modification and adaptation applications are carried out in tests. The aim of these practices is to eliminate or minimize the effect of the characteristics of the disabled person in the structure in which the measurement is aimed (Allan, Bulla, & Goodman, 2003; American Educational Research Association - AERA, American Psychological Association - APA and National Council on Measurement in Education - NCME, 1999.). Because following different processes for candidates who are determined to be disabled brings along questions about the validity of the exams (Çobanoğlu Aktan, Aksu, & Eser, 2018). Therefore, in order to compare the scores of disabled and non-disabled students, it is necessary to determine that the tests applied to the two groups measure the same structure (Südkamp, Pohl, & Winert, 2015).

According to Allman (2006), test accommodations are applied in order for individuals with disabilities to access academic materials. Kim (2012) stated that visually impaired students have problems in standard tests because they have problems understanding visual materials, and therefore accommodations are applied to visually impaired students, especially in “high-stakes” tests.

The accommodations and modifications made in the exams are evaluated under four headings. These titles are presentation, response, timing and setting. Examples of presentation accommodations include printing the test to the test takers in braille alphabet and larger than normal fonts, or giving the test with alternative applications such as audio cassettes and computer programs. Response accommodations allow candidates to respond to the test in different ways, such as using printers and computers to answer items. Timing accommodations usually include longer than usual exam time, exam breaks, and multiple exam sessions. Setting accommodations include the application of the exam in a special room separate from other candidates, and other different applications for the screens and the environment of the examinees to prevent distractions (American Educational Research Association et al., 1999; Bolt, 2004; Cahalan-Laitusis, 2004; Thurlow, Thompson and Lazarus, 2006). The way in which the read-aloud accommodation is given from the response arrangements constitutes the scope of this research. Read aloud accommodation is provided to visually impaired students in the examinations by human readers (live reader) in Turkey.

In developed countries, for example in the USA, with the above-mentioned regulations, visually impaired students are given test forms printed in braille alphabet or test applications in computer environment (College Board, 2020; Toppo, 2020). In addition, in these countries the evidence for the effectiveness of the accommodations provided for the visually impaired is also empirically researched and presented (Koretz & Barton, 2003). Students are given more time than standard paper and pencil tests in Braille alphabet, printing with large fonts, and vocalization of the items in the test (Allman, 2009). The opinions of the measurement and assessment experts must be obtained for the regulations to be made for students with disabilities in order to reflect their real performance in the tests. It is necessary to examine the effect of the accommodations made in the test on the structure and other types of validity that the test wants to measure (Philips, 1994), the issue of the effect of the characteristics of different levels of disability on the performance obtained from the test and knowledge on this subject. Because what is expected is that the scores obtained from the first form of the test and the scores obtained from the form designed for the benefit of the disabled are comparable with each other (Willingham, Ragosta, Bennett, Braun, Rock, & Powers, 1988).

The first point to be considered in exams prepared for disabled students is the preference and application of the correct accommodation. If suitable arrangements are not made for disabled students, students may get lower scores in these tests. In a study, it was found that 20% of disabled students got lower scores in accommodated exams (Kettler, Niebling, Mroch, Feldman, & Newell, 2003). Therefore, correct test accommodations should be made for students with disabilities.

Especially in the USA, alternative test forms such as computer-voiced test versions are developed for visually impaired students in the tests, the comparability and validity of the test forms are investigated, students' access to tests using technological facilities is increased and new technologies are discovered (College Board, 2020). In

addition, how much additional time will be given to disabled students in the tests and the effect of providing reader support on the measured structure are empirically investigated (Educational Testing Service, 2014). Computer-based test applications are also offered to students with disabilities (Tucker, 2009). Abell and Lewis (2005) stated that individualized computer testing for visually impaired people can be used for visually impaired people. Similarly, in a study in Turkey, it was stated that the developed reading comprehension test can be used as a computerized adaptive test (CAT) for visually impaired students (Şenel & Kutlu, 2018).

Considering the history of the accommodations made in the tests for disabled people, it is seen that the practices in the USA come to the fore. In the USA since the 1990s, firstly "Americans with Disabilities Act" (ADA) (Gordon & Keiser, 2000), then "No Child Left Behind Act" (NCLB) studies (Simpson, Lacava, & Graner, 2004) and With the “Improving America's Schools Act” law (Le Tendre, 1996), students with disabilities are gradually being included in the assessment in national and many federal assessment programs.

There are two major testing center makes the transition exam between stages in Turkey. These are the Assessment, Selection and Placement Center (ÖSYM) and the Ministry of National Education (MEB) General Directorate of Measurement, Evaluation and Examination Services. Visually impaired students are divided into two categories in the transition to high schools exam (LGS). Both groups are given additional time. In addition, students with low vision are given a reader coder or a question booklet in 18 pt. Live reader, coder support is provided to total visually impaired students (MEB, 2019). In the system before this application, Transition from Basic Education to Secondary Education (TEOG); Turkish, mathematics, science and technology, history of revolution and Kemalism, religious culture and moral knowledge, and foreign language courses were prepared based on the 8th grade curriculum. The tests were applied twice, in the first and second terms. In this exam practice, the visually impaired, as in the current system; “Students with low vision” and “students with total visual impairment (no vision)” were treated under two groups and accordingly, various test accommodations were provided in the exam. Students with low vision could take the exam in single halls if they wish, and these students were given an additional 15 minutes of time for each test. Students with low vision were provided one of the following accommodations (a) reader and coder, (b) an 18-point question booklet and answer sheet, and (c) an 18-point question booklet and answer sheet with the reader coder. Total visually impaired students were also given an additional 15 minutes for each test and these students were taken to the exam in single-person halls. In addition, these students were provided with reader and coder support. There is no question exemption for the visually impaired in TEOG; instead of questions containing pictures, figures and graphics, equivalent questions were used (Ministry of National Education, 2013). Any research wasn’t found, regarding the effect of these time arrangements for visually impaired students on students' achievement, done in Turkey. However, visually impaired students think that the given time is insufficient (Doğuş, Aslan, & Çakmak, 2020).

ÖSYM makes accommodations in parallel with MEB for the exams for visually impaired students. However, unlike MEB applications, no alternative questions are written instead of questions containing figures and graphics, and these questions are excluded from the exams of total visually impaired students (Measurement, Selection and Placement Center, 2014). ÖSYM previously (until 2014) prepared a question booklet in 14 point size for students with low vision. However, as of 2015, it prepared 14, 18 and 22 pt size exam booklets (Measurement Selection and Placement Center, 2015). ÖSYM returned to the practices before 2015 and stated that in the Higher Education Institutions Exam Guide for 2020, visually impaired students were provided with the opportunity of a 14-point booklet (Measurement, Selection and Placement Center, 2020). Also, only live reader support is given to visually impaired students in Open Secondary School and Open Education High School exams by MEB. There is no practice such as editing the questions asked in the test or removing the questions containing a shape from the test. It is thought that this situation prevents students from performing their real performance.

Visually impaired students are given reading by live reader [CO] accommodation in Turkey. It is stated that this regulation alone is not enough for students to provide their real performance (Sitlington, Clark, & Kolstoe, 2000). Visually impaired students are experiencing difficulties to the reader and encoder accommodation in Turkey (Doğuş et al., 2020; Karabay, and Demirtaşlı, 2018; Şenel, 2014, Tavşancıl, Uluman and Furat, 2012). They also think that their exam success depends on the reader who read the questions to them (Şenel, 2014).

Read aloud accommodation has been found to be generally useful for visually impaired students in exams (Elbaum, 2007; Elliott, Kratochwill, & McKevitt, 2001; Kim, 2012; Li, 2014; Sireci, Scarpati, & Li). When the read aloud accommodation is made by a live reader (human), some readers read the questions to give clues to the students (Karabay & Demirtaşlı, 2018). This is considered a serious problem. Generally speaking, read aloud accommodation with live readers has been found to be more effective than reading aloud arrangement with computer or cassette / CDs. One of the reasons for this is that cassette / CD or software read questions at a constant speed (Li, 2014).

In exams, which are used as a transition between levels, alternative item writing, live reader support and additional time are given to questions containing figures for visually impaired students. It is important to provide these students with the opportunity to apply tests in a computer environment without being dependent on others. Testing the effectiveness of this application with a live reader will provide important information about its usefulness. The problem of this research is to test the effectiveness of the Computerized Audio Test Implementation Tool (BOSTA) application against the live reader. It is thought that with this research, suggestions that will shed light on the exam practices of visually impaired students will be obtained to researchers, decision makers and test centers.

Purpose

The general aim of this study is to investigate whether presenting TEOG Turkish and mathematics tests to visually impaired individuals with two different test application approaches creates a significant difference in the performance of visually impaired individuals. These two test application approaches are readi aloud in computer environment and read aloud by the reader. In line with this general purpose, answers to the following questions were sought:

1. What is the test statistics regarding the scores of visually impaired students obtained as a result of the application of Turkish and mathematics tests in Computer Environment (BO) and Live Reader (CO) in Transition Exam from Basic Education to Secondary Education? Is there a significant difference between the test statistics and scores obtained from the two applications?
2. Is there a significant relationship between the Turkish and mathematics scores of the students obtained from the tests applied with BO and CO, their year-end success scores and the 2014-2015 TEOG II Turkish and mathematics scores?

METHOD

The research was designed as a quasi-experimental study from quantitative research designs. The dependent variable in the study is the scores the students obtained from the visually impaired forms of Turkish and mathematics tests in the TEOG applied in the second term of the 2013-2014 academic year. The independent variable is the presentation of the tests to the students. The group in which the BO application was applied was called the experiment group, and the group in which the CO application was applied was called the control group. The schematic representation of the research is given in Table 1.

Table 1. Schematic representation of the study.

BO	R	X	O_a
CO	R		O_b

X: Manipulation, $O_{a,b}$: Measurement, R: It shows that there is no random selection from the universe, and random assignments are made to the experimental and control groups.

When Table 1 is examined, it is seen that the experimental group was applied BO and the control group was applied CO. A quasi-experimental model was established in the research. In the study in which the randomized posttest-only control group design was used (Büyüköztürk, Kılıç Çakmak, Akgün, Karadeniz, & Demirel, 2011; Fraenkel, Wallen, & Hyun, 2012), two groups, experimental and controlwere created randomly. In this study, the practice of read aloud in the form of BO represents experimental manipulation. Therefore CO ,BO application is not applied and the test with CO is the common application condition, is considered as a control condition. The scores of visually impaired students in Turkish and mathematics tests were considered as dependent variables. The Turkish and math tests of the 2014 TEOG exam were read aloud via comptuer to the students in the experimental group. For the control group, the reading aloud of the same subtests was done with CO, as applied by MEB in TEOG.

It is possible for an experimental research to examine the causality relationship by controlling all variables except independent and dependent variables (Howitt & Cramer, 2008). In this study, random assignments were made primarily to the experimental and control groups in order to control other variables except independent and dependent variables (Krathwohl, 1997). In addition, in both test applications, both groups were given equal test taking time, and students' test taking environments were provided to be similar.

The research group consists of 48 eighth grade students who were given reader support in TEOG applications by MEB in a total of five secondary schools for the visually impaired in Ankara, Istanbul and Konya in the 2014-

2015 academic year. 24 students selected randomly were included in each of the experimental and control groups. The demographic information of the students is given in Table 2.

Table 2. Demographic information of the students in the research group

City	Ankara				İstanbul				Konya		Total
School	Mitat Enç		Göreneller		Türkan Sabancı		Veysel Vardal		Selçuklu		
Group	F	M	F	M	F	M	F	M	F	M	
BO	3	2	3	1	4	4	1	3	2	1	24
CO	3	2	3	1	4	4	0	3	4	0	24
Total	6	4	6	2	8	8	1	6	6	1	48

F: Female; M: Male

When Table 2 is examined, it is seen that the most students are in Istanbul (n = 23) and the least students are in Konya (n = 7). There are 18 students in Ankara. In addition, it is observed that students attend two secondary schools for the visually impaired in Istanbul and Ankara and one in Konya. It is seen that the distribution of students according to their gender in total is balanced. The students in the research group were divided in two categories as "total visually impaired" and "low vision" as MEB did. "Total visually impaired" are students who do not see at all or only feel the light, and "low vision" is the students who are informed by the guidance and research centers that they cannot read the 18-point booklet given by MEB in the TEOG. The study included all students who were studying in the eighth grade in five visually impaired secondary schools and who did not have any disability other than visual impairment; Students with disabilities other than visually impaired and sighted enough to be able to read the 18-point booklet were not included.

In this study, two success tests were used as data collection tools. One of them is the TEOG Turkish test administered in April 2014, the other is the TEOG math test booklet for the visually impaired administered in April 2014. Both tests consist of 20 multiple-choice items. While TEOG tests are developed based on expert opinion, empirical evidence is not included. However, one of the important stages of test development is testing items and predicting their psychometric properties (Crocker & Algina, 1986). KR-20 reliability values of the Turkish and mathematics tests used within the scope of the study were calculated with the data obtained from the students participating in the study and are given in Table 3.

Table 3. 2013-2014 academic year TEOG 2 Turkish test (booklet A) test statistics

Values	TEOG Turkish	TEOG Mathematics
Number of Items	20	20
$\overline{X}$	13.67	8.93
S	5.03	4.29
Skewness	-0.53	0.77
Curtosis	-0.73	-0.01
Minimum	0	0
Maximum	20	20
Median	15	8
SEM	1.72	1.97
Average difficulty	0.68	0.45
Average discrimination (biserial)	0.75	0.58
KR-20	0.88	0.79

When Table 3 is examined, it is seen that the reliability of the TEOG Turkish test booklet A is high, and the reliability of the TEOG mathematics test is medium. When the average difficulty of the TEOG Turkish and mathematics tests A booklets is evaluated, it can be stated that the Turkish test is easy and the mathematics test

is medium difficulty. The data used in the study were collected by the researcher himself by going to the visually impaired secondary schools in Ankara, Istanbul and Konya.

Within the scope of the study, a tool called Audio Test Application Tool in Computer Environment (BOSTA) was developed. According to the preliminary interviews and observations made to the visually impaired students and teachers who attend the classes of these students, it was concluded that the screen-reading software currently used for the visually impaired did not meet the needs and it was decided to develop BOSTA. Visually impaired users have stated that screen-reading software can skip words, so they may be at a disadvantage in exams. While developing the tool, the literature was scanned and interviews were made with visually impaired students and their teachers. BOSTA was developed using the game console (joystick) where ready-made audio files can be used and its schematic representation is given in Figure 1.

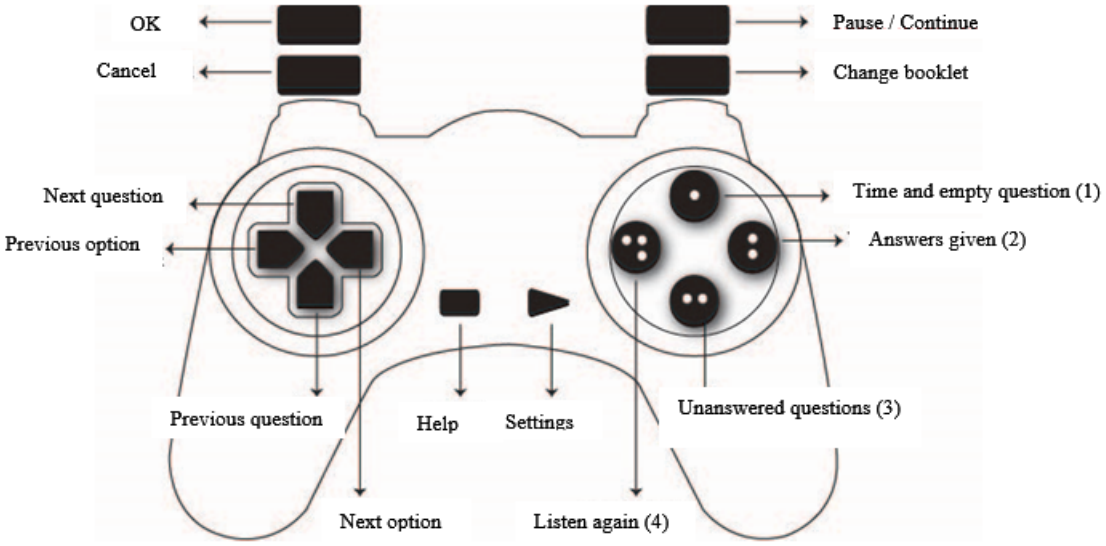

Figure 1. Schematic representation of the remote and the functions of the keys

When Figure 1 is examined, it is seen that you can move forward in questions and options with the buttons on the left of the control, and by using the keys on the right, some features that are not available in other software but are available in BOSTA can be used. The "Help" and "Settings" menus can be accessed on the middle keys. Students who took the BO application were trained to use BOSTA effectively.

SPSS 22 and ITEMAN 3.5 programs were used to analyze the data. Whether the data showed a normal distribution was examined. According to Table 3, it was concluded that Turkish test was normally distributed in both the experimental and control groups, and the mathematics test was not normally distributed. The mean, standard deviation, median, peak value, and KR-20 reliability coefficient of the test, item difficulty and item discrimination values for the items were calculated using the ITEMAN 3.5 program. The W value suggested by Alsawalmeth and Feldt (2000) was calculated in order to examine the difference in the obtained KR-20 reliability levels. Equality is given below:

$$W = \frac{(1-\alpha_2)}{(1-\alpha_1)} \qquad \text{Equality 1}$$

α_1: Reliability coefficient of the 1st test

α_2: Reliability coefficient of the 2nd test

Whether the scores obtained from the BO and CO applications differ according to the group was calculated by independent samples t-test. In order to answer the third research question, students' year-end achievement, Turkish, mathematics, TEOG Turkish and TEOG math scores were correlated with each other and their rank differences were calculated with Spearman's correlation coefficient.

FINDINGS

The Level of Test Statistics Regarding the Scores Obtained by the Visually Impaired Students as a Result of BO and CO Applications of Turkish and Mathematics Tests and Comparison for Two Applications

Table 4 shows the test statistics obtained from BO and CO applications of Turkish and mathematical tests.

Table 4. Values of Turkish and mathematical tests obtained from BO and CO applications

Values	Turkish		Matehematics	
	BO	CO	BO	CO
Number of items	20	20	20	20
$\overline{X}$	11.63	11.33	6.54	7.42
S	4.73	5.02	2.08	2.89
Skewness	.11	-.09	.26	.72
Curtosis	-1.21	-.96	-.98	.14
Minimum	4.00	2.00	3.00	3.00
Maximum	20.00	20.00	11.00	15.00
Median	11.00	10.00	6.00	7
SEM	1.83	1.86	2.05	2.02
Average difficulty	.58	.57	.33	.37
Average discrimination (biserial)	.51	.53	.22	.31
KR-20	.85	.86	.03	.51

When Table 4 is examined, it is seen that KR-20 reliability values of .85 in BO application and .86 in CO application are obtained for the Turkish test. It is seen that the reliability for the math test is low for both applications (.03 for BO, .51 for CO). Turkish tests can be expressed medium difficulty, and mathematics tests can be called difficult.

The Felt test was used to compare the KR-20 reliability coefficients obtained from the BO and CO applications of Turkish and mathematics tests. Felt test results of the relevant tests are given in Table 5.

Table 5. Reliability comparisons of BO and CO applications of Turkish and mathematics tests

	Method of Application	N	k	KR-20	W
Turkish	BO	24	20	.85	.93
	CO	24	20	.86	
Mathematics	BO	24	20	.03	.51
	CO	24	20	.51	

According to Table 5, no significant difference was found between the KR-20 reliability coefficients calculated as a result of the BO (experiment) and CO (control) applications of the Turkish test, W <F (23, 23). A significant difference was found between the KR-20 reliability coefficients calculated as a result of the application of the math test BO and CO, W> F (23,23). The reliability value of the CO application for the mathematics test was found to be higher than the reliability coefficient obtained from the BO application.

In order to examine the difference between the Turkish mean scores of the students according to the group, the normality test was performed according to the group and the skewness and kurtosis values were examined. Independent samples t test result for scores showing normal distribution is given in Table 6.

Table 6.Comparison of the Turkish scores of the students according to the way of giving the reading aloud arrangement (BO and CO)

Group	N	$\overline{X}$	S	df	t	p
Experimental (BO)	24	11.63	4.84	46	.20	.840
Control (CO)	24	11.33	5.13			

When Table 6 is examined, it is seen that there is no significant difference between the Turkish test success averages of the students in the experimental (BO) and control (CO) groups, t(46) = .20, p > .05. This finding shows that the way the arrangement of reading aloud does not affect students' Turkish achievement. Accordingly, BO application is as effective as CO application in terms of Turkish achievement of visually impaired students. Visually impaired students who took the Turkish test with the computer application succeed at the same level as those who took the same test with a live reader.

Similar to the Turkish test, the math test scores were also examined to see if they showed a normal distribution according to the group, and it was found that they showed a normal distribution. In order to examine the significance of the difference, independent samples t test was conducted and the analysis result is given in Table 7.

Table 7. Comparison of students' math scores according to the way in which the reading arrangement is given (BO and CO)

Group	N	$\overline{X}$	S	df	t	p
Experimental (BO)	24	6.54	2.13	46	-1.18	.244
Control (CO)	24	7.42	2.95			

When Table 7 is examined, it is seen that there is no significant difference between the mathematics scores of the students according to the way in which the read aloud accommodation is given.; t(46) = -1.18, p > .05. In other words, students' taking the TEOG math test as BO or CO affected their mathematics achievement equally. This finding shows that the BO application is as effective as the live reader in terms of the mathematics achievement of visually impaired students.

Turkish and Mathematics Scores of Students from Tests Applied with BO and CO; Relationship with Year-End Success Scores and 2014-2015 TEOG II Turkish and Mathematics Scores

TEOG mathematics scores of the students in the experimental and control groups do not show a normal distribution. Therefore, Spearman's rank difference correlation coefficient was used to calculate the correlations between year-end, Turkish, mathematics, TEOG Turkish and TEOG mathematics scores of the students in the experimental and control groups. Spearman rank differences correlations between the end of year, Turkish, mathematics, TEOG Turkish and TEOG mathematics scores of the students in the experimental and control groups are given in Table 8.

Table 8. Relationships between year-end, Turkish, mathematics, TEOG Turkish and TEOG mathematics scores of students in the experimental and control groups (n = 24)

Variables	Year-end	Turkish		TEOG Turkish		Mathematics		TEOG Mathematics	
		BO	CO	BO	CO	BO	CO	BO	CO
Year-end		.79**	.74**	.57**	.75**	.20	.58**	.57**	.34
Turkish				.40	.82**	.12	.43*	.44*	.37
TEOG Turkish						-.14	.44*	.58**	.40
Mathematics								.08	.31
TEOG Mathematics									

** p < .01; * p < .05

When Table 8 is examined, it is found that the BO and CO application of the Turkish test has a positive and significant relationship with the year-end success score, p <.01; in the mathematics test, while the CO application shows a significant correlation, p <.01, it is seen that the BO application does not show a significant correlation, p> .05. While the CO applications of the Turkish and mathematics tests showed a significant correlation with the TEOG Turkish and TEOG mathematics scores, p <.05, the BO applications of the same tests did not show a significant correlation, p> .05. On the other hand, while the TEOG mathematics scores of the students who took the BO application showed a significant correlation with the year-end, Turkish and TEOG Turkish scores, p <.05, the TEOG mathematics scores of the students who took the CO application did not show a significant correlation, p> .05. Only according to the correlation values, it can be stated that the application of CO in the Turkish test is more related to the school success scores, and the BO application in the Mathematics test is more related to the school achievement scores.

DISCUSSION

In this study, which examines the differences in the success of visually impaired students by applying the TEOG Turkish and mathematics tests visually impaired test forms with two different read-aloud approaches as BO and CO, a significant difference has not been found between the mean scores obtained from the BO application and the CO scores for both Turkish and mathematics tests. Accordingly, the BOSTA application has equal efficiency with a live reader. The result obtained from this study is consistent with the research that Calhoon et al. (2000) applied the practice of read aloud in live reader and computerized test and there was no significant difference. Laitusis et al. (2012) stated that reader-based misreading, diction disorders, etc. can be prevented and new and different experimental researches are needed regarding the accommodations applied in computers and other technological environments together with technological developments. Unlike the results of this research, it has been found in most studies that the read aloud accommodation given by a live reader is more effective than the application in computer environment (Li, 2014; Meloy, Deville, & Frisbie, 2002; Olson & Dirir, 2010). It is thought that some readers' reading the items in a way that gives clues to visually impaired students plays an important role in making the human reader appear more effective (Koretz & Hamilton, 2000). In this study, meetings were held with the readers and they were informed about not helping the students. However, some readers may have helped. Nevertheless, the similarity of CO and BO applications shows the effectiveness of the developed BOSTA. In addition, another reason why the computer application was not as effective as the live reader in previous applications may be that the software technology is not sufficiently developed. Although it is not directly related to the read aloud accommodation, it is stated that computer applications can be applied to visually impaired students in exams (Abell & Lewis, 2005; Şenel & Kutlu, 2018).

CONCLUSION AND RECOMMENDATIONS

The level of the test statistics regarding the scores of the TEOG Turkish and mathematics visually impaired tests as a result of BO and CO applications and whether there is a significant difference between these statistics were investigated. No significant difference was found between the reliability levels of the Turkish test obtained as a result of BO and CO applications. Accordingly, it can be stated that BO and CO applications have similar levels of reliability in terms of the Turkish test. For the mathematics test, the reliability coefficient obtained from the BO application was found to be significantly lower than the reliability coefficient obtained from the CO application. The reason for this may be that instead of nine items in the mathematics test, new items that are stated to measure the same gain were written, but these items were directly included in the test without being tested. It is also necessary to conduct different studies for what other reasons may be.

When the correlations between the scores obtained as a result of the BO and CO applications of the Turkish and mathematics tests and the TEOG Turkish and TEOG mathematics scores were examined, inconsistent results were obtained. For BO application; There was no significant correlation between the scores obtained from the Turkish and mathematics tests and the TEOG Turkish and TEOG mathematics scores and the scores obtained from the mathematics test at the end of the year. For the CO application, the Turkish and TEOG Turkish scores did not show a significant correlation with the scores obtained from the Mathematics test.

In this study, the arrangement of reading aloud in computer environment or by a live reader was examined with an application at secondary school level. Farklı öğrenim düzeylerinde (Lise ve üniversite) de benzer araştırmalar yürütülebilir. Different from this research conducted in Turkish and mathematics tests, research can be done for other courses.

In this research, only the read aloud accommodation was studied. Research may also be conducted on other testing arrangements, particularly those involving technology.

Test arrangements and adaptations using computer facilities are becoming widespread. Exam centers in Turkey may provide these adaptations and adaptations for the use of disabled students. They may also change the personnel structure, which is currently limited in this regard.

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Statements of publication ethics

I hereby declare that the study has not unethical issues and that research and publication ethics have been observed carefully.

Ethics Committee Approval Information

Since the study was completed in 2016 and consisted of a doctoral thesis, there is no ethics committee approval certificate.

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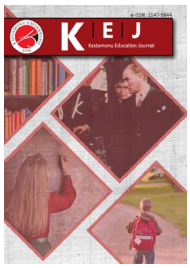

| Research Article / Araştırma Makalesi |

Evaluation of the Entrepreneurial and Innovative Universities in Turkey through Multiple-Criteria Decision Making Methods

Türkiye'deki Girişimci ve Yenilikçi Üniversitelerin Çok Kriterli Karar Verme Yöntemleri ile Değerlendirilmesi

Suzan Oğuz[1]

Keywords

1. Entrepreneurial and innovative university index
2. Multiple-criteria decision making methods
3. MCDM

Anahtar Kelimeler

1. Girişimci ve yenilikçi üniversite endeksi
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Abstract

Purpose: The purpose of this study is to examine the 2018 performances of the top 10 Entrepreneurial and Innovative Turkish universities through Multiple-Criteria Decision Making (MCDM) methods and to rank them.

Design/Methodology/Approach: While determining the criteria discussed within the scope of the analysis, TUBITAK's Entrepreneurial and Innovative University Index criteria were taken into consideration. This Index was created in order to obtain a success ranking based on the indicators determined among universities. In this context, first of all, objective weight values of the criteria were calculated by Entropy method. Then, the ranking was made among universities by using Edas and Topsis methods, which are among the MCDM methods.

Findings: Analyses performed through all two methods demonstrate that the Middle East Technical University ranks first. When the results of the analysis are evaluated in general, it is seen that the findings are consistent with the results of TUBITAK.

Highlights: Along with globalization, changes and developments taking place in information and communication technologies worldwide affect universities. Universities should support scientific studies, put emphasis on R&D activities, university-industry cooperation and patent studies in order to rise in performance rankings.

Öz

Çalışmanın amacı: Bu çalışmanın amacı, Türkiye'de bulunan Girişimci ve Yenilikçi ilk 10 üniversitenin 2018 yılı performanslarını Çok Kriterli Karar Verme Yöntemleri (ÇKKV) ile inceleyerek sıralama yapmaktır.

Materyal ve Yöntem: Analiz kapsamında ele alınan kriterler belirlenirken TÜBİTAK'ın Girişimci ve Yenilikçi Üniversite Endeksi kriterleri dikkate alınmıştır. Bu endeks, üniversiteler arasında belirlenen göstergelere bağlı olarak bir başarı sıralaması elde etmek amacıyla oluşturulmuştur. Bu kapsamda öncelikle Entropi yöntemi ile kriterlerin objektif ağırlık değerleri hesaplanmıştır. Daha sonra ÇKKV yöntemlerinden Edas ve Topsis yöntemleri kullanılarak üniversiteler arasında sıralama yapılmıştır.

Bulgular: Yapılan analizler her iki yöntemde de Orta Doğu Teknik Üniversitesi'nin ilk sırada yer aldığını göstermektedir. Analiz sonuçları genel olarak değerlendirildiğinde, bulguların TUBİTAK'ın sonuçları ile tutarlı olduğu görülmektedir.

Önemli Vurgular: Küreselleşme ile birlikte dünya genelinde bilgi ve iletişim teknolojilerinde meydana gelen değişim ve gelişmeler üniversiteleri de etkilemektedir. Üniversiteler performans sıralamalarında yükselmek için bilimsel çalışmaları desteklemeli, Ar-Ge faaliyetlerine, üniversite-sanayi işbirliğine ve patent çalışmalarına önem vermelidir.

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INTRODUCTION

In recent years, information-intensive new structures have been formed with entrepreneurial and innovative activities. Since these activities do not play an important role in the economy, there are many studies examining the factors affecting these activities (Guerrero et al., 2016). As well as being an economic value generator, entrepreneurship is closely associated with social, cultural and political dynamics due to the environment in which it takes place and the transformative mobility it creates. Although the interest of disciplines such as business, economics, finance, management and education in entrepreneurship continues, it draws attention that behavioral sciences, particularly sociology brings a different dimension to entrepreneurship research (Aytaç, 2006). Innovation, on the other hand, is based on knowledge. In this context, innovation is, changing, taking risks and most importantly being able to step out of what is already known. With the impact of developments in information and information technologies, global competition has increased, and innovativeness has become a necessity for even the most powerful businesses (Demirel and Seçkin, 2008).

Since universities are the new information resource centers in knowledge-based economies, they provide support to entrepreneurs in areas such as information transfer, guidance and consultancy, thereby producing entrepreneurial and innovative results beyond being an academic sector (Cunningham et al., 2019). When the development of universities is analyzed, it is seen that the last generation universities are entrepreneurial and innovative universities. This situation enables academicians and university students to use information along with entrepreneurship, that is, to encourage the transfer of information and technology (Koyuncuoğlu and Tekin, 2019). In the Higher Education Law No. 2547 enacted on November 4, 1981, universities were defined as “higher education institutions consisting of institutions and units like faculties, institutes, colleges etc, having scientific autonomy and public legal personality, who do high-level education, scientific research, publication and consultancy ”(YÖK, 2020). Universities have become centers of modern research by developing their activities such as knowledge generation and strengthening national culture over time. Therefore, universities both met the needs of the governments of the countries such as technology, managers and technical personnel, and provided the development of important concepts in the transformations caused by industrialization (Parlar & Palancı, 2020).

Universities are places that can meet important needs and opportunities and are positioned in fixed borders where entrepreneurship is realized. Raising graduates with entrepreneurial skills, highly qualified and able to create employment is among the primary goals of universities (Christensen & Eyring, 2011; Sutanto, 2017). An entrepreneurial approach helps universities identify challenges when formulating a strategy, seek ways to cope with these challenges, and identify what skills they need to achieve their goals (Klofsten et al., 2019).

TUBITAK, since 2012, has been publishing the "Entrepreneurial and Innovative University Index" report, in which universities are ranked according to their entrepreneurship and innovation performance and has been sharing the top 50 enterprising and innovative universities in Turkey with the public. The index study, which started to be published as from 2012, was evaluated under five dimensions and 23 indicators until 2018, and in 2018, the dimension of entrepreneurship and innovation culture was removed from the index study and the study was evaluated under four dimensions and 19 indicators. The dimensions of the entrepreneurial and innovative university index are as follows (TUBITAK, 2018).

1. Scientific and technological research competence,
2. Intellectual property pool,
3. Cooperation and interaction,
4. Economic contribution and commercialization.

This index aims to spread entrepreneurship among universities. In order for universities to reach their goals and make themselves mentioned in the performance rankings, they must follow the innovations required by the age and engage in entrepreneurial activities along with scientific and academic studies. There are studies in the literature where the performances of universities are analyzed with different multi criteria decision making methods (MCDM). Table 1 includes some of these studies.

Table 1. Literature summary

Authors	Year	Subject of the study	Method
Parlar and Palancı	2020	The performances of the universities of 81 countries in the World University Rankings 2018 list were measured.	Topsis, Maut, Saw and Aras
Karagöz, Kocakoç and Üçdoğruk	2020	The activities of 35 Entrepreneurial and Innovative universities between 2012 and 2017 were measured.	Data Envelopment Analysis
Ömürbek and Karataş	2019	The 2016 performances of 50 entrepreneurial and innovative universities were measured.	Entropy, Maut and Saw
Er and Yıldız	2018	Entrepreneurial and Innovative University Index values of Turkish universities for 2016 and 2017 were examined.	Oreste and Factor Analysis
Salimi and Rezaei	2015	The performances of three universities in the Netherlands were measured.	AHP and Fuzzy AHP
Özgüven	2011	For four foundation universities in Izmir, the selection problem was addressed.	AHP
Zangoueinezhad and Moshabaki	2011	The performance of one of the top 10 universities in Iran was measured with knowledge based indexes.	Fuzzy AHP

The aim of this study is to examine 2018 performances of the top 10 Innovative Entrepreneur universities in Turkey with MCDM. In this context, the Entrepreneurial and Innovative University Index criteria published by TUBITAK were taken into consideration. After the objective weights of the criteria were calculated with the Entropy method, performance evaluations were made using the Edas and Topsis methods. The methods used in the study were explained step by step in the methodology section, based on formulas. In the analysis part, these methods described were applied and interpreted. This study is expected to contribute to the universities in Turkey in terms of strengthening their entrepreneurship and innovation activities.

METHOD/MATERIALS

In this study, 2018 performances of top 10 entrepreneurial and innovative universities in Turkey were ranked with MCDM methods. The importance levels of the criteria in MCDM problems are not always equal. The effects of criteria having different degrees of importance on decision making are different from each other. Therefore, a weight value is assigned for all criteria and the importance levels of the criteria are determined. In this study, Entropy method was used to calculate the weight values of the criteria. After obtaining the weights of the criteria with the entropy method, the performance ranking was made using the Edas and Topsis methods from the MCDM methods. Microsoft Excel 2010 program was used for calculations.

Entropy Method

Entropy method is one of the most commonly used methods as it can be applied to many science and engineering fields. Entropy, a method developed by Rudolph Clausius in the field of thermodynamics in 1865, was adapted to information technologies by Claude E. Shannon in 1948 and started to be used as information entropy (Zhang et al., 2011: 444). The steps of the entropy method are shown below (Wu et al., 2011, Karami & Johansson, 2014, Ulutaş, 2019).

Step 1. Creating the decision matrix: First of all, a decision matrix containing all the alternatives and criteria in the selection problem is created.

$$X_{ij} = \begin{bmatrix} x_{11} & x_{12} & \dots & x_{1j} \\ x_{21} & x_{22} & \dots & x_{2j} \\ . & & & . \\ . & & & . \\ . & & & . \\ x_{i1} & x_{i2} & \dots & x_{ij} \end{bmatrix}$$

Step 2. Normalizing the decision matrix: After that, the decision matrix is normalized with the help of the following equation.

$$\mathrm{P}_{ij} = \frac{x_j}{\sum_{i=1}^{m} x_{ij}}$$

Step 3. Calculation of entropy value: In this step, the entropy value is calculated for all criteria.

$$\mathrm{E_j} = -\mathrm{k}\sum_{i=1}^{m} P_{ij} \ln\left(P_{ij}\right)$$

Step 4. Calculation of entropy weight: Finally, the weight value of all criteria (w_j) is calculated.

$$w_j = \frac{d_j}{\sum_{j=1}^{n} d_j}$$

Edas Method

The Edas method was developed by Ghorabaee et al. in 2015. With this method, the performance of the alternatives is measured and a ranking is made among the alternatives. The Edas method consists of the following steps (Ghorabaee et al., 2015, Li et al., 2020)

Step 1. Creating the decision matrix: In the first step of the Edas method application, a decision matrix is formed regarding the decision problem. This study continues with the decision matrix created for the Entropy method.

Step 2. Creating the mean solutions matrix: In this step, the average of j criteria values in the decision matrix is obtained. Mean solutions matrix is being created by taking the mean solutions of the criteria (AV_j).

$$AV_j = \frac{\sum_{i=1}^{n} X_{ij}}{n}$$

Step 3. Obtaining positive and negative distance matrices from the mean: Positive (PDA) and negative distance (NDA) matrices are obtained from the mean for each criterion. Each element of the matrices obtained ($_{ij}$, NDA_{ij}) is calculated with different equations depending on whether the criterion is benefit-based or cost-based. Here, while PDA shows the positive distance of i. alternative to the mean solution according to j. criteria, NDA shows the negative distance of i. alternative to the mean solution according to j. criteria.

$$PDA = [PDA_{ij}]_{nxm},$$
$$NDA = [NDA_{ij}]_{nxm}$$

For benefit-based criteria,

$$PDA_{ij} = \frac{\max(0,(Xij - AVj))}{AVj}$$
$$NDA_{ij} = \frac{\max(0,(AVj - Xij))}{AVj}$$

For cost-based criteria,

$$PDA_{ij} = \frac{\max(0,(AVj - Xij))}{AVj}$$
$$NDA_{ij} = \frac{\max(0,(Xij - AVj))}{AVj}$$

In the equations shown above, the benefit criterion represents the criteria that are desired to be maximum and the cost criterion represents the criteria that is desired to be minimum.

Step 4. Calculation of weighted total positive and negative values: In this step, using the positive and negative distance matrices from the mean, the weighted total positive (SPi) and negative (SNi) values are calculated. Criteria weights found by entropy method are added to the equation as a multiplier and the calculation is done.

$$SP_i = \sum_{j=1}^{m} w_j \, xPDA_{ij}$$
$$SN_i = \sum_{j=1}^{m} w_j \, xNDA_{ij}$$

Step 5. Normalizing the weighted total values: In this step, normalized SPi and SNi values are calculated for all criteria by the help of the following equation.

$$NSP_i = \frac{SPI_i}{\max_i(SPi)};$$
$$NSN_i = 1 - \frac{SN_i}{\max_i(SN_i)}.$$

Step 6. Evaluation of alternatives: Finally, the evaluation scores for each alternative (AS_i) is calculated.

$$AS_i = \frac{1}{2}(NSP_i + NSN_i)$$

Finally, evaluation scores regarding alternatives (AS_i) are ranked from high to low. The alternative with the highest value is determined as the best selection among other alternatives.

Topsis Method

Topsis method is a MCDM method developed by Hwang and Yoon in 1980. This method is based on two basic points: positive ideal solution and negative ideal solution. The application steps of the Topsis method are as follows (Çakır & Perçin, 2013; Özbek, 2017; Yıldırım & Önder, 2018).

Step 1. Normalization of the decision matrix: First of all, as shown in the equation below, the values of the criteria are normalized by dividing by the square root of the sum of the squares of those criteria.

$$n_{ij} = \frac{x_{ij}}{\sqrt{\sum_{j=1}^{m} x_{ij}^2}} \qquad j=1, \ldots, m,\ i=1 \ldots, n.$$

The decision matrix is obtained by being normalized using the equation shown above, and with the standard decision matrix (R_{ij}).

$$R_{ij} = \begin{bmatrix} r_{11} & r_{12} & \ldots & r_{1n} \\ r_{21} & r_{22} & \ldots & r_{2n} \\ . & & & . \\ . & & & . \\ . & & & . \\ r_{m1} & r_{m2} & \ldots & r_{mn} \end{bmatrix}$$

Step 2. Weighting the normalized decision matrix: In this step, by multiplying the predetermined criteria weights (w_j) by the elements of R_{ij} in the equation above, the weighted standard decision matrix (V_{ij}) is obtained

$$V_{ij} = \begin{bmatrix} w_1 n_{11} & w_2 n_{12} & \ldots & w_n n_{1n} \\ w_1 n_{21} & w_2 n_{22} & \ldots & w_n n_{2n} \\ . & & & . \\ . & & & . \\ . & & & . \\ w_1 n_{m1} & w_2 n_{m2} & \ldots & w_n n_{mn} \end{bmatrix}$$

Step 3. Calculation of positive and negative ideal solution points: Taken as the positive ideal solution point, A^+ represents the best performance values in the weighted normalized matrix. The negative ideal reference point A^- indicates the worst performance values in the same matrix.

$$A^* = \left\{ (\max_i v_{ij} \,|\, j \in J), (\min_i v_{ij} \,|\, j \in J') \right\}$$

$$A^- = \left\{ (\min_i v_{ij} \,|\, j \in J), (\max_i v_{ij} \,|\, j \in J') \right\}$$

Step 4. Calculation of distances to positive and negative ideal solution points: In the Topsis method, there are two distinction measures: S_i^* and S_i^- Values of S_i^*, showing Euclidean distances of alternatives to positive ideal solution points, and S_i^-, indicating their distances to negative ideal solution points are calculated as follows.

$$S_i^* = \sqrt{\sum_{j=1}^{n} (v_{ij} - v_j^*)^2}$$

$$S_i^- = \sqrt{\sum_{j=1}^{n} (v_{ij} - v_j^-)^2}$$

Step 5. Calculation of the relative proximity to the ideal solution point: C_i^*, which is the proximity coefficient, shows the proximity of the alternatives to the positive ideal solution point and is calculated by the following equation. Then the performance rankings of the alternatives C_i^* are ranged in order of magnitude of their values. The alternative with the highest value in the ranking is the first.

$$C_i^* = \frac{S_i^-}{S_i^- + S_i^*}$$

FINDINGS

The performances of the universities taken within the scope of the study were evaluated according to four criteria determined by TUBİTAK and ranked. The analyzes were carried out by applying the formulas shown in the method section. The universities and criteria considered within the scope of the analysis are shown in Table 2 and Table 3, respectively.

Table 2. Universities evaluated within the scope of the analysis

Code	University Name
U1	Middle East Technical University
U2	Istanbul Technical University
U3	Sabancı University
U4	İhsan Doğramacı Bilkent University
U5	Boğaziçi University
U6	Yıldız Technical University
U7	Gebze Technical University
U8	Hacettepe University
U9	Izmir Institute of Technology
U10	Ege University

Table 3. Criteria used within the scope of the analysis

Code	Criteria name
C1	Scientific and technological research competence
C2	Intellectual property pool
C3	Cooperation and interaction
C4	Economic contribution and commercialization

Table 4 shows the decision matrix of 2018 performance scores of the top 10 entrepreneurial and innovative universities. This matrix shows the criterion scores of 10 universities taken within the scope of analysis in the Entrepreneurial and Innovative University Index published by TUBITAK. When the analysis was performed, all values after the comma were taken into account in the TUBITAK ranking.

Table 4. Decision matrix

Universities	C1	C2	C3	C4
U1	23,63	16,24	28,54	24,75
U2	21,93	15,89	27,59	24,75
U3	18,08	15,16	27,9	24,36
U4	21,3	14,02	26,05	23,05
U5	20,55	15,46	28,06	19,26
U6	17,18	17,54	24,1	22,58
U7	18,18	9,93	24,64	25,07
U8	20,18	12,51	24,44	18,8
U9	20,99	9,3	24,93	20,42
U10	18,37	10,29	25	17

When evaluating universities, the weights of the four criteria used were calculated by Entropy method first. First, the entropy values were calculated by normalizing the decision matrix, then the weights of the criteria were obtained. Criterion weights are as shown in Table 3. When the table is examined, it is seen that the criteria are ranked as C2> C4> C1> C3 according to their weights. According to the results of the entropy method, the most important criterion was found to be the intellectual property pool (C2).

Table 5. Criterion weights

C1	C2	C3	C4
0.2393422	0.28014	0.232865	0.247652

Decision making is the process of choosing the most suitable alternative among the available options considering the criteria determined to achieve a specified goal (Özbek, 2017). Accordingly, the criterion weights obtained by Entropy method were

moved to Edas and Topsis methods and a ranking was done among the alternatives. The ranking results are shown in Table 6 and Table 7, respectively.

Table 6. Edas ranking results

Universities	NSP_I	NSN_I	AS_I	Ranking
U1	1	1	1	1
U2	0,75841824	1	0,879209119	2
U3	0,49502137	0,8357768	0,665399082	3
U4	0,23352846	0,99530631	0,614417385	4
U5	0,4088857	0,79395225	0,601418978	6
U6	0,58266361	0,63359998	0,608131796	5
U7	0,2317985	0,29273247	0,262265484	8
U8	0,01131255	0,514827	0,263069775	7
U9	0,07629954	0,2697953	0,173047419	9
U10	0	0	0	10

It is seen that the university with the best performance according to the evaluation scores obtained by Edas method is Middle East Technical University (U1). This university is followed by Istanbul Technical University (U2), Sabancı University (U3) and Bilkent University (U4), respectively.

Table 7. Topsis ranking results

Universities	S_i^*	S_i^-	C_i^*	Ranking
U1	0,009228	0,066177	0,877623	1
U2	0,014272	0,060692	0,809617	2
U3	0,030128	0,052255	0,634297	4
U4	0,029203	0,04542	0,608664	6
U5	0,030697	0,04851	0,612449	5
U6	0,033808	0,062053	0,647321	3
U7	0,060168	0,032829	0,353011	8
U8	0,047906	0,027236	0,362456	7
U9	0,063085	0,021984	0,258427	9
U10	0,065736	0,009246	0,123316	10

It is seen that the university with the best performance according to the evaluation scores obtained by Topsis method, just like in Edas method, is Middle East Technical University (U1). This university is followed by Istanbul Technical University (U2), Yildiz Technical University (U6) and Sabancı University (U3), respectively.

Table 8. Comparative ranking results of entrepreneurial and innovative universities

Universities	TUBITAK	Edas	Topsis
Middle East Technical University	1	1	1
Istanbul Technical University	2	2	2
Sabancı University	3	3	4
İhsan Doğramacı Bilkent University	4	4	6
Boğaziçi University	5	6	5
Yıldız Technical University	6	5	3
Gebze Technical University	7	8	8
Hacettepe University	8	7	7
Izmir Institute of Technology	9	9	9
Ege University	10	10	10

Table 8 contains the comparative ranking results of Entrepreneurial and Innovative universities. According to Edas and Topsis methods, while Middle East Technical University (U1) ranks first in both methods, Istanbul Technical University (U2) ranks second in the performance evaluation rankings. Sabancı University (U3) ranks third for the Edas method, while Yildiz Technical University (U6) ranks third for the Topsis method. When the results of the analysis are evaluated in general, it is seen that the findings are consistent with the results of TUBITAK.

CONCLUSION AND RECOMMENDATIONS

In the information society, universities have undertaken new tasks and relationships to contribute to economic and social development while maintaining their own sustainability. Therefore, they have begun to play a greater role in the economy and society as organizations that produce, disseminate and have the potential to apply information (Schmitz et al., 2017). Along with globalization, changes and developments taking place in information and communication technologies worldwide affect universities, too. Universities contribute to the development and increasing levels of well-being of their countries thanks to their research findings, as well as being education and research institutions. For these reasons, it is extremely important to educate individuals with the vision and capabilities of entrepreneurship and innovation and to make it widespread throughout the country. Besides, universities are in cooperation and interaction with various fields of industry. This interaction not only strengthens technology transfers but also provides mutual benefits for the public and private sectors.

"Entrepreneurial and Innovative University Index" has been published by TUBITAK since 2012 in order to encourage universities to entrepreneurship activities in Turkey. This index ranks universities under four dimensions, based on entrepreneurship and innovation performances. Four basic dimensions used in performance rankings are scientific and technological research competence, intellectual property pool, cooperation and interaction, and economic contribution and commercialization. This index report is expected to intensify competition in the field of entrepreneurship and innovation between universities and thus benefit the development of activities in this field.

In this study, 2018 performances of top 10 entrepreneurial and innovative universities in Turkey were ranked with MCDM methods. In this direction, the entrepreneurial and innovative university index criteria determined by TUBITAK were taken into account. Firstly, the objective weights of the criteria were determined by Entropy method. Then, the performances of the universities were measured with Edas and Topsis methods, which are from MCDM methods, and ranked and compared with TUBITAK results. Middle East Technical University ranks first in the performance evaluation ranking made according to Edas and Topsis methods. Istanbul Technical University ranks second for Edas and Topsis methods. Sabancı University ranks third for the Edas method and fourth for the Topsis method. When the overall ranking of all universities was examined, it was determined that their findings were quite similar to TUBITAK rankings.

When the findings of the studies in the literature conducted using different MCDM methods are examined, it is seen that, again, similar results were obtained with TUBITAK ranking results (Ömürbek and Karataş, 2018; Er and Yildiz 2018). Universities should support scientific studies, put emphasis on R&D activities, university-industry cooperation and patent studies in order to rise in performance rankings. The use of multiple methods within the scope of the study is important in terms of the comparison and consistency of the results. It is recommended to expand future studies to cover all universities in Turkey and to compare the results obtained by using different MCDM methods. In addition, the methods used in this study can be used to solve different decision-making problems.

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Statements of publication ethics

I hereby declare that the study has not unethical issues and that research and publication ethics have been observed carefully.

Ethics Committee Approval Information

Since this study was carried out with open access data from the TUBITAK, the approval of the ethics commission was not applied.

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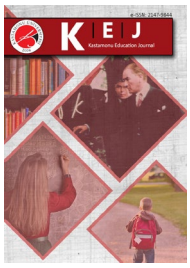

|Research Article / Araştırma Makalesi|

Analysis on the Reflective Thinking Skills of the 7th and 8th Grade Students toward Problem Solving

7. ve 8. Sınıf Öğrencilerinin Problem Çözmeye Yönelik Yansıtıcı Düşünme Becerilerinin İncelenmesi

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Keywords

1. Mathematics education
2. Middle school students
3. Problem solving
4. Reflective thinking skill

Anahtar Kelimeler

1. Matematik eğitimi
2. Ortaokul öğrencileri
3. Problem çözme
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Abstract

This study aims to analyze the reflective thinking skills of the 7th and 8th grade students toward problem solving. Using both qualitative and quantitative data collection tools, this study draws on the mixed-methods design. The sample consists of a total of 167 students, including 78 female and 89 male students studying in a middle school in the district of Fatih, province of Istanbul, Turkey in the 2019-2020 academic year. To that end, this study benefits from "The Reflective Thinking Ability Scale towards Problem Solving" and a personal information form to gather quantitative data. Qualitative data are obtained through reflective dialogue forms that present the semi-structured interview questions. The analysis of the quantitative data is performed through descriptive statistics methods, independent samples t-test, correlation analysis whereas the analysis of the qualitative data is conducted through descriptive analysis. The analyses performed in this study ascertain that the reflective thinking ability of the students toward problem solving is high. This study also concludes that there is a significant correlation between this ability and mathematics achievement whilst there is no such significant correlation across genders and grade levels. Based on the analysis of the qualitative data, it is notable that the reflections of the students are lacking and inadequate in each sub-dimension of reflective thinking, namely, questioning, reasoning and evaluation sub-dimensions, as well as in this ability in general.

Öz

Bu çalışmanın amacı 7. ve 8. sınıf öğrencilerinin problem çözmeye yönelik yansıtıcı düşünme becerilerini incelemektir. Bu amaçla nicel ve nitel veri toplama araçlarının birlikte kullanıldığı karma desen benimsenmiştir. Çalışmanın örneklemini 2019-2020 eğitim öğretim yılında İstanbul ilinin Fatih ilçesinde yer alan bir ortaokulda öğrenim görmekte olan 78 kız 89 erkek olmak üzere 167 öğrenci oluşturmaktadır. Araştırmada, nicel verileri toplamak için "Problem Çözmeye Yönelik Yansıtıcı Düşünme Becerisi Ölçeği" ve kişisel bilgi formu kullanılmıştır. Nitel veriler, yarı yapılandırılmış görüşme sorularından oluşan yansıtıcı diyalog formu ile elde edilmiştir. Verilerin analiz sürecinde nicel veriler için betimsel istatistiki yöntemler, bağımsız örneklemler t-testi, korelasyon analizi, ve nitel veriler için betimsel analiz kullanılmıştır. Analizler sonucunda öğrencilerin problem çözmeye yönelik yansıtıcı düşünme becerilerinin yüksek olduğu bulunmuştur. Bu beceri ile matematik başarısı arasında anlamlı bir ilişki olduğu bulunurken, cinsiyet ve sınıf düzeyine göre problem çözmeye yönelik yansıtıcı düşünme becerisinin anlamlı farklılık göstermediği sonucuna ulaşılmıştır. Nitel verilerin analizleri sonucunda, yansıtıcı düşünmenin sorgulama, nedenleme ve değerlendirme alt boyutlarının her birinde ve bu becerinin genelinde, öğrencilerin problem çözümlerine yönelik yansıtıcı diyalog bakımından eksik ve yetersiz yansıtmalar yaptığı görülmüştür.

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INTRODUCTION

The concepts of problem solving, critical thinking, metacognitive thinking, creative thinking and reflective thinking are among higher-order thinking skills and are closely related to each other (Erdoğan, 2019). Reflective thinking as one of higher-order thinking skills has been widely addressed in the literature (Erdoğan and Şengül, 2018; Griffin, 2003; Gürol, 2011; Jansen and Spitzer, 2009). It is notable that researchers define reflective thinking in different ways. Indeed, Mezirow (1991) argues that reflective thinking is "an important part of the learning process that combines past interpretations and new experiences to construct conceptualizations of the future by performing different functions to meet the needs of the individual." (p.101). Kember et al. (2000) defines reflective thinking skill as one's thinking about what s/he can do to overcome a problem, questioning about, evaluating and comparing his/her thoughts. Ersözlü (2008) describes this skill as reflection on and questioning past, present and future experiences, and then evaluating the steps to be taken to solve the problems arising from such reflection and questioning. Reflective thinking is a reflection process through which an individual thoroughly questions any subject s/he deals with, examines reasons while developing assumptions on the subject, and lastly identifies his/her misconceptions about the subject and explores new ways.

In the relevant literature, Dewey, Mezirow and Schön are the scholars who led the main discussion on reflective thinking. Dewey (1991) approached this concept based on problem-solving stages; Mezirow (1991) highlighted emotions in reflective thinking and Schön (1987) distinguished between two types of reflective practice: reflection in action and reflection on action. While reflection in action focuses on solving problems that emerge during the action, reflection on action is about an evaluation, respective analysis of the action, after the action is taken, and a systematic and deliberate reflection on it in every aspect (Dewey, 1991; Mezirow; 1991; Schön, 1987; cited from Bayrak and Usluel, 2011). Dewey (1933) reports that reflective thinking process consists of five stages: suggestions, problems, hypotheses, reasoning and testing. Suggestions: the ideas that appear in the mind of an individual when faced with a complex situation. Problems: the effort to see the bigger picture, rather than facing the details. Hypothesis: is what can be done with due consideration of the suggestions. It requires further thinking over the information. Reasoning: new developments created with knowledge, ideas and past experiences. Testing: process of testing problems to produce a solution. In the last step, a new problem may emerge or the existing problem may be solved. Each stage of reflective thinking process does not follow a certain order and is in harmony with each other (Kızılkaya and Aşkar, 2009). Different tools are used for reflective thinking. For example, activities such as reflective diaries, reflective dialogue, reflective writing, videotapes, thinking aloud, and group discussions are the tools that allow a reflective thinking process (Kızılkaya and Aşkar, 2009). Previous studies have investigated the effects of these reflective thinking tools on success (Çontay, 2012), problem-solving skills, attitude and anxiety (Küçük, 2019), as well as reflective thinking skills (Bayrak and Usluel, 2011; Can and Altuntaş, 2016).

Reflective thinking skills in mathematics education have gained more importance since they were associated with problem solving. The basic skill of mathematics is problem solving (Erdoğan, 2019). Problem solving process is a process whereby higher-order thinking skills are acquired. The PISA 2003 technical report prepared by OECD explains the steps to be followed in problem solving process as follows: defining the problem in real terms, determining appropriate information or limitations, presenting possible options or solutions, solving the problem, controlling the solution and sharing the results (Cited from Kızılkaya and Aşkar, 2009). The use of reflective thinking in problem solving process indicates the reflective problem-solving skill. In other words, if reflective thinking skills are dominantly present in the problem-solving steps, problem solving skills are involved too (Saygılı and Atahan, 2014). Numerous studies are available on reflective thinking skills toward problem solving (Baki, Güç and Özmen, 2012; Baş and Kıvılcım, 2013; Bjuland, 2004; Can, 2015; Demirel, Derman and Karagedik, 2015; Erdoğan, 2019; Güneş, 2015; Hong and Choi, 2015; Saygılı and Atahan, 2014; Şen, 2013; Tat, 2015; Tuncer and Özeren, 2012; Ülker, 2019). Among them, the study by Hong and Choi (2015) developed a reliable and valid questionnaire to measure reflective thinking toward problem solving. Baş and Kıvılcım (2013) examined the relationship between high-school students' achievement in geometry and their reflective thinking skills toward problem solving and found a high positive correlation between these two variables. Saygılı and Atahan (2014) performed a study to determine the reflective thinking skill levels of gifted children toward problem solving and concluded that the reflective thinking skills of these children are high. Also, through an experimental study, Sarıtepeci (2017) studied the effect of the digital storytelling method on the reflective thinking skills of the participants at the middle school level and ascertained that it had a positive effect. The study also found out that the number of activities/homework performed by the participants in an online learning environment affected the development of reflective thinking skills.

The actions involved in reflective thinking process toward problem solving are questioning, reasoning and evaluation (Kızılkaya and Aşkar, 2009). Questioning is the process where one seeks answers to herself/himself or to questions from others. The process of reasoning urges one to investigate the cause of his/her actions by establishing cause-effect relationships. Evaluation allows one to look back at her/his previous actions and distinguish between what is wrong and right. Individuals with reflective thinking skills question, think, produce, synthesize previous learning with new information, adapt and apply the information they produce to their daily life (Yıldırım and Yıldız, 2019). Moreover, reflective thinking leads students to learn through their experiences, to become aware of what they are doing, to reflect on them, to take responsibility for their own learning, to identify and correct their own mistakes, to think critically, to develop problem solving and research skills (Tok, 2008). Albayrak and Simşek (2018) state that offering an effective learning-teaching setting, reflective thinking activities provide students and teachers with a solution-oriented approach. Students are guides who observe and shape their own work in the reflective thinking process (Yıldırım, 2013). Thus, students who are responsible for their own learning will be hopefully involved in an effective learning process. It appears

that reflective thinking skills are important skills for achieving the student profile targeted in new curricula Reflective thinking skills help individuals in the problem-solving process and can be best revealed in the problem-solving process (Kızılkaya and Aşkar, 2009). Reflective dialogue, which involves reflective thinking, offers students the opportunity to discuss a topic (Kramarski and Kohen, 2017). Students can reflect on the topic during the discussion and review, question and evaluate what they have learned in this reflection process. These being said, addressing problem solving and reflective thinking together, this study explores the reflective thinking skills of students toward problem solving through reflective dialogues.

This study seeks to analyze the reflective thinking skills of the 7th and 8th grade students toward problem solving and to reveal the reflective thinking process whereby the students reflect on certain problems. Accordingly, it aims to answer the following research questions:

1) At what level are the reflective thinking skills of the 7th and 8th grade students toward problem solving?

1.1) Do the reflective thinking skills of the students toward problem solving significantly differ by grade level?

1.2) Do the reflective thinking skills of the students toward problem solving significantly differ by gender?

1.3) Are reflective thinking skills toward problem solving significantly correlated with mathematics achievement?

2) What reflective thinking skills do the 7th and 8th grade students use toward problem solving?

METHOD

Research Model

This study draws on the mixed-methods sequential explanatory design, which is one of the mixed-methods research designs. The mixed-methods sequential explanatory design is intended to use qualitative data to explain quantitative findings in more detail (Creswell, 2017). The first part of this study includes the process of collecting and analyzing qualitative data through various measurement tools. Then, the qualitative data are explained through interviews made in the quantitative part of this study.

Study Group

The study population consists of 7th and 8th grade students studying in middle schools in the district of Fatih, province of Istanbul, Turkey. A total of 167 students, including 78 female and 89 male students studying in a middle school in the district of Fatih, province of Istanbul, participated in this study. 118 of them are 7th graders whereas 49 are 8th graders. The participants who are easily accessible were selected for the sample. Within the qualitative part of this study, 12 students (10 female and 2 male), including six 7th graders and six 8th graders, were interviewed through semi-structured interviews. Two students in each mathematics achievement group (low, moderate and high) for each grade are included in this study to achieve maximum variation sampling. The success of students in the mathematics course was considered as a criterion in this process. The eligibility of the students selected was also confirmed by their mathematics teachers.

Table 1. The demographic characteristics of the students

Student	Grade Level	Gender	Mathematics achievement
S1	7	Male	Low
S2	7	Female	Low
S3	7	Female	Moderate
S4	7	Female	Moderate
S5	7	Female	High
S6	7	Male	High
S7	8	Female	Low
S8	8	Female	Low
S9	8	Female	Moderate
S10	8	Female	Moderate
S11	8	Female	High
S12	8	Female	High

Data Collection Tools and Process

The first part of this study includes the process of collecting qualitative data. The data collection in the qualitative part of this study was performed through the personal information form designed by the researcher and "The Reflective Thinking Ability Scale towards Problem Solving" developed by Kızılkaya and Aşkar (2009). This scale consists of 14 items and three sub-dimensions. The questioning dimension includes five items (1st, 3rd, 7th, 9th and 13th items); the evaluation dimension includes five items (2nd, 4th, 6th, 10th and 14th items) and the reasoning dimension includes four items (5th, 8th, 11th and 12th items). Examples of the items in this scale are: the 13th item in the scale reads "When I read a problem, I ask myself questions to understand what the problem says and asks." In the questioning sub-dimension, the 4th item reads "I evaluate the possible solutions one by one to find a better

solution to the next problem" in the evaluation sub-dimension and the 8th item reads "While solving a problem, I think about the reasons for the operations and try to establish a connection with the results I have found" in the reasoning sub-dimension. This scale has no reverse item. Kızılkaya and Aşkar (2009) conducted a confirmatory factor analysis for validating the reflective thinking ability scale towards problem solving with 7th grade students and concluded that the fit indices were acceptable. They found the Cronbach's Alpha reliability coefficient of this scale as 0.872. This study measured its Cronbach's Alpha reliability coefficient as 0.855. The items in this 5-point Likert scale represent five frequency responses as "never, rarely, sometimes, often and always." These responses are scored as Always=5, Often=4, Sometimes=3, Rarely=2, Never=1. The students were asked to consider the frequency of the action stated while filling the scale. The total scale score was calculated by summing the scores that represent the answers given to 14 items in the scale. Thus, the highest possible score for this score is 70 whilst the lowest score is 14. The range of the total score symbolizes the degree to which one has reflective thinking skills. To interpret the data more precisely, the range coefficients were determined using the [(Number of options - 1) / formula for number of options]. Accordingly, the values with a range of 1.00-1.80 are very low; of 1.81-2.60 are low, of 2.61-3.40 are moderate, of 3.41-4.20 are high and of 4.21-5.00 are very high.

The researchers, based on the analyses and results of the data obtained, supported the quantitative findings with qualitative data and provided more in-depth information. To collect data for the qualitative part of this study, the researcher designed and used "the reflective dialogue form" with 10 open-ended questions in the form of semi-structured interview. The questions in the form of reflective dialogue were prepared using the three sub-dimensions of reflective thinking reported by Kızılkaya and Aşkar (2009). The 1st, 4th, 6th and 7th questions in the form are related to the reasoning sub-dimension; the 2nd, 3rd and 5th questions are linked to the questioning sub-dimension and the 8th, 9th and 10th questions are associated with the evaluation sub-dimension. The questions in the form were reviewed by two field experts on mathematics education and finalized based on their feedback. Examples of the questions in the reflective dialogue form are presented below:

Questioning: *"Which method did you use in solving this problem? How did you decide to apply this method?"*

Reasoning: "*How did you utilize the mathematical tools you used in problem solving? Please explain."*

Evaluation: "*After you solved the problem, what did you do to be sure of the result you calculated? Please explain."*

In the qualitative part, a total of 12 students, two students in each mathematics achievement group (low, moderate and high) for each grade, were interviewed. Prior to the interviews, each student was asked two problems for the problem-solving process. Then, the students were asked the questions in the reflective dialogue form to reveal their reflecting thinking ability toward problem solving. Once the students completed the problem-solving process, the reflective dialogues between them and the researchers on problem solutions were voice-recorded. The interviews lasted about 20-30 minutes. The problems used in the interviews were obtained from the skill-based tests and sample questions prepared by the Turkish Ministry of National Education, provided that the answers were not shown. An expert on mathematics education and the teacher teaching mathematics to these students were consulted for the suitability of these problems to the level of the students and their effectiveness in revealing the reflective thinking ability toward problem solving. Appendix 1 presents the screenshots of the problems asked to the students.

Data Analysis

In the quantitative part of this study, the data were analyzed using the SPSS 22.0 statistical package program. Independent samples t-test was performed to determine whether the reflective thinking skills of the students toward problem solving significantly differed by grade level and gender, and correlation analysis was applied to evaluate the correlation of these skills with mathematics achievement. Also, descriptive statistical methods (mean, standard deviation, minimum and maximum values) were used to determine the levels of reflective thinking skills of the students toward problem solving.

In the qualitative part of this study, a descriptive analysis was conducted. The data from the interviews were analyzed according to the sub-dimensions of questioning, reasoning and evaluation of the scale toward problem solving. The levels of the reflective thinking ability of the students toward problem solving were determined based on the two problems asked to the students; their levels are presented as adequate, partially adequate or inadequate in tables. If the student gave appropriate answers to each question in a clear and understandable way during the reflective dialogues, it was considered that s/he had adequate reflective thinking skills. If the student gave appropriate answers to 1 out of 3 questions or 2 out of 4 questions in a clear and understandable way during the reflective dialogues, it was considered that s/he had partially adequate reflective thinking skills. And, if the student failed to give appropriate answers to any question in a clear and understandable way and to express himself/herself during the reflective dialogues, it was considered that s/he had inadequate reflective thinking skills. The data from the interviews with a total of 12 students, including two 7th graders and two 8th graders in each of the three sub-dimensions (questioning, reasoning and evaluation) and the analyses of these data were presented in this study. The analyses were separately coded by the researchers and the agreement percentage was 86%. The researchers discussed the discrepancies between the codes to reconcile any disagreements on the codes and to reach a conclusion.

FINDINGS

Findings from the Quantitative Data

This study, which seeks to analyze the reflective thinking ability of the 7th and 8th grade students toward problem solving, demonstrates how their ability differed by grade level, gender and mathematics achievement. The descriptive statistics of the answers of the students to the "Questioning", "Evaluation" and "Reasoning" dimensions in the scale were calculated and to reveal the levels of the reflective thinking skills of the 7th and 8th graders toward problem solving, and these statistics are presented below.

Table 2. Descriptive Results of the Scores on the Reflective Thinking Ability Scale towards Problem Solving

Variables	N	Minimum	Maximum	$\overline{X}$	ss	Level
Questioning	167	1	5	3,52	0,79	High
Evaluation	167	1	5	3,67	0,82	High
Reasoning	167	1	5	3,46	0,84	High

Table 2 shows that the average scores of the participants on the sub-dimensions of questioning, evaluation and reasoning in the scale are 3,52± 0,79; 3,67±0,82 and 3,46±0,84, respectively. These values imply that the perceptions of the participants on their questioning, evaluation and reasoning skills are high. The average of the answers of the participants to the overall scale is 3,59±0,69. This value means that the reflective thinking ability of the participants toward problem solving is high.

Table 3 demonstrates the answers of the participants to the "Questioning", "Evaluation" and "Reasoning" dimensions as well as their descriptive statistics and results of independent samples t-test on grade level to determine whether the reflective thinking ability of the students toward problem solving significantly differed by grade level or not.

Table 3. Comparison of the reflective thinking ability toward problem solving across grade levels

Variable	Grade	N	$\overline{X}$	Ss	F	p	t
Questioning	7. grade	118	3,42	0,76	0,56	0,45	-2,520
	8. grade	49	3,76	0,83			
Evaluation	7. grade	118	3,64	0,83	0,19	0,66	-0,712
	8. grade	49	3,74	0,80			
Reasoning	7. grade	118	3,46	0,82	0,03	0,85	-2,36
	8. grade	49	3,80	0,84			
Total	**7. grade**	**118**	**3,52**	**0,68**	**0,02**	**0,86**	**-1,85**
	8. grade	**49**	**3,75**	**0,69**			

As seen in Table 3, the mean scores on the questioning, evaluation and reasoning sub-dimensions in the scale did not significantly differ across grade levels (p>0,05). The mean scores in the table imply that there was no significant difference between grade level and reflective thinking ability toward problem solving for the overall scale (p>0,05). In other words, as grade level changes, the reflective thinking skills of the students do not change at all.

Table 4 demonstrates the answers of the participants to the "Questioning", "Evaluation" and "Reasoning" dimensions as well as their descriptive statistics and results of independent samples t-test on gender to determine whether the reflective thinking ability of the students toward problem solving significantly differed by gender or not.

Table 4. Comparison of the reflective thinking ability toward problem solving across genders

Variable	Grade	N	$\overline{X}$	Ss	F	p	t
Questioning	Female	78	3,66	0,66	5,19	0,024	2,06
	Male	89	3,40	0,88			
Evaluation	Female	78	3,78	0,73	2,67	0,10	1,61
	Male	89	3,57	0,88			
Reasoning	Female	78	3,64	0,78	1,62	0,31	1,11
	Male	89	3,49	0,88			
Total	**Female**	**78**	**3,71**	**0,58**	**2,56**	**0,11**	**1,98**
	Male	**89**	**3,75**	**0,75**			

As observed in Table 4, the mean score on the questioning sub-dimension in the scale significantly differed by the independent variable of gender (p>0,05) for the male students. On the other hand, the mean scores on the evaluation and reasoning sub-dimensions in the scale did not significantly differ across genders (p>0,05). For the overall scale, there was no significant difference between gender and reflective thinking ability toward problem solving (p>0,05). To determine any significant difference between the reflective thinking ability of the students toward problem solving and mathematics achievement, this study also calculated correlation coefficient. The descriptive statistics on the data obtained are presented in the following table.

Table 5. Correlation between reflective thinking ability toward problem solving and mathematics achievement

Variable	N	$\overline{X}$	Ss	r	p
Mathematics achievement score	167	67,36	23,88	0,442	.000

The Pearson's correlation analysis, which was performed to measure the relationship between reflective thinking ability and mathematics achievement, found r = 0,442 and p=.000. Table 5 shows that there was a moderate, positive and significant correlation between reflective thinking ability toward problem solving and mathematics achievement.

Findings from the Qualitative Data

This section presents the qualitative findings on the reflective dialogues with the students to enrich the findings from the quantitative findings. Table 6 offers information on the levels of the reflective thinking skills of 12 students selected from the sample toward problem solving based on the reflective dialogues with them on the problems they solved. The 7th graders are abbreviated as S1, S2, S3, S4, S5, S6 whilst the 8th graders are abbreviated as S7, S8, S9, S10, S11 and S12.

Table 6. The levels of the reflective thinking skills of the students toward problem solving based on the reflective dialogues

Grade Level	Mathematics achievement	Student	Problem	Questioning			Reasoning			Evaluation		
				Adequate	Partially Adequate	Inadequate	Adequate	Partially Adequate	Inadequate	Adequate	Partially Adequate	Inadequate
7.	Low	S1	1.Problem			x			x			x
			2.Problem			x			x			x
		S2	1.Problem			x		x				x
			2.Problem			x			x		x	
	Moderate	S3	1.Problem			x		x			x	
			2.Problem			x			x		x	
		S4	1.Problem		x				x			x
			2.Problem		x				x			x
	High	S5	1.Problem			x			x			x
			2.Problem			x			x			x
		S6	1.Problem		x				x			x
			2.Problem			x			x			x
8.	Low	S7	1.Problem			x	x					x
			2.Problem			x			x			x
		S8	1.Problem		x		x				x	
			2.Problem			x			x		x	
	Moderate	S9	1.Problem			x			x			x
			2.Problem			x	x				x	
		S10	1.Problem		x			x				x
			2.Problem			x			x			x
	High	S11	1.Problem			x	x				x	
			2.Problem			x			x			x
		S12	1.Problem			x	x					x
			2.Problem			x		x				x
			n=24	**0**	**5(20,8%)**	**19(79,2%)**	**5(20,8%)**	**4(16,7%)**	**15(62,5%)**		**7(29,2%)**	**17(70,8%)**

The skills of the students were classified based on the reflective dialogues with the selected students with low, moderate and high mathematics achievement on 2 different problems. Their reflective ability is mostly inadequate. In the questioning sub-dimension, no student had any adequate reflective thinking skills whereas the students demonstrated partially adequate reflective thinking skills in solving 5 problems and showed inadequate reflective thinking skills in solving 19 problems. In the reasoning sub-dimension, the students demonstrated adequate reflective thinking skills in solving 5 problems, partially adequate skills in 4 problems and inadequate skills in 15 problems. The 7th graders failed to show adequate reflective thinking skills in the reasoning sub-dimension. However, the 8th graders, except from S10, demonstrated adequate reflective thinking skills in a problem. Also, in the evaluation sub-dimension, similar to the questioning sub-dimension, no student had any adequate reflective thinking skills whilst the students demonstrated partially adequate reflective thinking skills in solving 7 problems and showed inadequate reflective thinking skills in solving 17 problems. It is remarkable that the students showed largely inadequate reflective thinking skills in each sub-dimension. That is, the 7th graders and 8th graders had poor reflective thinking ability toward problem solving based on the reflective dialogues on the solutions they provided. The self-perceptions of the students about this ability were notably high, but their levels of displaying this ability were low.

Reflective thinking skills in the questioning sub-dimension

In the questioning sub-dimension, the students were asked to re-express the problems posed to them in their own words, to explain what is given and required in the problem, and to indicate the different solutions to the problem. No student showed any adequate reflective thinking skills in the questioning sub-dimension. Out of the 24 problem solutions, which were provided by 12 students (each solving 2 problems), the students demonstrated partially adequate reflective thinking ability only in 5 of them and inadequate reflective thinking ability in the remaining 19 solutions. This section presents some of the problem solutions provided by the students with different math achievement, grade levels and reflective thinking skills as well as some of the remarkable student statements.

S1 is a 7th grader with low mathematics achievement. This student incorrectly calculated the result of the first problem to be 64. He did not want to share how he solved the problem. In the questioning sub-dimension, the student was asked to re-express the problem in his own words and gave a short feedback, saying that "*I would express the numbers more clearly*" which is not related to the expression of the problem. Further, the student failed to correctly explain what the problem presents and asks and consider the different ways to solve the problem. Thus, the student showed inadequate reflective thinking skills in the questioning sub-dimension.

S4 is a 7th grader with moderate mathematics achievement. Figure 1 presents the solution provided by S4 to the 2nd problem.

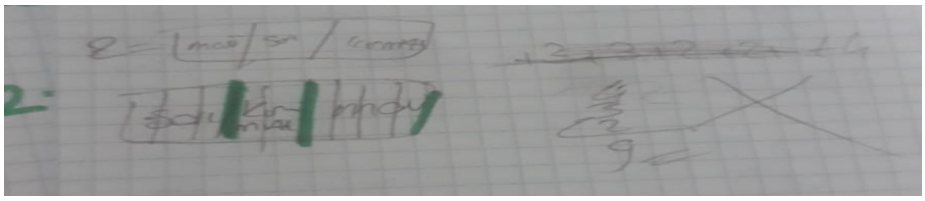

Figure 1. The solution provided by the 7th grader S4 for the 2nd problem

S4 drew the same shape given in the problem on the paper. Dissecting the colored areas in the same way, the student added the number of these areas and found the answer as 9.

In the questioning sub-dimension, S4 told that "I would express it as it is written here", rather than expressing the problem in her own words. However, the student correctly identified what the problem presents and asks. It is notable that she can actually comprehend what information the problem presents and what it asks. Still, she found the incorrect solution. She believed that there could not be different solutions to the problem and stated that she thought this while solving the problem. Thus, she failed to re-express the problem and present different solutions to the problem. Yet, the fact that she correctly identified what the problem presents and asks and that she thought if there could be different solutions to the problem means that the student showed partially adequate reflective thinking skills.

S10 is an 8th grader with moderate mathematics achievement. Figure 2 presents the solution provided by this student to the 1st problem.

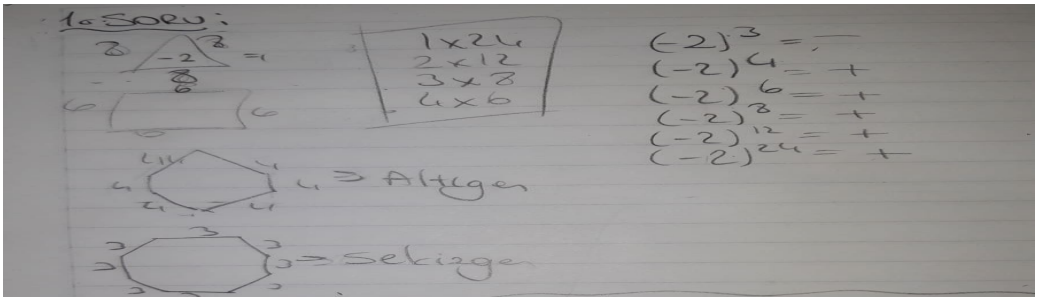

Figure 2. The solution provided by the 8th grader S10 for the 1st problem

S10 found the correct answer, calculating it as $\frac{1}{6}$. While solving the problem, S10 drew a triangle with a side length of 8 cm, a rectangle with a side length of 6 cm, a hexagon with a side length of 4 cm and an octagon with a side length of 3 cm. On the side, she found the positive divisors of 24. Then, she examined which ones are negative or positive in the positive multipliers, which she considered as the powers of -2. The student found the answer as $\frac{1}{6}$ because she determined that 1 out of 6 situations meets the condition.

S10 showed partially adequate reflective thinking ability in the questioning sub-dimension during the reflective dialogues. As S10 found the correct answer, she did not have any difficulty in understanding the problem and achieved to re-express it. Yet, she was confused about what the problem presents and asks, saying that: "*What the problem presents is different regular polygons with a circumference of 24 cm and a number to be written inside. What the problem asks is the probability of getting a negative integer on the card randomly selected.*"

S11 is an 8th grader with high mathematics achievement. She first said that the answer to the second problem is 167 and then stated that she wanted to recalculate it and said 28. Both answers are incorrect. Figure 3 presents the solution provided by her to for the second problem.

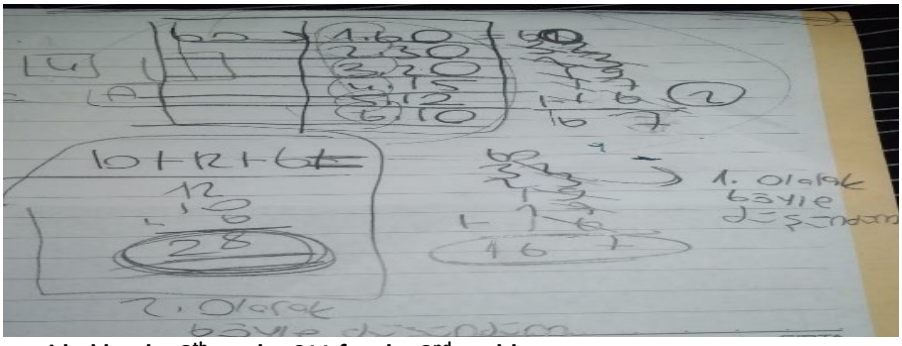

Figure 3. The solution provided by the 8th grader S11 for the 2nd problem

S11 first noted all factor pairs of 60 and added them on the side. She then added these numbers and calculated the answer as 167. Realizing that this is not correct, the student then wrote 28 by adding the numbers 12, 10 and 6. However, how she ended up with these numbers is not clearly stated.

The answers of S11 during the reflective dialogues were not at the expected level. When asked to re-express the problem, S11 instead explained how she solved it at length. Yet, her explanation was unclear. About what the problem presents and asks, S11 stated that: "*What it presents is 60 and what it asks to sum the factor pairs of 60*." This means that S11 could not successfully understand the problem. Although the problem only includes addition operations, the student mentioned about multipliers, which implies that the student had difficulty in answering this problem. As a result, the student showed poor reflective thinking ability in the questioning sub-dimension during the reflective dialogues.

Reflective thinking abilities in the reasoning sub-dimension

In the reasoning sub-dimension, the students were asked to compare the given problem with other problems, explain the method they followed in problem solving and how they decided to apply this method, and express the mathematical ways they used in problem solving. Out of the 24 problem solutions, which were provided by 12 students (each solving 2 problems), the students demonstrated adequate reflective thinking ability only in 5 of them and partially adequate reflective thinking ability in the 4 solutions and inadequate reflective thinking ability in the remaining 15 solutions. This section presents some of the problem solutions provided by the students with different math achievement, grade levels and reflective thinking skills as well as some of the remarkable student statements.

S2 is a 7th grader with low mathematics achievement. This student incorrectly calculated the answer to the cricket question as 21. Figure 4 shows the solution provided by her for the 1st problem.

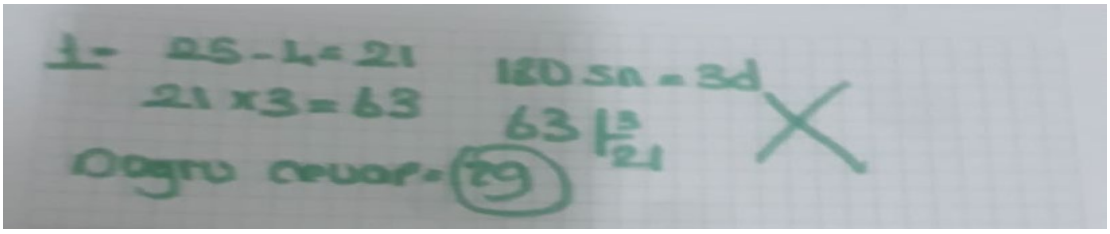

Figure 4. The solution provided by the 7th grader S1 for the 1st problem

S2 first subtracted 4 out of 25, presented in the problem, and then multiplied it by 3. Knowing that 180 seconds is equal to 3 minutes, she then divided 63 by 3 and found 21. First of all, the expression used instead of the unknown in the equation is false; the student should establish a ratio. She should calculate how many times it would chirp in 25 seconds if it chirps 180 times in 1 minute. However, she mistakenly used the number 25 as it is and directly subtracted 4 out of it and multiplied it by 3. The reason why she did such a mistake is that she failed to reflect what she read into her solution. She also made the time conversion with the wrong time unit.

In the reasoning sub-dimension, S2 clearly explained how she solved the problem: "*I used an equation first. That is, I calculated the second or minute as x. Then I performed 25-4 and multiplied it by 3. As a result, I found x to be 21*." She also reported that she previously solved similar problems. Though the solution of the student was incorrect, she did not have difficulty in justifying her solution. Nevertheless, the fact that S2 used concise statements means that she had partially adequate reflective thinking skills in the reasoning sub-dimension.

S5 is a 7th grader with high mathematics achievement. She found the answer of the 2nd problem as 9. But she also stated that she was not sure of her result. Figure 5 presents the solution provided by this student for the 2nd problem.

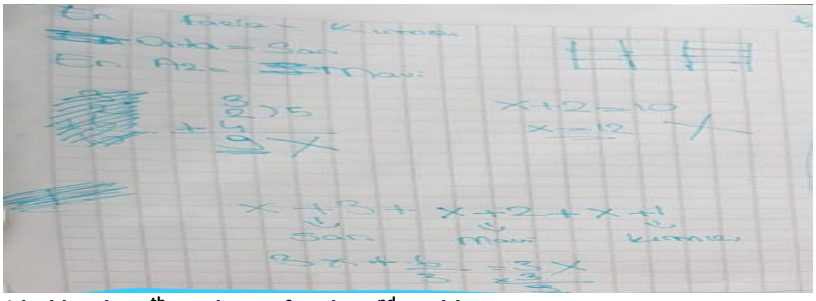

Figure 5. The solution provided by the 7th grader S5 for the 2nd problem

To fully understand the problem, S5 converted some mathematics expressions into text. She also calculated how many parts the shape is divided into. Then, considering the expression in the problem that reads it is 2 cm more than, she established an equation, but this equation was quite different from the correct solution to the problem. Further, she added the algebraic expressions called yellow, blue and red and found that the sum was equal to 3x. She still failed to find the correct result.

In the questioning sub-dimension, S5 stated that she previously solved similar problems, but could not identify in what way they were similar. When asked to describe the mathematical tools she used in problem solving, she said that: *"I listed it from the highest to the lowest. Then I established the equation to find out the difference between them. I did not draw a shape."* But she drew a shape, albeit small, on the paper. S5, who could not thoroughly explain how she used the equation tool and the mathematical operations she performed and failed to justify them, showed poor reflective thinking ability in the reasoning sub-dimension.

S8 is an 8th grader with low mathematics achievement. The answer of this student to the 1st problem was 0, so it is was incorrect. Figure 6 presents the solution provided by her for the 1st problem.

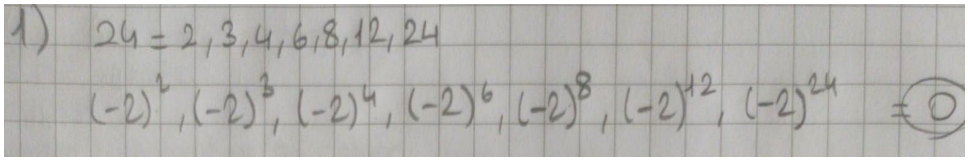

Figure 6. The solution provided by the 8th grader S8 for the 1st problem

S8 first wrote the positive integer divisors of 24. She did not include the number 1, but she included the number 2 to her list. She overlooked the fact that there cannot be a 2-sided polygon. Then, believing that any of these numbers could be a negative, she found the answer as 0.

In the reasoning sub-dimension, S8 stated that she solved problems similar to this one before and explained their similarity as follows: "*It is like finding its exponent based on the edge, well, it is a question type that I encounter*." S8 described how she solved the problem: "*I used the following method: I first found the divisors of 24, except from 1. Then, I positioned these divisors as the exponents of -2. So, I realized that since the exponents are all even, the results would not be negative*." Although her result was incorrect, she clearly expressed what she did and achieved to show her reflective thinking skills. The student acted carelessly in solving the problem. It appears that although she could not successfully solve the problem, she showed a high level of reflective thinking ability in the reasoning sub-dimension.

S10 is an 8th grader with moderate mathematics achievement. S10 failed to find the answer to the 2nd problem. Figure 7 presents the solution provided by her for the 2nd problem.

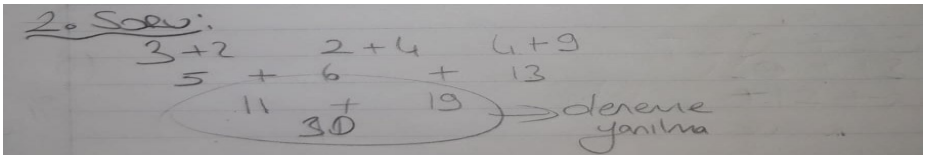

Figure 7. The solution provided by the 8th grader S10 for the 2nd problem

Thus, S10 showed a low level of reflective thinking ability in the reasoning sub-dimension. Because she failed to provide a detail description of how she tried to solve the problem and stated that she did not use any mathematical tools to solve it. She also reported that she did not solve any problem similar to this one.

Reflective thinking abilities in the evaluation dimension

In the evaluation sub-dimension, the students were asked to explain what they did to be sure of their result, if they could not solve the problem, to tell what questions they asked themselves about why they could not solve the problem, and to create a new problem by using the given problem. Out of the 24 problem solutions, which were provided by 12 students (each solving 2 problems), the students demonstrated partially adequate reflective thinking ability in 7 of them and inadequate reflective thinking ability in the remaining 18 solutions. This section presents some of the problem solutions provided by the students with different math achievement, grade levels and reflective thinking skills as well as some of the remarkable student statements.

S3 is a 7th grader with moderate mathematics achievement. This student incorrectly calculated the answer to the 1st problem as 150. Figure 8 presents the solution provided by S3.

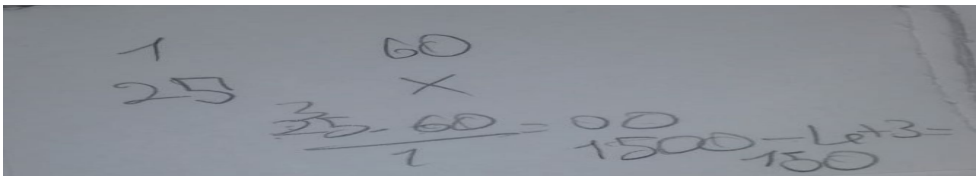

Figure 8. The solution provided by the 7th grader S3 for the 1st problem

S3 tried to establish a ratio between a minute being 60 seconds and the number of chirping in 25 seconds. She wanted to subtract 4 out of the resulting number and then multiply it by 3, but she made an error in the operations. That is, the student used an incorrect ratio in problem solving and the operations she performed did not match the expressions given in the problem.

In the evaluation sub-dimension, S3 did not perform any operation to make sure of the result she found, saying that "*I did not redo the equation to be sure, so I just checked the question again and thought that made sense.*" The reason for this is that S3 did not consider the problem-solving steps during the problem-solving process. Also, when asked to pose a similar problem, the student stated that: "*I would create a problem like this: if s/he runs 100 m in a minute, how far will s/he go in 5 minutes?"* and thus came up with a commonly used problem. S3 did not do anything to make sure of her result, but she gave positive feedback that she could pose a new problem. It therefore appears that S3 showed partially adequate reflective thinking skills.

S6 is a 7th grader with high mathematics achievement. He could not find the correct answer for the 2nd problem. Figure 9 shows his solution.

Figure 9. The solution provided by the 7th grader S6 for the 2nd problem

S6 first drew the shape given in the problem and wrote some algebraic expressions on it. Yet, these algebraic expressions were not clear and the student failed to solve the problem.

In the evaluation sub-dimension, the student stated that he did not reflect on why he could not solve the problem and did not check the way he tried to solve it, and told that "*I did not do much. I just put 6 or so. I already realized that this was not the solution*." When asked to pose a new problem, he stated that: "*Instead of dividing it in the same way and saying that one is longer than the other, I would say here is a piece of red in two parts, each one is 12 cm. Then, I ask about the blue box*." In other words, the student offered a less complex problem by reducing the unknowns of the problem, rather than creating an original problem. It follows that S6 showed inadequate reflective thinking ability in the evaluation sub-dimension.

S9 is an 8th grader with moderate mathematics achievement. Figure 10 presents the solution provided by her for the 1st problem.

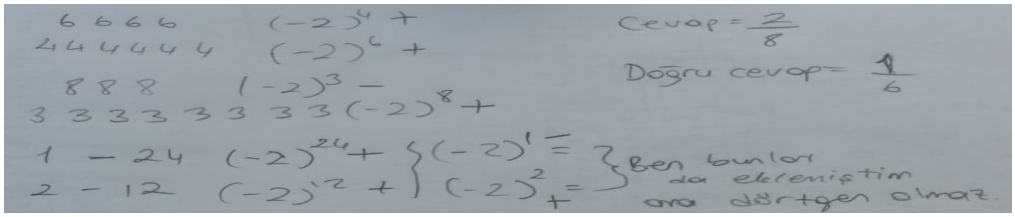

Figure 10. The solution provided by the 8th grader S9 for the 1st problem

Thinking that polygons with side lengths of 6 cm, 4 cm, 8 cm, 3 cm, 2 cm and 1 cm are possible, S9 listed these polygons one under the other. She then wrote them as the powers of -2, noting whether they are negative or positive next to them. The student, who much later realized that 1 and 2 are not possible, wrote that she took into consideration these possibilities as well while solving the problem. As a result, she incorrectly calculated the answer as $\frac{1}{4}$.

In the evaluation sub-dimension, it is notable that though the student stated that she re-checked the operations she performed, she failed to realize her mistakes. The student also could not pose a new problem, despite her statement that reads "*Yes, I can. I would limit the circumference in numbers and pose a new problem.*" She further could justify the mathematical operations she performed and the numbers she used. Although some of her answers were reasonable in the evaluation sub-dimension, S9 offered very short answers during the reflective dialogues, which implies that she showed partially adequate reflective thinking ability.

S12 is an 8th grader with high mathematics achievement. This student successfully found the correct answer for the 2nd problem.

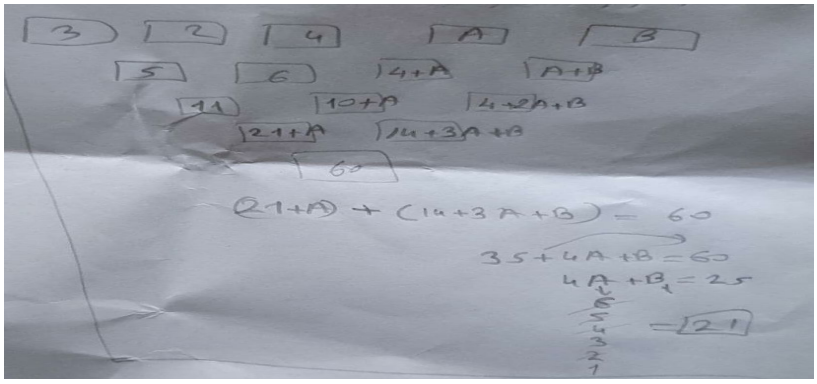

Figure 11. The solution provided by the 8th grader S12 for the 2nd problem

S12 drew the same shape in the problem on the paper and filled in all the numbers and algebraic expressions into the relevant boxes. As the last box read 60, she thought that 35+4A+B was equal to 60. Then, she thought that 4A+B was equal to 25. Lastly, summing all possible values for A, she found the result as 21.

In the evaluation sub-dimension, it is notable that S12 did not do anything to make sure of her solution. When asked to create a new problem, she stated that "*I would change the numbers and ask for their multiplication rather than addition*." The student did not change the structure of the problem; instead, she replaced addition with multiplication. It appears that although this student provided the correct answer in the evaluation sub-dimension, her justification for her mathematical thinking and the operations she performed was poor. Therefore, S12 showed inadequate reflective thinking ability in the evaluation sub-dimension.

DISCUSSION

The analysis of the qualitative data in this study reveals that the participants overall have a high level of reflective thinking ability toward problem solving. In other words, the students consider themselves as good in this skill. This study thus concludes that the reflective thinking ability of the students toward problem solving is high in all sub-dimensions of questioning, evaluation and reasoning. Erdoğan (2019) found that the reflective thinking ability of the middle school students toward problem solving is poor. The difference in the findings perhaps results from the samples that include students at a different education level.

The qualitative part of this study also investigates whether their reflective thinking ability significantly varies across grade levels and genders. No significant difference has been observed between grade level and reflective thinking ability toward problem solving. Similarly, Demirbaş (2012) reports that the reflective thinking ability levels of 4th and 5th graders do not differ across grade levels; on the other hand, Erdoğan (2019) argues that as the grade level among middle school students increases, their reflective thinking skills for problem solving improve too. It seems that the finding that reflective thinking ability significantly changes across grade levels depends on the age group of participants. Another finding of this study is that reflective thinking ability toward

problem solving significantly varies for male students in the questioning sub-dimension. However, there is no significant difference across genders in the other sub-dimensions. The overall score of the participants on the scale shows that the variable of gender does not have a significant impact on reflective thinking ability toward problem solving. This finding is congruent with the findings of Erdoğan (2019), Saygılı and Atahan (2014) and Yıldırım (2013). Yet, some studies in the literature claim that reflective thinking skills toward problem solving are higher among female students (Hoare, 2006; Aydın and Çelik, 2013) or male students (Gohindo, 2004).

In conclusion, this study ascertains that the mathematics achievement of the participants and their reflective thinking ability toward problem solving are correlated. This correlation is positive, significant and at a moderate level. There are certain studies in the literature that report the positive correlation between academic achievement and reflective thinking (Baş and Kıvılcım, 2013; Cengiz, 2014; Dursun, 2015; Karaoğlan Yılmaz, 2014; Kızılkaya, 2009; Mohamad et al., 2013). Experimental research that explore the impact of reflective thinking on mathematical performance show that this effect is positive and contributes to post-test achievement scores (Bölükbaş, 2004; Dursun, 2015; Kırnık, 2010; Tok, 2008). Baş and Kıvılcım (2013) and Şen (2011) determine a significant correlation between reflective thinking skills toward problem solving and academic achievement in mathematics course. The reason for this is perhaps that reflective thinking ability is one of the higher-order thinking skills and supports individuals in many ways. The reflective dialogues with the students reveal the reflective thinking skills of the 7th and 8th graders. The students first solved the problems and then reflected on these problems through reflective dialogues. The 7th graders had more difficulty in solving the problems compared to the 8th graders. The 8th graders are more familiar with exam questions as they are preparing for the High School Entrance Exam (LGS). This perhaps helps them solving the problems more easily. All of the students had difficulty in the reflective dialogues and their reflections were incomplete and inadequate. It is notable that the students had difficulty particularly in re-expressing the problem in their own words in the questioning sub-dimension. Instead of re-expressing the problem, most of the students offered explanations by repeating the same expressions in the problem, and some of them articulated their solutions for the problem. As the students had difficulty in solving the problems, they also failed to express alternative solutions to the problem. Although the students, including those with high mathematics achievement, generally stated that there may be alternative solutions, they failed to explain these alternative solutions.

The findings of this study clearly indicate that most of the students, those with low and moderate mathematics achievement in particular, had difficulty in explaining the problems and posing new problems. Though those with high mathematics achievement were more successful in understanding the problems than other students, they experienced similar difficulties in posing new problems. The majority of the students tended to pose same problems without making dramatic changes on the given problem. Some students even stated that they could not pose a new problem. Pusmaz and Tavşan (2019) investigates the reflective thinking skills of the students successful in solving mathematics problems toward problem solving and similarly finds that the students expressed similar problems instead of posing new problems with their own sentences. Tertemiz and Sulak (2013) posit that the technique used by the students while posing a new problem involves changing the values of the given data, without making any change in the conditions and the subject. The students are not familiar with problem posing activities, which may be the reason for that they had difficulty in posing new problems during the reflective dialogues. These dialogues demonstrate that students do not like lengthy problems, that the length of problems affects their willingness to solve the problem and their success, and that when there are unfamiliar terms in the problem, these terms, although they are not necessary to solve the problem, create confusion and make it difficult to find the correct result. Considering the qualitative and quantitative data together, one may understand that the average scores of the students on the scale are high, but their reflective thinking ability during the reflective dialogues is low. That is to say, the self-perceptions of the students on this skill are high, yet their ability to exhibit this skill is low. The fact that the qualitative and quantitative data are not parallel may result from the lack of self-understanding of the students on their reflective thinking skills. The concept of reflective thinking is new to the students, and they are not familiar with having dialogue on the problems they solved. For that reason, the students considered themselves good in the expressions in the scale, but they could not put it into practice. The acquisition of reflective thinking skills in the school environment is considered key (Wilson and Jan, 1993). Because reflective thinking is generally achieved through teaching (Meissner, 1999). In this regard, it is important to perform systematic and regular reflective thinking activities in schools. This will perhaps help allow students to gain reflective thinking skills.

CONCLUSION AND SUGGESTIONS

This study concludes that the reflective thinking skills of the 7th and 8th graders are high and that these skills do not significantly differ across genders and grade levels but have a significant and moderate correlation with mathematics achievement. Also, unlike the quantitative data, the qualitative data show that the students' reflections on their own problem solutions were insufficient. The students had the most difficulty in re-expressing the problems in their own words, explaining different ways to solve the problems and pose new problems. Based on the findings, future studies may enlarge the size of the sample, which is one of the limitations of this study. Qualitative studies may be performed to analyze the reflective thinking ability of elementary school students toward problem solving. This would help identifying the factors that affect the acquisition of this ability from an early age and take the necessary measures. Studies that investigate the reflective thinking ability of elementary school students as well as high school students would offer new insights into the literature. Students may participate in reflective dialogues after problem solving to improve their reflective thinking ability toward problem solving. Future studies may focus on other variables related to

the reflective thinking ability of students toward problem solving and their effects on mathematics achievement. The reflective thinking ability of both students and teachers may be further explored, and the effect of teachers on students in relation to this ability may be analyzed.

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Researchers' contribution rate

The study was conducted and reported with equal collaboration of the researchers.

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APPENDIX-1 (Problems)

1 dakika = 60 saniye

Cırcır böceklerinin ötme sıklığı hava sıcaklığı hakkında bilgi verir.

Bir cırcır böceği 25 saniyede, derece selsiyus (°C) cinsinden hava sıcaklığı değerinin 4 eksiğinin 3 katı kadar öter.

Yukarıdaki bilgiyi kullanarak bulunduğu kamp alanındaki hava sıcaklığını ölçmek isteyen İdil, bir cırcır böceğinin dakikada 180 kere öttüğünü sayar.

Buna göre İdil kamp alanındaki hava sıcaklığını kaç derece selsiyus (°C) olarak hesaplar?

1 minute = 60 seconds

The chirping of crickets gives information about the air temperature.

A cricket chirps 4 less than 3 times the air temperature value in Celsius (°C) in 25 seconds. Using the information above, İdil wants to measure the air temperature in the camp area she stays and finds that a cricket chirps 180 times in 1 minute.

So, how many degree in Celsius (°C) does İdil calculate the air temperature in the camp area?

Figure 12. The 1st problem for the 7th graders

Düzgün çokgenlerin iç bölgelerine tam sayılar yazılarak aşağıda örnekleri verilen kurala göre üslü ifadeler elde edilecektir.

- Yukarıdaki kurala göre kenar uzunlukları santimetre cinsinden birer tam sayı ve çevre uzunluğu 24 cm olan farklı düzgün çokgenlerin tamamı oluşturuluyor.
- Bu düzgün çokgenlerin her birinin içerisine -2 yazılıp üslü ifadeler elde ediliyor.
- Oluşturulan üslü ifadeler eş kartlara yazılıp bir torbaya atılıyor.

Bu torbadan rastgele seçilen bir kartın üzerinde negatif bir tam sayının değerine eşit olan bir üslü ifade yazma olasılığı nedir?

According to the rule below, integers are written in the inner regions of regular polygons to obtain exponential expressions.

- According to the rule above, all possible regular polygons with side lengths integer in centimeters and a circumference of 24 cm are created.
- Then, -2 is added to the inner regions of each polygon to obtain exponential expressions.
- The resulting exponential expressions are written on papers and put in a bag.

What is the probability of randomly selecting a card on which an exponential expression equal to the value of a negative integer is written?

Figure 13. The 2nd problem for the 7th graders

Bir tahtanın üst yüzeyi çizgiler ile aşağıdaki gibi üç eş parçaya ayrılıp her bölge farklı bir renge boyanıyor.

Daha sonra tahtanın üst yüzeyindeki çizgilere paralel olacak şekilde sarı bölgeyi 3, kırmızı bölgeyi 2 ve mavi bölgeyi 4 eş parçaya ayıran çizgiler çiziliyor.

Sarı bölgedeki ardışık çizgiler arasındaki mesafe mavi bölgedeki ardışık çizgiler arasındaki mesafeden 2 cm daha fazladır.

Buna göre kırmızı bölgedeki ardışık çizgiler arasındaki mesafe kaç santimetredir?

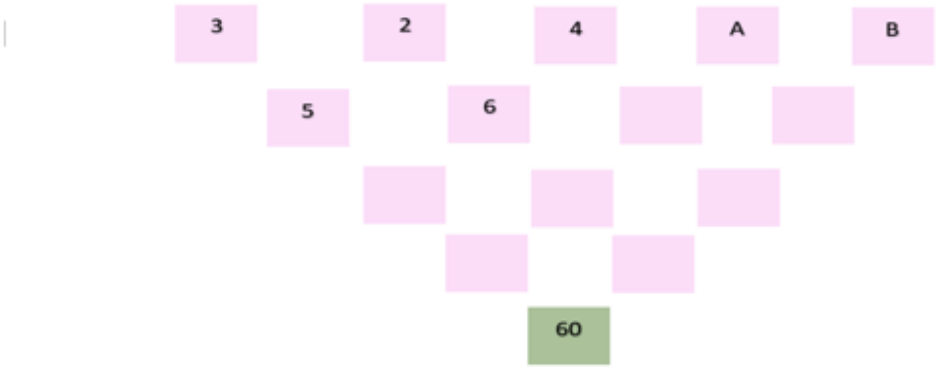
-The top surface of a board is divided into three equal parts as below, and each area is painted in a different color.

-Then, the yellow area is divided into 3 equal parts; the red area into 2 and the blue area into 4, parallel to the lines on the surface of the board.

-The distance between the consecutive lines in the yellow area is 2 cm greater than the distance between the consecutive lines in the blue area.

So, how many centimeters is the distance between the consecutive lines in the red area?

Figure 14. The 1st problem for the 8th graders



Yukarıdaki şekilde pembe olan hücrelere bazı kurallara göre sayılar yerleştirilmiştir. Bu kurallar

- A ve B pozitif tam sayı olmalıdır.
- Tabloda yukarıdan merkeze doğru (yeşil hücre) hücrelere sayılar yazılırken, bir üst satırdaki kesişen pembe hücrede bulunan sayılar toplanarak yazılır.

Buna göre A sayısının alabileceği değerlerin toplamı kaçtır?

In the above figure, the numbers are placed in the pink squares according to some rules. These rules are as follows:

- A and B must be a positive integer.
- While writing numbers from the top to the center (to the green square) in the table, the numbers in the pink squares that intersect in the upper row are added together.

So, what are the sum of all possible values for A?

Figure 15. The 2nd problem for the 8th graders

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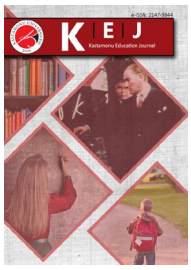

|Araştırma Makalesi / Research Article|

COVID-19 Pandemi Sürecinde Öğretmen Adaylarının Uzaktan Eğitime İlişkin Görüşleri

Views of Teacher Candidates on Distance Education in the COVID-19 Pandemic Process

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Keywords

1. COVID-19
2. Pandemic
3. Emergency distance education
4. Teacher candidates

Anahtar Kelimeler

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Abstract

Purpose: The purpose of this study is to determine the reflection of the faculty of education science and social studies teacher candidates in the emergency distance education process (their motivation for education, educational activities, purposes and preferences of social media use) during the COVID-19 pandemic process.

Design/Methodology/Approach: This research is a qualitatively prepared study. As a research design, it is a descriptive research that is also included in qualitative studies. The research group of this study total consists of 120 science (N = 42; 38 females, 4 males) and social studies (N = 78; 60 females, 18 males) teachers candidates. An open-ended survey was used as a data collection tool in the study. The data collection tool was applied within the scope of the "Instructional Technologies" course, which is common in the program of the students of both departments. The data obtained from the survey were subjected to content analysis.

Findings: As a result of the study, it was concluded that the social media environment most used by science/social studies teacher candidates during the COVID-19 pandemic process was WhatsApp.

Highlights: It has been determined that the COVID-19 epidemic process offers significant opportunities science/social studies teacher candidates to explore the digital learning world. Considering the positive effects of the digital literacy of candidates during the COVID-19 epidemic process, it is recommended that teachers, teacher candidates, curriculums and textbooks are developed in terms of digital competencies.

Öz

Çalışmanın amacı: Bu çalışmanın amacı, COVID-19 pandemi sürecinde eğitim fakültesi fen bilgisi ve sosyal bilgiler öğretmen adaylarının acil uzaktan eğitime ilişkin görüşlerini (eğitime yönelik motivasyon, eğitim-öğretim faaliyetleri, sosyal medya kullanım amaçları ve tercihleri) belirlemektir.

Materyal ve Yöntem: Araştırma nitel olarak hazırlanmıştır. Araştırma deseni olarak nitel çalışmalar içerisinde de yer alan betimsel bir araştırma niteliğindedir. Bu araştırmanın çalışma grubunu toplam 120 fen bilgisi (N=42; 38 kadın, 4 erkek) ve sosyal bilgiler (N=78; 60 kadın, 18 erkek) öğretmen adayı oluşturmaktadır. Çalışmada veri toplama aracı olarak açık uçlu anket kullanılmıştır. Veri toplama aracı her iki anabilim dalı öğrencilerinin programında ortak olan "Öğretim Teknolojileri" dersi kapsamında uygulanmıştır. Anketten elde edilen veriler içerik analizine tabi tutulmuştur.

Bulgular: Çalışma sonucunda, fen bilgisi ve sosyal bilgiler öğretmen adaylarının COVID-19 pandemi sürecinde en fazla kullandıkları sosyal medya ortamının WhatsApp olduğu sonucuna varılmıştır.

Önemli Vurgular: COVID-19 salgın sürecinin dijital öğrenme dünyasını keşfetmek adına öğretmen adaylarına önemli fırsatlar sunduğu belirlenmiştir. COVID-19 salgın sürecinde adaylarının dijital okuryazarlığının gelişmesine olumlu etkileri göz önüne alındığında öğretmenlerin, öğretmen adaylarının, öğretim programlarının ve ders kitaplarının dijital yetkinlikler açısından geliştirilmesi önerilmektedir.

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INTRODUCTION

The pandemic caused by the virus called COVID-19, which emerged in Wuhan, China in late 2019, affected the whole world in a very short period of time. Against this situation, countries have implemented a series of measures (Pınar and Dönel Akgül, 2020). Against this situation, countries social distancing, quarantine, curfews, suspension of face-to-face education activities, wide restrictions on the movement of goods and people, etc. has implemented measures packages (Gupta and Goplani, 2020). During this transition to compulsory distance education, face-to-face education of approximately 25 million students in Turkey and 1.6 billion students worldwide had to be suspended (UNESCO, 2020). International organizations such as UN, UNICEF and OECD are working to ensure that the new education conditions, which have to be carried out remotely, do not increase the current success gaps in countries. In addition, they publish reports so that they do not create a new social problem area and try to support this process in different dimensions. Countries within the scope of UNESCO are trying to support especially the more vulnerable and disadvantaged people in reducing the negative impact of the compulsory break in education and ensuring the continuity of education through distance learning (UNESCO, 2020). In this direction, starting from the principle that education is a basic human right, both public and private institutions and organizations have made an effort to continue their activities within the scope of distance education (Honey, Culp and Carrigg 2000). This rapid transition has been in a structure that was caught off-guard in parallel with the sudden and rapid spread of the pandemic and required a rapid transformation (Telli Yamamoto and Altun, 2020). Considering the practices in the world, the activities of universities with a large number of programs and students such as the Technical University of Munich in Germany, the University of Bologna and Milan in Italy were been limited. Distance education was started in these universities, and educational activities were carried out synchronously and asynchronously using systems such as Moodle, UNIBO, Ariel (Dikmen and Bahçeci, 2020). Turkey encountered COVID-19 relatively later than European countries, thanks to the measures it took. However, after the understanding that the epidemic would spread, the practices of the countries that were successful in the fight were evaluated. In this context, higher education was suspended for 3 weeks at the first stage, and then it was deemed appropriate to conduct the 2019-2020 spring and 2020-2021 fall semesters entirely with distance education (YÖK, 2020). In addition, before the decision to suspend education in higher education, information and guidance regarding some measures were sent to universities. During the period when education was suspended within the scope of COVID-19 measures, studies were also carried out in the basic areas of legislation, infrastructure, human resources, content and implementation in order not to disrupt the learning processes of students (Telli Yamamoto and Altun, 2020).

This process has seriously affected the education sector, one of the largest service industries worldwide. 123 universities with distance education infrastructure and experience have switched to distance education with their own means as of March 23, 2020. For universities that do not have a distance education unit, it has been decided that the open course materials pool created after this date will be opened to all universities and supported by the coordination of the Higher Education Council from universities with distance education infrastructure or open education capability. It has been decided to broadcast common lessons throughout the country by including state-affiliated television channels within the body of the Turkish Radio and Television Corporation (TRT) to this support (YÖK, 2020). By allowing this practice and approach at the associate and undergraduate level, also at the graduate level; necessary studies have been carried out to ensure that there is no interruption in these processes by using distance education and digital opportunities, provided that they are auditable (Kırmızıgül, 2020). Trabzon University, where the study was conducted, has structured all its education within the scope of distance education in this context. The process was carried out using moodle as a learning management system and Adobe Connect infrastructure as a live classroom platform. Within the scope of the undergraduate programs of the university, a total of 2394 lessons were given with the live class method. Students were supported by establishing auxiliary elements such as technical support documents, SMS, e-mail notification, contact points, and information platform. In this context, the system structured according to formal education was immediately transformed into crisis management and distance education. The sudden development of the pandemic has brought with many problems. For this reason, the continuation of education was aimed with the means at hand, and the process was structured within the scope of "emergency distance education", not distance education, for reasons such as temporary solutions and physical distance (Bozkurt, 2020). Emergency distance education includes the use of distance education solutions in times of crisis or emergency, where the process cannot continue face-to-face. However, the most important difference of this process from distance education is to switch to face-to-face education again when the problem disappears. In these conditions, the main purpose is to deliver educational content to students quickly and reliably, even if it has been not prepared for distance education during an emergency or crisis (Akkoyunlu and Bardakçı, 2020; Hodges, Moore, Lockee, Trust, and Bond, 2020). Although many universities have distance education infrastructure, there is a need for a configuration called "emergency distance education" and new solution proposals in the process. When uncertainties such as the possibility of emergence and/or repetition of similar situations are added to the aforementioned needs, it is necessary to determine the training problems for the instant solution of the problems that occur within the scope of emergency distance education in the face of a global crisis such as COVID-19. Within the scope of this period, the social media environments shared and the research of the shared contents have become a current and priority work area. In other words, although rapid studies are carried out in the field of medicine in order to produce a solution to the pandemic, studies are needed to successfully manage the process in the field of education. It has been observed that individuals use social media tools (Skype, WhatsApp, Zoom, etc.) intensively in a global crisis such as COVID-19 (He and Harris, 2020). It is thought that the quality and quantity of shares in social media will be important for the structuring of the post-pandemic normalization process. Within the scope of distance education, it is important in terms of process management to address social dimensions such as determining the motivation of students

towards education and the factors that affect the process positively or negatively. This process also revealed the understanding that there are different ways of learning and the roles of the school outside of education (socializing, coaching, sharing). In addition to the difficulty of planning the distance education process, it has come to the fore that it should focus on education from different perspectives around the world with its equal opportunity dimensions. The COVID-19 pandemic has revealed the necessity of distance education applications not only in normal times or to support formal education, but also in some crisis situations (epidemics, wars, disasters, forced migrations, etc.) (Can, 2020).

History has shown that irreversible changes occur in the world after every pandemic. This process is called the "New World Order" in the literature (Arı and Kanat, 2020). In the new world order expected after the COVID-19 pandemic, it is thought that teacher and teacher education, which is the leading role in education process, will differ. With the pandemic process, it is important to determine the effects of providing teacher training with emergency distance education on both students and prospective teachers who are the teachers of the future. In our country, it is seen that programs are created within the framework of the integrated program approach. In this context, social and science lessons were considered as axis lessons. Having axis lessons means that other lessons (Turkish, Mathematics, Physical Education, Music, which are expression and skill lessons) are shaped around these lessons. However, even if this is the case, in practice, the lessons are taught independently and disconnected from each other (Tertemiz, 2004). In this context, the branches in which students encounter scientific knowledge for the first time as a different discipline are science and social sciences. Therefore, in this study, it was deemed appropriate to work with science and social studies teacher candidates. Due to the pandemic, it was found appropriate to give the "Instructional Technologies" course, which the branch teacher candidates took in the fourth semester of their undergraduate education, with emergency distance education. Because this course also allows teacher candidates to transform some of the education they received in the process into practice. The instructional technologies course provided a basis for prospective teachers to bring together alternative educational environments and field knowledge that can be used in the management of this process. In addition, the process also revealed the importance of current digital literacy as a requirement of the course content of all components of the teaching process (YÖK, 2018). Teachers candidates, who appear to be consumers of this knowledge today, will appear as both producers and users of knowledge in the future. Therefore, the purpose of this study is to determine the views of the faculty of education science and social studies teacher candidates in the emergency remote education process (their motivation for education, educational activities, and social media usage preferences) during the COVID-19 pandemic process.

In this context, the sub-problems of the study are presented below;

COVID-19 pandemic process, science/social studies teacher candidates;

1. What are their views on educational motivations?

2. What are their views on educational activities?

3. What are the purposes of using social media and social media usage preferences?

METHOD

This research is a qualitatively prepared study. As a research design, it is a descriptive research that is also included in qualitative studies. Descriptive methods try to reveal the existing situation quantitatively or qualitatively. Since the aim of the related research is to determine the effect of the COVID-19 pandemic process on the education process of pre-service science and social studies teachers, it is a descriptive research. The main purpose of descriptive research is to explain the situation examined in detail (Çepni, 2007). According to Simon and Burstein (1985); descriptive methods aim to classify and describe behaviors according to their common characteristics. In descriptive studies, “What is the current situation?”, “Where are we?”, and “Where should we go?” questions' response are being investigated (Kaptan, 1998). Descriptive research designs raise questions of why because descriptive research designs aim to gain in-depth information on any subject (de Vaus, 2001).

Participants of the Study

The research group of this study consists of total 120 second grade science (N = 42; 38 females, 4 males)\social studies (N = 78; 60 females, 18 males) teacher candidates teaching program in the spring semester of the 2019-2020 academic year.

Data Collection Tool

In this study, an open-ended survey developed by the researchers was used as a data collection tool. Within the scope of the validity study of the developed survey, the opinions of three field experts whose fields of study are Science Education, Social Sciences Education and Computer and Instructional Technologies Education were used. Within the scope of the validity study, a pilot application of the survey questions was made with three science/social studies teacher candidates. After the pilot application, the following arrangements were made within the framework of the opinions of the field experts in order to make the questions more understandable:

In the second question asked to the teacher candidates about the positive and negative effects of the pandemic process, the teacher candidates were asked to state three positive and negative effects each. However, considering that this expression may have a limiting effect on teacher candidates, the expression "three" was removed from the question.

While in the first case of the third question, structured options regarding social media environments were presented, these options were excluded from the question considering that these preferences limited and directed them. The final form of the survey questions is presented below.

1. How has the current COVID-19 pandemic process affected your educational motivation? Please explain.

2. What are the positive and negative effects of the COVID-19 pandemic process on your educational activities? Please explain.

3. Which social media environments did you use during the COVID-19 pandemic? Please specify.

4. What are your purposes of using social media during the COVID-19 pandemic? Please specify.

Application Steps

In the spring semester of the 2019-2020 academic year, after 5 weeks of face-to-face lessons until March 23, 2020, emergency distance education started with the pandemic. The process was completed with the distance education that lasted for nine weeks. The data collection tool was applied in the 15th week within the scope of the “Instructional Technology” course, which is common in the program of both departments. The data of the study were collected over a period of 1 week, given Moodle as a learning management system and Adobe Connect infrastructure as a live classroom platform. Verbal consent of the students was obtained during the process. The obtained data were evaluated by subjecting them to content analysis.

Data Analysis

The data obtained from the survey were subjected to content analysis. With content analysis, it is aimed to reach the relationships and concepts that can explain the data collected (Yıldırım and Şimşek, 2011). In the content analysis, the meaningful parts between the data was coded. The data obtained within the scope of coding were divided into sections and comparisons and associations were made between the data (Strauss and Corbin, 1990). The data were categorized by means of codes and given with frequencies by creating common themes. The data is organized according to codes and themes. At the last stage, the meaning integrity of the themes derived from the data was provided and interpreted. By re-examining the data that were written down in the content analysis, attention was paid to ensure that the themes were at an equal distance from each other and that the codes did not overlap.

In qualitative research, the reliability of data analysis depends especially on the coding process. For the reliability of the analysis of the survey data, the data obtained were analyzed by three different coders. The analyzes made independently of each other were examined by bringing three different coders together. The aspects that stand out and are considered important in the analyzed data were determined, and first the codes and then the categories were obtained. Then, the codes and categories produced separately by each of the three researchers were compared and the codes and categories were clarified. In this context, coding reliability was examined to determine how consistent the researchers' categories. Consistency index was used in the study and coding reliability was calculated. The agreement rate is “an index found by calculating the coding situations where the same coding is done, on which agreement is reached and cannot be reached”. The consistency value calculated using the agreement rate was found to be 0.80. The coding that was not agreed upon was resolved by negotiation. As stated by Tavşancıl and Aslan (2001), the agreement rate used to determine inter-rater reliability is expected to be higher than 0.70. In this study, it can be stated that the coding reliability is at an acceptable level. In terms of research ethics, science teachers candidates were coded as F1, F2…F42. Social studies teacher candidates were coded as S1, S2…S78.

FINDINGS

The first question in the survey is below. Then, the findings obtained from the analysis of this question is presented. Question asked in the survey was; “How has the current COVID-19 pandemic process affected your educational motivation? Please explain.” The findings obtained for the question are presented in Figure 1.

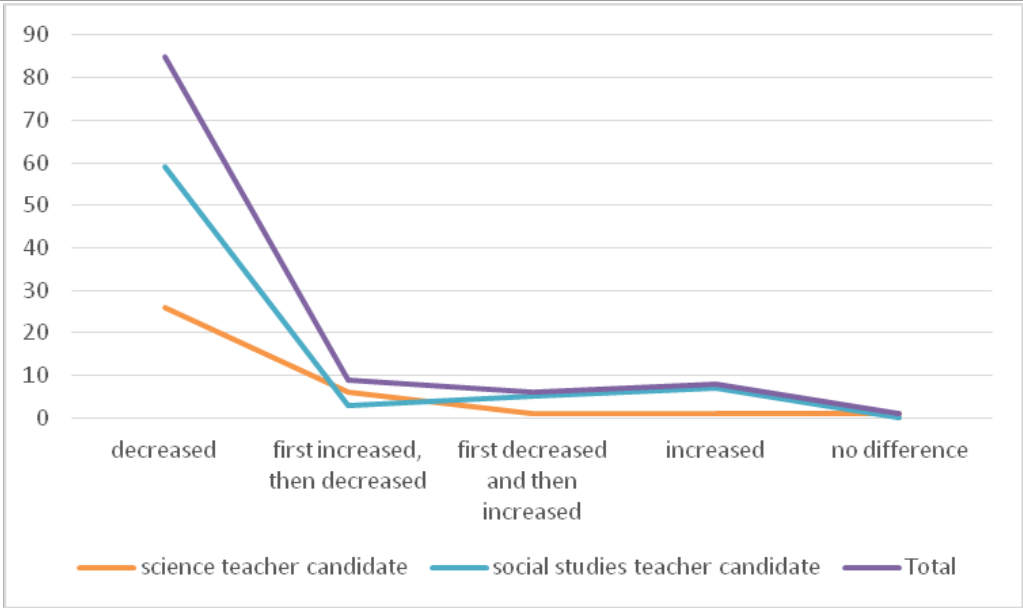


Figure 1. The effect of the pandemic period on the motivation of teacher candidates towards education

When the motivations of the teacher candidates given in Figure 1 during the pandemic period are examined, it is seen that the general motivation of the majority of them (f=85) has decreased. It is seen that the motivation of the science (f=26) and social studies teacher candidates (f=59) decreased in the process. A total of 11 pre-service teachers did not comment on this question.

The factors that positively and negatively affect the motivation of teacher candidates towards education during the COVID-19 epidemic are summarized in Figure 2.

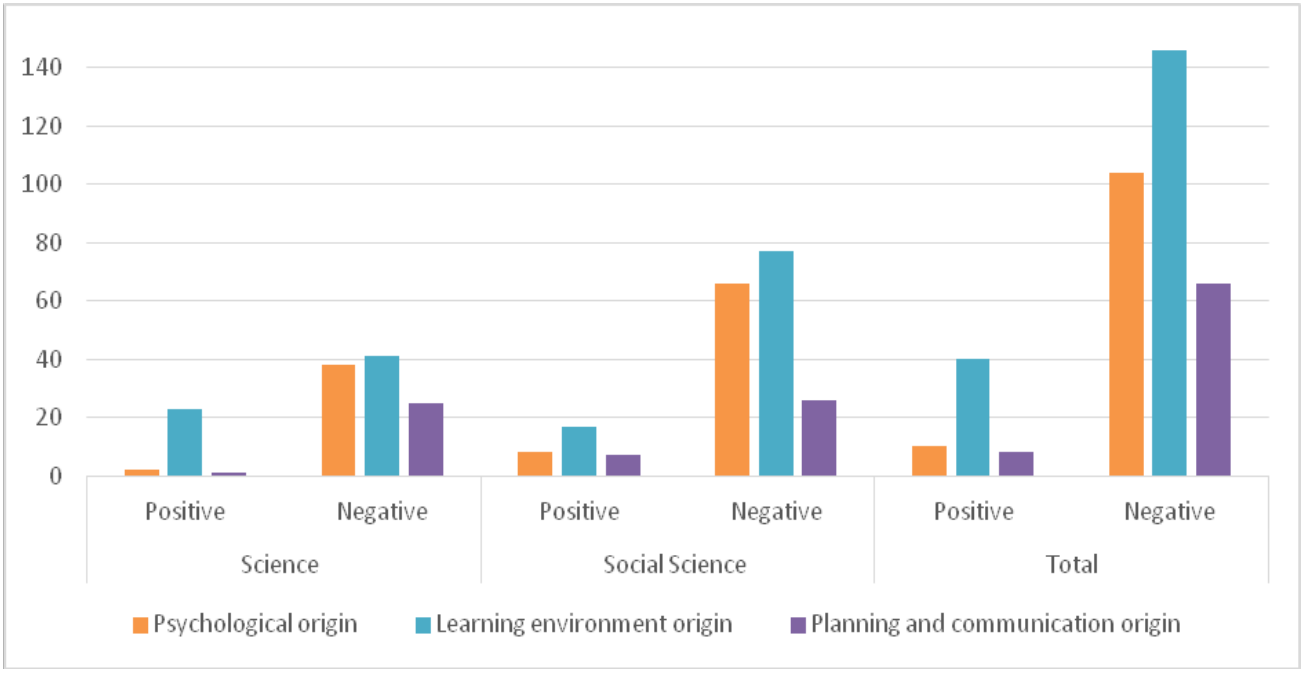


Figure 2. Factors that positively and negatively affect teacher candidates' motivation towards education during the COVID-19 epidemic process

When Figure 2 is examined, it is seen that the negatives that the teacher candidates stated that they experienced during the pandemic process are similar on the basis of branches are grouped under certain basic components. Accordingly, at the beginning of the problems that pre-service teachers stated that they experienced the most in this process, "psychological origin" and "learning environment origin" are the ones.

The positive and negative factors of the COVID-19 epidemic process on the motivation of teacher candidates in the process are summarized in Figure 3 on the basis of frequency.

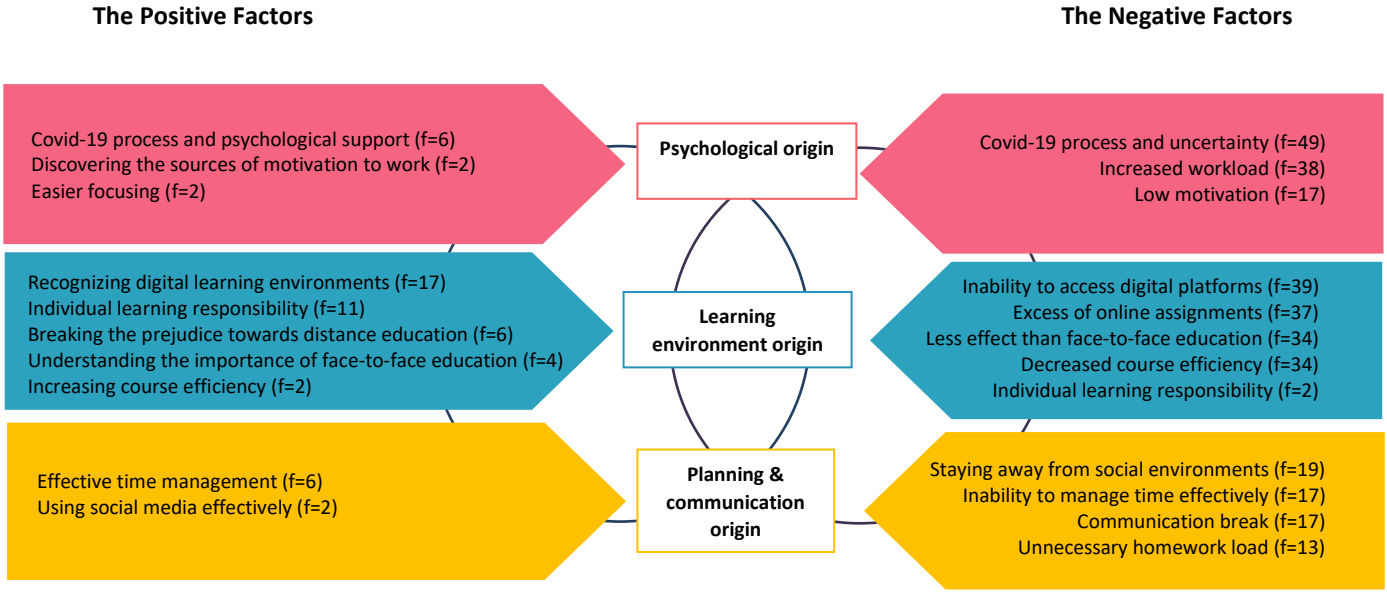


Figure 3. Factors that positively and negatively affect teacher candidates' motivation towards education during the COVID-19 epidemic process

When Figure 3 is examined, it is revealed that pre-service teachers were affected by same factors but in different ways. Accordingly, it is sawn that teacher candidates are grouped under the themes of "learning environment origin", "psychological origin" and "planning and communication origin", respectively, during the COVID-19 epidemic process. Social studies and science teacher candidates are affected by psychological problems. Most of the pre-service teachers stated that their psychology deteriorated due to the uncertainty of the process and that they had problems focusing on the lesson. The other problem under this title is that as a result of the distance education, the teacher candidates increasing workload and finding this process boring. Another reflection of the process is observed as low motivation in teacher candidates.

Asked in the survey; “What are the positive and negative effects of the COVID-19 pandemic process on your educational activities? Please explain." Findings for the question are given below.

The opinions of pre-service teachers on the positive effects on educational activities during the COVID-19 epidemic are presented in Table 1.

Table 1. The positive effects of the COVID-19 epidemic process on the educational activities of teacher candidates

Positive effects*	Science (f)	Social (f)	Total (f)
Development of digital literacy, learning different computer applications	16	24	40
Learning to do research	8	22	30
Leisure time (reading books/exploring our interests)	10	18	28
Understanding the contribution of instructional technologies to the learning-teaching process	4	14	18
Saving on time	9	9	18
Having the opportunity to follow the lessons from home and watch them again and again	9	8	17
Learning planned and programmed work	4	9	13
Learning the distance education process	6	6	12
Spending lots of fun with the family	4	7	11
Easy access to resources	4	5	9
Understanding the value of face-to-face teaching	4	4	8
Higher success	7	1	8
Not having to get up early and go to school	4	2	6
Not risking their own and others' health by staying at home	3	1	4
Sharing opinions with friends on social media	-	3	3
Increasing interest in education and training	1	1	2
Learning to be patient	1	-	1
Financial relief	-	1	1
Sharing materials for students with disabilities “while we were not aware of its existence, we met some teachers again during the pandemic process.”	-	1	1

*: Teacher candidates have declared multiple opinions.

When Table 1 is examined, it is seen that science and social studies teacher candidates mostly stated their opinions about the code of "Development of digital literacy, learning different computer applications" about the positive effects of the COVID-19 epidemic process on educational activities.

The opinions of pre-service teachers on the negative effects of their educational activities during the COVID-19 epidemic is presented in Table 2.

Table 2. The negative effects of the COVID-19 epidemic process on the educational activities of teacher candidates

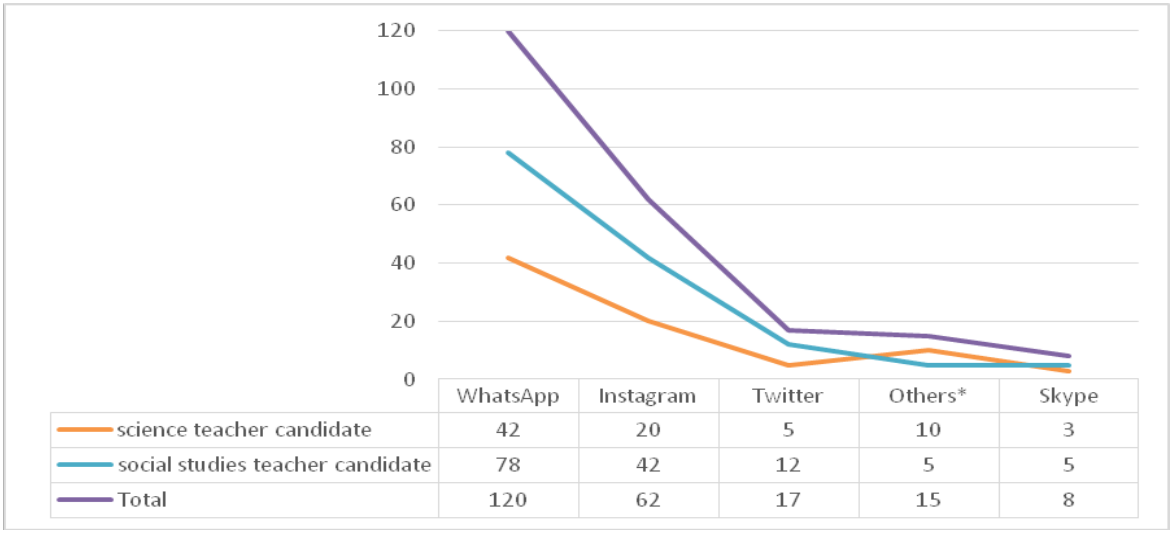
Negative Effects *	Science (f)	Social (f)	Total (f)
Lagging behind in homework/classes due to lack of internet/computer access	28	28	56
Lack of effective and efficient learning	16	33	49
Decreased interest and motivation towards the lesson	7	23	30
Excess homework	9	12	21
Failure to practice in lessons	8	8	16
Inability to communicate face-to-face with the lecturer	6	10	16
Psychological problems such as distraction / inability to focus / anxiety / stress	7	6	13
inability to socialize	7	3	10
Avoidance of face-to-face training	6	3	9
Insufficient fair assessment of exams and assignments	4	2	6
Not understanding homework/not getting feedback	1	4	5
Difficulty of group work in distance education	1	4	5
Experiencing physical pain/negative impact on health	-	3	3
Inability to spend time on my hobbies and relax myself	2	-	2
It was difficult for me to access course materials.	2	-	2
Postponement of plans	1	-	1

*: Teacher candidates have declared multiple opinions.

When Table 2 is examined, it is seen that science and social studies teacher candidates mostly stated their opinions about the code of "lacking homework/classes due to lack of internet/computer access" regarding the negative effects of the COVID-19 epidemic process on educational activities.

Question asked in the survey; “Which social media environments did you use during the COVID-19 pandemic? Please specify." The findings obtained for the question are presented in Figure 4.

Social media environments used by teacher candidates during the COVID-19 pandemic are presented in Figure 4.



***:**Google drive, Imo, Adobe connect

Figure 4. COVID-19 teacher candidates social media they use in the process of pandemic

When Figure 4 is examined, it is seen that the social media environment that teacher candidates use most during the COVID-19 pandemic is WhatsApp. This is true for both programs. After WhatsApp, the most used social media medium by science and social studies teacher candidates is Instagram.

Question asked in the survey; “What are your purposes of using social media during the COVID-19 pandemic? Please specify." The findings obtained for the question are presented in Figure 5.

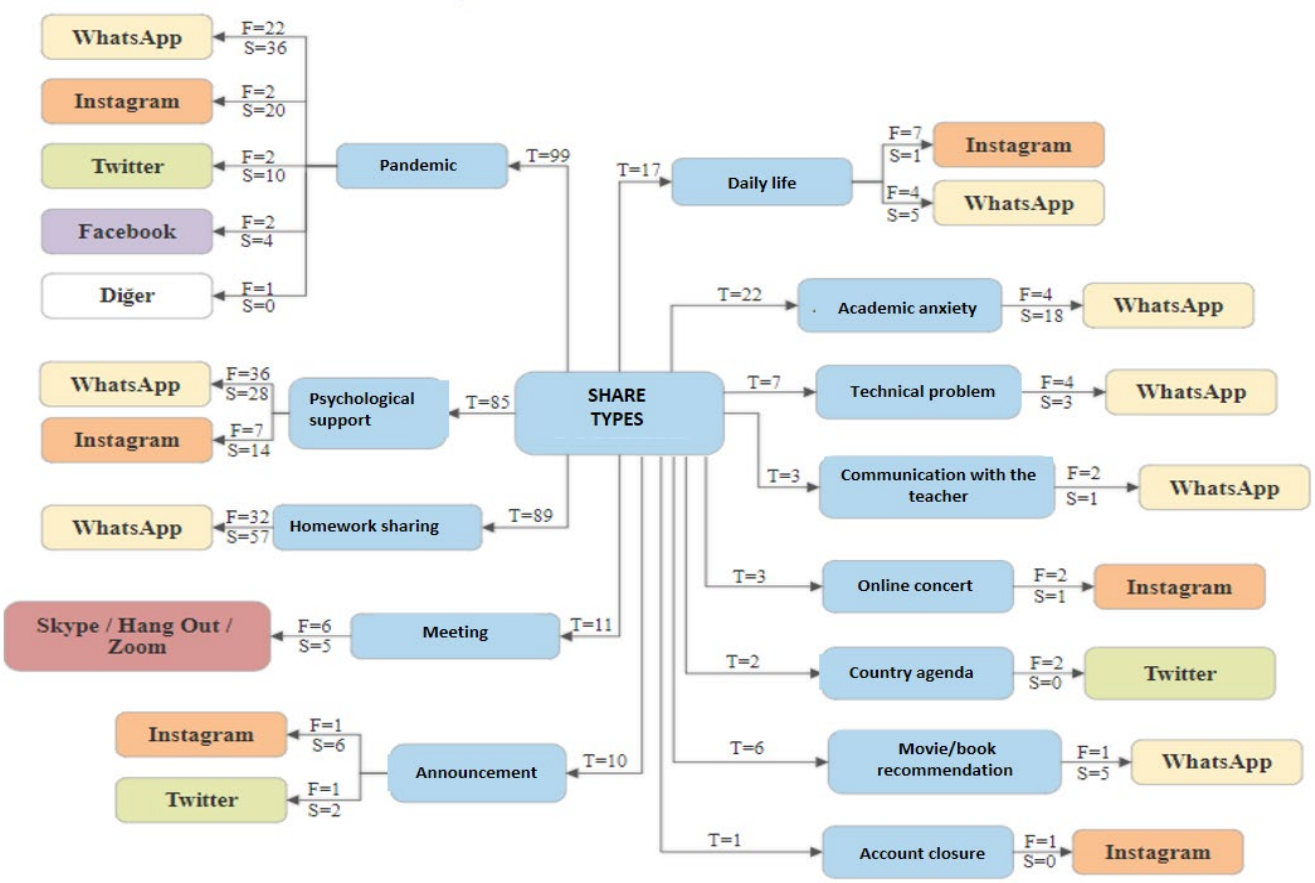


Figure 5. Posts of teacher candidates on social media during the COVID-19 pandemic

When Figure 5 is examined, it is seen that teacher candidates mostly use WhatsApp for "homework sharing" purposes. Pre-service science teachers mostly used WhatsApp for psychological support. It is seen that social studies teacher candidates mostly use WhatsApp for "Homework sharing" purposes. In addition, when the shares are examined, it is seen that they follow the posts related to the "pandemic", "homework sharing" and "psychological support". Examples of teacher candidates' views on using social media for "homework sharing" are presented below.

> *"…As for the lessons, we completed each other's deficiencies. We helped each other with our homework and shared our homework with each other. We tried to explain the subject, albeit on a small-scale, to our friends who lacked the subject or did not fully understand the subject."* (S51)

Examples of the views of teacher candidates about the "pandemic" are presented below.

> *"Recently, we shared news about what precautions and bans were taken in the transition to a controlled social life, and what we should pay attention to in our future lives."* (F17)
>
> *"We tried to help our friends stay at home by sharing the hashtag "Stay at home Turkey" on Instagram. We are trying to research and organize activities for the pandemic process."* (S21)
>
> *"With this social media tool, I made various statements about people staying at home. I stated that I support the shared announcements by liking it."* (S37)

Examples of teacher candidates' views on using social media for "psychological support" are presented below.

> *"Sometimes we shared the stress of being busy with homework and not being able to go out on WhatsApp." (F23).*
>
> *"…We mutually increased our motivation, which fell during the pandemic process." (S24)*

DISCUSSION, CONCLUSION and RECOMMENDATIONS

When the findings obtained for the first sub-problem, which deals with the motivation of teacher candidates during the pandemic period, are examined; it is seen that the majority of them (f=85) have decreased their motivation. The uncertainty of the process and the increasing workload of teacher candidates are shown as the reason for this. Decreased motivation of teacher candidates; It can be attributed to the fact that social distancing and restrictive movement policies have significantly changed traditional education practices (Altuntaş Yılmaz, 2020). When the factors that positively and negatively affect the motivation of teacher candidates towards education during the COVID-19 epidemic process (Figure 2) are examined, it is seen that the negativities that the teacher candidates stated that they experienced during the pandemic process are similar on the

basis of branches and are grouped under certain basic components. According to this, one of the problems that the teacher candidates stated that they experienced in this process is those of "psychological origin". It is thought that factors such as the fact that teacher candidates do not have the opportunity to socialize as in the school environment, the lack of interest and motivation in the lessons due to the lack of face-to-face education, and the difficulty in accessing information of students who have difficulties in using technological devices (Ağır, 2007) are effective in addressing psychological problems. Similarly, Lee (2020) found in his study that COVID-19 anxiety significantly affects social attitudes. Examining the psychological origins of the negativities that pre-service teachers stated to have experienced during the COVID-19 epidemic process, it is seen that pre-service science and social studies teachers emphasize the theme that their workload has increased.

When the findings obtained for the second sub-problem (Table 1) are examined; regarding the positive effects of the COVID-19 epidemic process on educational activities, it was observed that the science and social studies teacher candidates mostly expressed their views on the code of "Development of digital literacy, learning different computer applications". Considering the opinions of the teacher candidates, it can be said that the COVID-19 epidemic process offers important opportunities to the teacher candidates in order to explore the digital learning world. Burke and Dempsey (2020) in their study where they reported the advantages and disadvantages of school closures in Ireland along with the pandemic, stated that as an advantage of the pandemic process, teachers had the opportunity to embrace the digital learning world in this process. The same is true for teacher candidates. In this process, it is possible to say that the digital literacy and computer use skills of the teacher candidates have improved since they have to do all their homework and work on digital media. Scherer, Siddiq, and Teo (2015) stated that the most basic goal in the 21st century is to train students in terms of digital competence. It is seen that the COVID-19 epidemic process has positive effects on meeting the most basic goal in the 21st century. In this process, all students were faced with the digital world. This has contributed positively to the development of teacher candidates digital literacy. It is seen that the COVID-19 epidemic process acts as a catalyst for more effective use of digital devices, online resources, social media technology and e-learning activities (Mulenga and Marban, 2020). Another code that teacher candidates stated regarding their positive effects on educational activities is "learning to do research". It is thought that the reason for the frequency difference between social studies and science teaching in this code is due to the "Research Methods in Education" course that science teacher candidates took in the second year fall semester. Within the scope of this course, teacher candidates take the acquisitions that form the basis of the research such as literature review and article review. This situation may have been effective in social studies teacher candidates emphasis on this code. It is a fact that technological tools cannot improve a poorly-planned teaching (Borich, 2017). As Karataş (2020) stated, if the COVID-19 pandemic can be considered as an opportunity for post-traumatic growth, it has the potential to initiate many changes at the individual and society level. For this reason, education and training activities should be planned and programmed during the COVID-19 epidemic process. It is seen that teacher candidates emphasized the code of "Learning planned and programmed work" during the COVID-19 epidemic process. It can be said that this process has positive effects on pre-service teachers gaining the habit of planned and programmed work. Regarding the negative effects of the COVID-19 epidemic process on educational activities, the opinions of the science\social studies teacher candidates about the code "Lagging behind in homework/classes due to lack of internet/computer access". It was concluded that the main negative effect of the COVID-19 epidemic process on the educational activities of the teacher candidates is the lack of internet/computer access. Lack of internet and computer access negatively affects the distance education process. Pre-service teachers stated that they fell behind in classes and could not do their homework due to this reason. As Agnoletto and Queiroz (2020) point out, the logic of "Digitalization" is not simple. It is important to provide the technical infrastructure before going digital. Bakioğlu and Çevik (2020) stated in their study that students cannot access the internet/computer, that students do not participate in online or offline classes, and that students have low motivation. Considering the opinions of teacher candidates within the scope of the study, it can be concluded that providing the technical infrastructure in the distance education process plays a key role in the effective execution of the process. Among the negative effects of the COVID-19 epidemic process on the educational activities of teacher candidates, the reasons such as the inability to learn effectively and efficiently, the decrease in interest and motivation towards the lesson, and the assignment of a lot of homework attract attention. With the closure of educational institutions and the interruption of face-to-face education, the education of 1.6 billion students, which corresponds to approximately half of the student population from all education levels, has been interrupted (UNESCO, 2020). This situation has brought many problems with it. In order to achieve the right balance in distance education, using technology and pedagogy for a purpose (Anderson, 2009) is extremely important in terms of providing an effective and efficient learning process. For this reason, it is extremely important to be able to use technology and pedagogy for the purpose in order to ensure effective and efficient learning during the pandemic process. In this process, it is necessary not to limit distance education only to online materials and communication processes. It is necessary to plan the process effectively and make a balanced instructional design. In this way, positive contributions can be made to the development of effective and productive learning.

When the findings obtained for the third sub-problem are examined; it has been concluded that the social media environment that science and social studies teacher candidates use most during the COVID-19 pandemic process is WhatsApp.

The fact that WhatsApp is an instant messaging application used for both communication and teaching purposes in group communication and education as well as personal communication (Yazıcı, 2015; Uzun and Uluçay, 2017; Çetinkaya, 2017) is thought to be effective in the use of this application by all teacher candidates. In addition, the use of this application by the instructors for the purpose of instant communication with the teacher candidates during the pandemic process may have been effective in the use of this sharing environment by the teacher candidates. Therefore WhatsApp, one of the instant messaging applications, is widely used today and is a more preferred application among its peers due to its many features (Maden, 2019). When the teacher candidates posts on social media during the COVID-19 pandemic process (Figure 5) were examined, it was seen that the teacher candidates mostly used WhatsApp for "Homework sharing" purposes. In the study conducted by Maden (2019), it was determined that 72.5% of the pre-service teachers followed all the aims determined as written, visual and file sharing when asked about the purposes for which they use the WhatsApp application to Turkish teacher candidates. Similarly, in this study, it was determined that the majority of teacher candidates use WhatsApp for homework sharing purposes. It is seen in Figure 4 that after WhatsApp, the other social application that teacher candidates use the most is Instagram. It is thought that the reason for the difference in the rate of using Instagram for social sharing purposes by the pre-service science and social studies teachers is due to the awareness-raising activities of the social studies teacher candidates on social media within the scope of community service practices, which are among the lessons. In this case, it is seen that social media tools can turn into environments that support educational activities if needed.

Considering the positive effects on the development of digital literacy of teacher candidates during the COVID-19 epidemic process, it is recommended that teachers, prospective teachers, curricula and textbooks be developed in terms of digital competencies. Studies can be planned in which the positive and negative effects of teacher candidates from the process and the change in their motivation are evaluated together with the effect on teachers and students. In order to reduce the excessive workload that negatively affects the motivation of the instructors and to keep them at a reasonable level, it can be ensured that they increase their cooperation and prevent unnecessary workload and repetitions by communicating with each other about the course content and homework. In order to minimize the systemic uncertainties, which is one of the most important factors that have a negative effect on motivation in emergency distance education situations, online orientation programs can be organized by the advisors. Emphasizing the positive and strong sides of emergency distance education, with examples on different platforms, that the situations that seem like disadvantages can be turned into advantages, may minimize the negative effects of the process on motivation. Through the relevant application and research centers and departments of universities that can provide psychological support, the support they need regarding the psychological consequences of the COVID-19 epidemic, increasing psychological resilience and effective coping methods can be provided professionally through online environments.

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Statements of publication ethics

We hereby declare that the study has not unethical issues and that research and publication ethics have been observed carefully.

Researchers' contribution rate

The study was conducted and reported with equal collaboration of the researchers.

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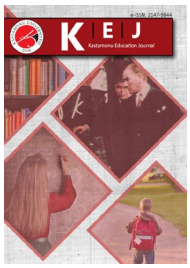

| Research Article / Araştırma Makalesi |

Cognitive Control and Flexibility as Predictor of Career Adaptability in Emerging Adults

Beliren Yetişkinlerde Kariyer Uyumluluğunun Yordayıcısı Olarak Bilişsel Kontrol ve Esneklik[1]

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Keywords

1. Career adaptability
2. Cognitive control
3. Cognitive flexibility

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Abstract

Purpose: The main purpose of this study is to reveal the predictive role of cognitive control and flexibility on career adaptability of emerging adults and the relationships among the variables.

Design/Methodology/Approach: A total of 318 emerging adults, 193 female (60.7%) and 125 male (39.3%) participated in the study. The age range of the participants in the study is 19-26 and the mean age is 21.52 (SD: 1.57). The data of the study were collected by the Career Adaptability Scale and the Cognitive Control/Flexibility Questionnaire. Pearson correlation coefficient and multiple regression analysis were used to analyze the data.

Findings: The findings of the study revealed that the variables in the study showed positive correlations and appraisal/coping flexibility factor significantly predicted career adaptability. According to the regression model, appraisal/coping flexibility factor explains approximately 12% of the total variance in career adaptability.

Highlights: The results of the study were discussed in light of the literature, and the recommendations were proposed to the experts and researchers working in the field of career psychological counseling.

Öz

Çalışmanın amacı: Bu araştırmanın temel amacı beliren yetişkinlerde, bilişsel kontrol ve esnekliğin, kariyer uyumluluğunu yordama gücünü ve değişkenlerin aralarındaki ilişkileri ortaya koymaktır.

Materyal ve Yöntem: Araştırmaya 193'ü kadın (%60.7) ve 125'i erkek (%39.3) olmak üzere toplam 318 gönüllü beliren yetişkin katılım göstermiştir. Araştırmaya katılanların yaş ranjları 19-26, yaş ortalamaları 21.52'dir (SS: 1.57). Araştırmanın verileri, Kariyer Uyumluluğu Ölçeği ve Bilişsel Kontrol/Esneklik Ölçeği ile toplanmıştır. Verilerin analizinde Pearson korelasyon katsayısı ve çoklu regresyon analizi kullanılmıştır.

Bulgular: Çalışmanın bulguları araştırmada yer alan değişkenler arasında pozitif yönde bir ilişki olduğunu ve bilişsel kontrol/esnekliğe ait değerlendirme ve başa çıkma esnekliği faktörünün kariyer uyumluluğunu anlamlı bir şekilde yordadığını ortaya koymuştur. Regresyon modeline göre bilişsel kontrol/esnekliğin bu alt faktörü kariyer uyumluluğundaki toplam varyansın yaklaşık % 12'sini açıklamaktadır.

Önemli Vurgular: Araştırmanın sonuçları alanyazın ışığında tartışılarak, kariyer psikolojik danışmanlığı alanında çalışan uzmanlara ve araştırmacılara önerilerde bulunulmuştur.

[1] Add footnote here.

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INTRODUCTION

In order to remain productive, purposeful, and profitable in their career lives, individuals need to adapt effectively to changing personal needs, environmental demands, and opportunities throughout their lives (Hartung & Cadaret, 2017). Career adaptability was first conceptualized as career maturity to describe an individual's ability to maintain career-oriented behavior and confidence in career choice in the face of business challenges (Super & Knasel, 1981). Career adaptability, which is at the center of Career Construction Theory (Savickas, 1997, Savickas, 2002, Savickas, 2005, Savickas, 2013), was defined as "a psychosocial construct that denotes an individual's resources for coping with current and anticipated tasks, transitions, traumas in their occupational roles" (Savickas & Porfeli, 2012, p. 662). Career adaptability refers to the readiness of individuals to cope with unforeseen adaptability caused by changes in working and working conditions, as well as predictable tasks in preparing and participating in work roles (Savickas, 1997). According to the Construction Theory, adaptability is a stable personality trait that includes readiness and willingness to adapt to career changes and affects the development and use of career adaptation resources (Savickas, 2013).

The results of a meta-analysis study (Rudolph et al., 2017) based on the Career Construction Theory showed that career adaptability is associated with adaptation measures (cognitive ability, big five personality traits, self-esteem, basic self-assessments, proactive personality, future orientation, hope, and optimism), adaptation of responses (career planning, career exploration, professional self-efficacy, and career decision-making self-efficacy), adjustment results (career identity, search, career/ job/school satisfaction, emotional organizational commitment, job stress, employability, promotability, intention to leave, income, self-reported job performance, entrepreneurial outcomes, life satisfaction, and positive and negative emotions) and also certain demographic characteristics (age, education). Also, other studies revealed that career adaptability is related to subjective well-being (Hartung & Taber, 2008), resilience (McIlveen et al., 2019), life satisfaction (Ramos & Lopez, 2018), self-esteem (Duffy, 2010), post-traumatic growth (Prescod & Zeligman, 2018), emotional intelligence (Merino-Tejedor et al., 2018), hope and optimism (Santilli et al., 2019).

A study of adults' career adaptability in Turkey reported that the participants with a high level of resilience, hope, and optimism as positive personality traits perceived themselves as more adaptive in their careers (Büyükgöze-Kavas, 2016). In another study conducted on teacher candidates (Gerçek, 2018), it was shown that there were significant negative relationships between vocational anxiety levels and career adaptability levels. In a study conducted by Eryılmaz and Kara (2018), it was found that career adaptability of teacher candidates increased as their career decision-competence expectations increased, and career adaptability decreased as career obstacles increased.

Another important feature associated with career adaptability is cognitive flexibility. When individuals encounter situations that require adaptation, they cognitively evaluate their ability to respond adaptively to the demands of the environment (Lazarus & Folkman, 1984). Cognitive flexibility has been conceptualized as "(a) an awareness that in any given situation, there are options and alternatives available, (b) willingness to be flexible and adapt to the situation, and (c) self-efficacy in being flexible" (Martin & Rubin, 1995, p.1). According to Dennis and Vander-Wal's definition, cognitive flexibility is the "ability to switch cognitive sets to adapt to the changing environmental stimuli" (2010, p. 242). The cognitive control/flexibility concept studied in this study is based on the model introduced by Gabrys et al. (2018). According to this model, cognitive control/flexibility is an important feature that is effective in an individual's ability to adapt to new situations that require change. Cognitive control over emotion defines the ability to control individuals' negative repetitive thoughts and feelings. On the other hand, appraisal/coping flexibility requires the ability to manage negative thoughts and emotions by re-evaluating the situation that requires adaptation and to choose the appropriate strategy by creating alternative coping strategies.

Cognitive flexibility, which is an important feature related to career adaptability of individuals, is related to the ability to adjust problem-solving strategies within the scope of the requirements of a change of task (Al Jabari, 2012). In the literature, studies are showing that cognitive flexibility is an important predictor of an individual's adaptability (Lepine et al., 2000). For example, in a study conducted by Lin (2013) on university students, it was reported that cognitive flexibility was an important predictor of openness to experience. In a similar study conducted by Demirtaş in Turkey (2020), it was shown that cognitive flexibility has an important role in adjustment to university life. Although no study directly addresses the relationship between career adaptability and cognitive flexibility in the literature, there are studies that examine cognitive flexibility in terms of some variables related to career adaptability. For example, Lee et al. (2020) reported that in the mediation model they tested, cognitive flexibility levels of university students had a significant effect on career maturity. In a recent study by Yıldız et al. (2020), it has been shown that cognitive flexibility in university students is an important predictor of career future. The findings of the research conducted by Demirtaş (2019) on 509 emerging adults who received pedagogical formation training revealed that both cognitive control over emotion and appraisal/coping flexibility had negative relationships with career stress.

The question of whether individuals can adapt to new or changing situations is becoming more and more important in today's rapidly developing and changing world (Morrison & Hall, 2002; Hamtiaux & Houssemand, 2012). The life period in which the participants constitute the study group of this research is a phase of the life-span between adolescence and adulthood, which is conceptualized as emerging adulthood by Arnett (2000). Arnett (2000) suggested that emerging adulthood is a different period between the ages of 18 and 25 when adolescents become more independent and explore various life possibilities. Five basic characteristics distinguish emerging adulthood from the previous adolescence period or the following young adulthood as a developmental period (Arnett, 2006). First, it is the period when people are most likely to discover various possibilities for their

lives in various fields, particularly love and work, as a starting point for making permanent choices that will form the basis of their adult lives. Secondly, the discoveries in the emerging adult stage make this stage of life not only highly stimulating and eventful but also highly unstable. The various behaviors of individuals at this stage reflect their discovery of different possibilities and their frequent change of direction regarding love, work, and education. Third, individuals at this stage are more self-centered rather than selfish. Their social obligations, their low duties, and responsibilities towards others give them autonomy in managing their own lives. Fourth, this phase is a period in which the individual feels in between, neither as an adolescent nor as an adult. Fifth, and lastly, this phase is the age of possibilities where individuals are highly optimistic about their future and people have a unique opportunity to transform their lives (Arnett, 2006). Although there is limited research on emerging adulthood in Turkey, it is stated that this period is comprised of the age range of 19-26 (Atak & Çok, 2007). The results of the limited number of studies show that this period takes place within the framework of the limitations brought by the social, economic, and cultural conditions and that the dependence on the family is relatively more preserved in this process in Turkey (Doğan & Cebioğlu, 2011). Also, due to the high unemployment and the complexity of businesses in Turkey, individuals can be directed to only certain professions by their families in this period (Doğan & Cebioğlu, 2011). Therefore, while emerging adults tend to explore various career opportunities that are compatible with the developmental period they are in, they also face difficulties in finding satisfying and longer-term jobs (Konstam et al., 2015). Career adaptability is an important feature that helps individuals effectively deal with career uncertainty and uncertain job roles (Chong & Leong, 2017). In light of theoretical explanations and research, this study aims to examine career adaptability of emerging adults who continue their university education in Turkey in terms of cognitive control/flexibility levels. It was hypothesized that emerging adults with high cognitive control/flexibility levels would have high career adaptability. It is considered that the results of the research will contribute to the field of career psychological counseling. This study examining career adaptability of emerging adults in terms of cognitive processes is thought to be important as career psychological counseling is a process that not only helps individuals make career-related decisions but also helps them manage their careers effectively throughout their lives and develop resilience to cope with the challenges that arise as their work lives progress (Kidd, 2007).

METHOD/MATERIALS

In this section, research design, study group, data collection tools, process/data analysis, and data analysis subtitles are presented.

Research Design

This research is designed in a correlational design. In the correlational design, the existence and direction of relationships between variables are discussed (Fraenkel & Wallen, 2006). This study was conducted following the correlational research design as it aimed to reveal the predictive role of cognitive control/flexibility levels (predictive variable) of emerging adults on their career adaptability (predicted variable) and the relationships between them.

Study Group

A total of 318 volunteers, including 193 women (60.7%) and 125 men (39.3%), participated in the study. The age ranges of the participants are 19-26 and the average age is 21.52 (SD: 1.57). In determining the study group, a convenience sampling method, which includes studying an accessible sample, was used (Cohen et al., 2007). Based on this method, the university students who continue the programs in the Faculty of Education of a university located in the Mediterranean Region and the students who continue the pedagogical formation education at the same faculty were included in the study. Informed consent was provided for participation in the study, and volunteerism was taken as a basis.

Measures

The data of the study were collected by the Career Adaptability Scale and the Cognitive Control and Flexibility Questionnaire.

Career Adaptability Scale (CAS). The CAS was developed by Eryılmaz and Kara (2016). The measurement tool consists of 10 items and two dimensions including career discovery and career plan. While the lowest 10 points were taken from the CAS; the highest 50 points can be obtained. The lowest score is 10 and the highest score is 50 obtained from the 5 Likert-type scale. The increase in the scores obtained from the scale is interpreted as the higher career adaptability of the individuals. The exploratory and confirmatory factor analysis methods were used in the validity study of the scale. In the exploratory factor analysis, the total explained variance was found to be 55.87%. Also, the results of the confirmatory factor analysis revealed that the two-factor model had high fit indexes (Eryılmaz & Kara, 2016). Cronbach's alpha internal consistency coefficient was found as .85. In this study, the first-level confirmatory factor analysis was used for the construct validity of the Career Adaptability Scale. The results of the goodness of fit indexes of the scale ($\chi 2$ / df = 3.23, CFI = .94, IFI = .94, NFI = .91, TLI = .92, GFI = .93, AGFI = .89, RMSEA = .08 (90% GA RMSEA = [.06, .10]) has been interpreted as within acceptable limits (Jöreskog & Sörbom, 1993; Kline, 2005; Schumacker & Lomax, 1996; Tabachnick & Fidell, 2013). Also, Cronbach's alpha reliability coefficient calculated for the reliability analysis in this study was α = .71 for career plan and α = .86 for career exploration, and α = .85 for the total scale.

Cognitive Control and Flexibility Questionnaire (CCFQ). The scale was developed by Gabrys et al. (2018). The scale measures the ability of individuals to maintain control over their negative thoughts and emotions, their ability to approach the situation with alternative perspectives, and to show the appropriate response instead of giving sudden reactions in challenging situations. The adaptation study of the scale to Turkish was conducted by Demirtaş (2019). The psychometric properties of the scale were investigated by linguistic equivalence, item analysis, construct validity, and Cronbach's alpha reliability. The results of the

confirmatory factor analysis showed that the two-factor structure of the scale, Cognitive Control over Emotion and Appraisal and Coping Flexibility, has adequate fit values. Cronbach's alpha coefficients obtained in the adaptation study of the scale were reported as between .85 and .91. In this study, the construct validity of the CCFQ was evaluated with first-level confirmatory factor analysis. The first-order confirmatory factor analysis results showed that the goodness of fit indexes of the scale ($\chi 2$ / df = 2.69, CFI = .90, IFI = .90, NFI = .85, TLI = .88, GFI = .89, AGFI = .86, RMSEA = .07 (90% GA RMSEA = [.06, .08]) were within acceptable limits (Jöreskog & Sörbom, 1993; Kline, 2005; Schumacker & Lomax, 1996; Tabachnick & Fidell, 2013). Cronbach's alpha coefficients of the scale were calculated as α = .83 for cognitive control over emotions factor; α = .87 for appraisal and coping flexibility and α = .88. for the total.

Research Design

The data of the study were collected in a state university in the Mediterranean Region in the 2019-2020 academic year. The Data collection tools were applied by the researcher in a classroom. The study was based on volunteerism by providing informed consent. First, the validity and reliability analyses of the measures were conducted. The first-level confirmatory factor analysis was performed for the construct validity of the measures. AMOS 21 program was used in these analyzes. Then, the preliminary analyzes of the data were calculated. At this stage, the skewness and kurtosis values were examined for the normality assumption. After the normality assumption was met, Pearson correlation analysis and the multiple regression analysis techniques were applied. These analyzes were done through SPSS 21.

FINDINGS

The kurtosis and skewness values for the normality assumption were investigated. As the values of skewness and kurtosis showed acceptable ranges in the region of -1 to +1 (career adaptability: skewness -81, kurtosis: 1.17; cognitive control over emotion: skewness .14, kurtosis: -.41; appraisal and coping flexibility: skewness -.39, kurtosis .76; cognitive control/flexibility: skewness -.04, kurtosis .21), it was concluded that the scores did not show a significant deviation from the normal distribution (Tabachnick & Fidell, 2013). Descriptive statistics and the skewness/kurtosis values are given in Table 1.

Table 1. Descriptive Statistics, Skewness ve Kurtosis Values

Variables	N	$\bar{X}$	SD	Skewness	Kurtosis
Career Adaptability	318	39.53	5.83	-.81	1.17
Cognitive Control Over Emotion	318	36.66	9.59	.14	-.41
Appraisal and Coping Flexibility	318	47.72	7.49	-.39	.76
Cognitive Control/Flexibility	318	84.39	14.73	-.04	.21

The Pearson correlation analysis finding between the variables in the study are presented in Table 2.

Table 2. Pearson's Product of Moments Correlation Analysis Results

Variables	Career Adaptability	Cognitive Control over Emotion	Appraisal and Coping Flexibility
Career Adaptability	1	.24**	.34**
Cognitive Control over Emotion	.24**	1	.47**
Appraisal and Coping Flexibility	.34**	.47**	1

p< .01**, *p*<.05*

Table 2 shows that career adaptability is positively correlated with cognitive control over emotion factor (r=.24; *p*<.01). Also, there is a positive relationship between career adaptability and appraisal/coping flexibility factor (r= .34; *p*<.01). The findings of the multiple regression analysis among the variables in the study are given in Table 3.

Table 3. Variance Statistics Regarding the Variable Predicting Career Adaptability

Model	R	R^2	SEE	Variance Statistics				
Model 1	.35	.12	5.47	ΔR^2	ΔF	Df1	Df2	*p*
				.12	22.58	2	315	.00

Not. SEE = Standard Error of Estimate, df = Degree of Freedom

Table 3 shows that the regression model developed to determine to what extent appraisal/coping flexibility predicts career adaptability ($F_{(2,315)}$ = 22.58, *p*< .01, R = .35, R^2 = .12, ΔR^2= .12) is statistically significant.

Table 4. Multiple Regression Analysis of the Variable Predicting Career Adaptability

Model		Unstandardized Coefficients	Standardized Coefficients			
		B	SE	β	*t*	*p*
Model 1	(Constant)	26.34	1.99		14.26	.00
	Cognitive Control Over Emotion	.06	.03	.10	1.68	.09
	Appraisal and Coping Flexibility	.22	.04	.29**	4.90	.00

Not: *p*< .01**, *p*<.05*

Table 4 shows that appraisal and coping flexibility is a significant predictor of career adaptability (β= 29; t= 4.90; *p*<.01) and explains approximately 12% of the variance in career adaptability.

DISCUSSION

The results showed that career adaptability positively correlated with both factors (cognitive control over emotion and appraisal/coping flexibility) of cognitive control/flexibility. On the other hand, only appraisal/coping flexibility factor statistically predicted career adaptability. The regression model revealed that appraisal/coping flexibility explained approximately 12% of the variance in career adaptability.

Career adaptability is an important characteristic that helps individuals effectively deal with career ambiguity and uncertain job roles (Chong & Leong, 2017). In cognitive control/flexibility model conceptualized by Gabrys et al. (2018), cognitive control over emotion refers to an individual's ability to control repetitive negative thoughts and emotions. Appraisal/coping flexibility shows the tendency to manage negative thoughts and emotions by re-evaluating stressful situations and formulating multiple alternative coping strategies before choosing the appropriate one. Although no study addresses career adaptability in terms of the cognitive control/flexibility model of Gabrys et al. (2018), there are limited studies on the relationship between career adaptability and cognitive flexibility. This study is consistent with the research findings conducted by Chong and Leong (2017) on 307 university students with work experience in the career field, demonstrating that responsibility, cognitive flexibility, and environmental exploration are associated with strategic career management through career adaptability. The results of an experimental study conducted by Janeiro et al. (2014) on high school students showed that a six-week career intervention aimed at increasing career adaptability had a stronger effect on students with low career maturity, pessimistic, and highly negative views about the future. The appraisal and coping flexibility factor of cognitive control/flexibility is related to the ability to engage in a series of effortful behaviors that can facilitate the selection of alternative coping strategies. Therefore, it can be concluded that this experimental study confirms the relationships between career adaptability and appraisal/coping flexibility. Furthermore, the findings of the study by Yıldız-Akyol and Boyacı (2020) examining career adaptability of university students in terms of their career futures showed that there is a positive significant relationship between cognitive flexibility and career adaptability, which is one of the factors of career future, consistent with this study. In light of all these studies, it can be said that cognitive flexibility is an important feature that increases career adaptability.

CONCLUSION AND RECOMMENDATIONS

In the light of the relevant literature and based on the research findings, it can be concluded that individuals with cognitive flexibility have the ability to evaluate occupational ambiguity in detail and appropriately, to create more than one alternative coping strategy before choosing the appropriate one, and thus have a higher level of career adaptability. This study examining the cognitive control/flexibility levels and career adaptability of emerging adults has some limitations. One limitation of the study is that the participants were selected using the convenience sampling method. Similar studies on different samples can increase the generalizability of the research findings. Another limitation of the research is that the research is carried out in a cross-sectional design since it cannot reveal the causality between the relationships. Besides these limitations, it is thought that the research will contribute to the understanding of the relationships between cognitive control/flexibility and career adaptability. Based on these results, some suggestions can be made for future research. Based on the regression model found significant in this study, different models can be created in the relational research design. Also, experimental studies may be suggested to examine the relationships between variables in the context of cause and effect. The findings of the study can provide a guide to experts working in the field emphasizing that individuals' cognitive flexibility has an important role in increasing career adaptability when designing career

psycho-educational programs. In this context, it is considered that the programs developed based on cognitive flexibility will contribute significantly to the career development of individuals. In addition to career psycho-educational programs aimed at assessing and developing individuals' competencies and skills, this study is also considered to be important in terms of career psychological counseling which is a process that not only helps individuals make career-related decisions but also helps them manage their careers effectively throughout their lives and develop emotional resilience to cope with the challenges that arise as their work lives progress (Kidd, 2007).

Declaration of Conflicting Interests

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Statements of Publication Ethics

We hereby declare that the study has no unethical issues and that research and publication ethics have been observed carefully.

Authors' Contribution Rate

A.S.D and A.K. conceived of the presented idea. A.S.D. and A.K. wrote the introduction. A.S.D. collected and transcribed the data. A.K. analyzed the data and wrote the findings. A.S.D. wrote the discussion and conclusion. A.K. wrote the recommendations. All authors contributed to the final manuscript.

Researchers' Contribution Rate

The study was conducted and reported with the equal collaboration of the researchers.

Ethics Committee Approval Information

The research was reviewed and approved by the Scientific Research and Publication Ethics Committee of Alanya Alaaddin Keykubat University (Approval Date: 01.06.2020, Approval Document Number: 88431307-050.01.04-E.9233).

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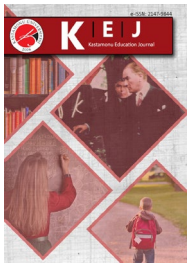

|Research Article/ Araştırma Makalesi|

A Different Technic in The Teaching of Reading Comprehension Strategy: Self-Regulated Strategy Development Model

Okuduğunu Anlama Stratejisi Öğretiminde Farklı Bir Uygulama: Öz-Düzenlemeli Strateji Gelişimi Modeli [1]

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Keywords
1. Self-regulated strategy development
2. Strategy instruction
3. Reading

Anahtar Kelimeler
1. Öz-düzenlemeli strateji gelişimi
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Abstract

Purpose: In the reading comprehension strategy teaching which starting with Durkin, how strategies are taught are as important as the strategy. One of the application that used in strategy instruction is the "Self-Regulated Strategy Development (SRSD)" model which developed by Harris and Graham. This model, which was developed for the development of writing skills and applied to students with more learning disabilities, has started to be applied over time with reading skills and students without any disabilities. Since the use of the model in the reading area is new, information about the model should be revealed in detail. For this reason, it is aimed to describe in detail the usage of the SRSD model in the teaching of comprehension.
Design/Methodology/Approach: The document examination method from qualitative research methods was used in the research.
Findings: As a result, it was found that SRSD model was used to develop different skills with different groups. It has been seen that the SRSD model was used in literary works to improve writing, reading, metacognition, and mathematics skills. Despite the fact that SRSD has been addressed with an increasing number of studies abroad in the field of strategy teachings, the finding that there is not much work on this area in Turkey.
Highlights: This model, which was originally developed for teaching writing, has been applied in the field of reading in recent years. It is a model that allows students to control their own reading comprehension process. It supports the student in this process and guides his/her understanding.

Öz

Çalışmanın amacı: Durkin ile başlayan okuduğunu anlama stratejisi öğretiminde, öğretilen strateji kadar stratejilerin nasıl öğretildiği de önemlidir. Strateji öğretiminde kullanılan modellerden biri Harris ve Graham tarafından geliştirilen "Öz-Düzenlemeli Strateji Gelişimi (ÖDSG)" modelidir. Yazma becerilerinin geliştirilmesi amacıyla hazırlanan ve daha çok öğrenme yetersizliği olan öğrenciler üzerinde uygulanan bu model, zamanla okuma becerisi ve herhangi bir yetersizliği olmayan öğrenciler üzerinde uygulanmaya başlanmıştır. Modelin okuma alanında kullanımı yeni olduğu için model ile ilgili bilgilerin detaylı olarak ortaya konmasını gerekmektedir. Bu nedenle araştırmada, ÖDSG modelinin okuduğunu anlama öğretiminde kullanımının detaylı bir şekilde incelenmesi amaçlanmaktadır.

Materyal ve Yöntem: Araştırmada nitel araştırma yöntemlerinden doküman incelemesi yöntemi kullanılmıştır.

Bulgular: Araştırmada ÖDSG modelinin farklı gruplarda ve farklı becerileri geliştirmek için kullanıldığı bulgusuna ulaşılmıştır. Modelin yazma, okuma, üst biliş ve matematik becerilerini geliştirmeye yönelik çalışmalarda kullanıldığı görülmüştür. Model, okuduğunu anlama stratejisi öğretiminde yurt dışı çalışmalarda artan bir şekilde kullanılsa da Türkiye'de yeterince kullanılmamaktadır.

Önemli Vurgular: Başlangıçta yazı öğretimi için geliştirilen bu model son yıllarda okuma alanında uygulanmaya başlanmıştır. Öğrencilerin kendi kendilerine okuduğunu anlama sürecini kontrol etmelerini sağlayan bir modeldir. Öğrenciyi bu süreçte destekleyerek anlamasına rehberlik yapmaktadır.

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INTRODUCTION

In today's technology world, the number of produced information is increasing day by day. With the increase in information, the ways of accessing information are also increasing and the individual can reach the information when they want much more easily than in the past. However, the use of information depends on how well the source of information is understood. Understanding written texts, in particular, requires a good reading comprehension skill. The concept of reading comprehension has an important role in human life and educational activities. For this reason, studies on reading comprehension maintain its importance from past to present. So that researches on the basis of countries have been quite remarkable in recent years. The increasing importance given to exams such as PISA and PIRLS are one of the indicators of this.

Reading is a mental process that requires to construct meaning as a result of interaction with the text (Akyol, 2008). This process includes three key elements. These are the reader, the text and the activity (Snow, 2002). From these elements, the reader takes an active role in the meaning-making process to construct meaning. It interacts with the text and takes part in a number of activities in the interaction process. These activities of the reader are important practices that enable to construct meaning.

Reading isn't a random process (Duffy & Roehler, 1987). Reading is an active process and the reader performs many activities in this reading process (Akyol, 2008; Pressley, 2002). These activities which carried out before, during and after reading have a very important position for comprehension (Hilden & Pressley, 2007). These practices, which are done before, during or after reading and aiming to provide comprehension, are called reading comprehension strategies (Duffy & Roehler, 1987: Karatay, 2014). Comprehension strategies can be defined as the conscious, deliberate and flexible plans that readers use and organize in various texts to achieve a certain purpose (Duffy & Roehler, 1987; Dole, Duffy, Roehler, & Pearson, 1991; Lenski & Nierstheimer, 2002). Practices such as summarizing, determining the main idea, determining the author's purpose, using prior knowledge can be given as examples of reading comprehension strategies.

The active reading habits of good readers don't develop spontaneously in poor readers. Weak readers mostly expect external guidance (Akyol, 2008). In this sense, the strategies taught are a guide that enables weak readers to participate actively in the comprehension process (Ülper, 2010; Van Keer & Verhaeghe, 2005). Now the reader is expected to internalize the taught strategy and use it in a way that checks his understanding. However, the ability of students to apply strategies independently reveals the necessity of focusing on "how" as well as "what" is taught to students.

Different methods are followed for the teaching of strategies. Pressley, Harris, and Marks (1992) claimed that good strategy teaching is based on the principles of constructivism. They stated that Moshman's (1982) classification of constructivism would help to understand the use of constructivism in strategy teaching. They grouped them as strategy teaching based on endogenous constructivism, exogenous constructivism and dialectical constructivism.

Strategy teaching based on endogenous constructivism takes place in a social environment that is dependent on the learning and teaching content. Strategy teaching is based on student-centered explanations and the discovery of instructional principles. There is no direct strategy teaching here (Almasi, 2003). The teacher provides students with a useful and rich environment to participate in the learning process (Harris & Graham, 1994). In strategy teaching based on endogenous constructivism, the student is expected to internalize the strategies used. When we look at the 2005 Turkish curriculum, it is aimed to internalize the strategies by presenting them to the students. The strategy is used throughout the course, but there is no direct instruction about these strategies.

Modeling and explanation play an important role in strategy teaching based on exogenous constructivism (Pressley et al., 1992). Especially low-achieving students need open instruction (Snow, 2002). One of the models based on extrinsic constructivism is direct instruction (Almasi, 2003). Direct instruction of strategies includes step-by-step open instruction in certain strategies. In the direct instruction model, the teacher teaches the strategy as a model or by clearly explaining how to use the strategy (Bauman, 1984). Over time, teacher-directed activities are reduced and students are tried to work independently. It is stated that although direct instruction is effective in teaching strategies, it is insufficient in providing metacognitive awareness about when and how to use the strategy (Almasi, 2003).

Dialectical constructivism, on the other hand, lies between endogenous and exogenous constructivism. Dialectical approaches don't advocate either stating clearly all the steps of a strategy, nor fully discovering the strategy by the student. They aim to support students according to their needs (Pressley et al., 1992). Reciprocal teaching and operational strategy teaching can be given as examples for strategy teaching based on dialectical constructivism (Almasi, 2003).

Reciprocal teaching is a strategy teaching method that is used extensively (Pressley & Woloshyn, 1995). The teaching of questioning, summarizing, clarifying and predicting strategies in reciprocal instruction is supported by dialogues between teachers and students (Rosenshine & Meister, 1994). Students take turns taking the leadership role in the group and apply these strategies. The teacher intervenes when necessary (Pressley et al., 1992).

Operational strategy teaching involves structuring the meaning of the text with the using of the strategies which used by good readers. Although strategies vary in operational strategy teaching, they are generally taught in a certain order. The teaching of strategies carried out in the group together with the group members, and it is tried to create a common meaning.

The long-term aim of operational strategy teaching is to internalize the strategy and to ensure the continuously adaptable strategic understanding (Pressley & Woloshyn, 1995).

Different from these teaching methods, there are also methods developed by researchers. Palincsar et al. (1991) created a model using direct teaching, reciprocal teaching and problem-based teaching. These applications for strategy teaching have a large place in the literature. However, students need strategy teaching models that will enable them to control the strategy implementation process. In a way, it should be ensured that they have the ability to self-manage this process (Almasi, 2003). This is one of the basic features expected from today's individuals.

One of the models that supports students to use the strategy on their own, provides cognitive and motivational support, and integrates self-regulation procedures and strategy teaching steps is the "Self-Regulated Strategy Development" model. A detailed examination of this model, which has been used in studies on reading in recent years, is very important for the model to be used effectively in teaching reading comprehension strategy.

Purpose of the research

In this study, it is aimed to provide detailed information about the "Self-Regulated Strategy Development" model, which was developed for students to use strategies independently. For this purpose, answers to the following questions were sought.

1- What is the Self-Regulated Strategy Development model?

2- In which areas is the Self-Regulated Strategy Development model used?

3- How is the Self-Regulated Strategy Development model applied in teaching reading comprehension strategy?

4- What are the studies which the Self-Regulated Strategy Development model is used in teaching reading comprehension strategy?

Importance of Research

Self-regulation, which can be defined as the individual's management of his own behavior (Senemoğlu, 2012), requires the individual to take responsibility for his own learning, plan and control it in the learning process (Aydın & Atalay, 2015). Good readers need to be able to organize the reading comprehension process in order to construct meaning from the text (Hilden & Pressley, 2007). Therefore, in order to prevent reading comprehension problems, there is a need for a teaching model in which students can control and regulate their comprehension process. Examining and revealing the SRSD model developed to meet these needs of the students reveals the importance of the research.

METHOD

In this study, it is aimed to reveal detailed information about the "Self-Regulated Strategy Development" model. For this reason, it was necessary to examine the studies on the model in detail. One of the ways to reach detailed information about a subject is the document review method. This method includes the analysis of written materials containing information about the phenomenon or cases that are aimed to be investigated (Yıldırım & Şimşek, 2013). For this reason, the document analysis method, which is one of the qualitative research methods, was used in this study.

Search have been made by researchers using the keywords “self-regulated strategy development”, “self-regulated strategy teaching”, “strategy instruction”, “strategy teaching”, “reading” in EBSCOhost (Business Source Complete), ScienceDirect, ProQuest and Google Scholar electronic databases.

FINDINGS

1- What is the Self-Regulated Strategy Development model?

SRSD is a teaching model that was developed by using the theories which stating that changes in strategic knowledge, content knowledge and motivation will create the learning process (Harris, Graham, & Mason, 2006). The formation of the model was pioneered by the random convergence between the studies of the two researchers in different fields—Harris's cognitive-behavioral practices for shy children and Graham's research on writing. Although many researches are effective in the formation of the model, four sources come to the fore at most. The first of these is Donald Meichenbaum and his book “Cognitive-Behavior Modification: An Integrative Approach”. In his book, Meichenbaum (1977) emphasizes that changes from negative self-talk to positive self-talk is a process that is also reflected in the behavior of the individual (Sanders, 2018). It also provided the basis and acceleration of the study by including a model for teaching processes. Secondly, the work of Soviet theorists (Vygotsky, Luria and Sokolov) on the self-control and development of the mind was utilized. The third reference is Deshler, Schumaker, and colleagues' work on strategy teaching steps for students with learning disabilities. While developing the strategy teaching steps in the SRSD model, these steps were used. Finally, the studies of Brown, Campione and colleagues on the critical aspects of self-control, metacognition and strategy teaching are based on (Harris & Graham, 1999).

The model aims to support students who have difficulties in acquiring and developing some skills emotionally, behaviorally and cognitively. These students need more structured, clear and expanded instruction than their peers in developing skills, strategies or meaning. Many studies have been integrated for powerful applications that will meet this need (Harris and Graham, 1999).

Although the development of reading and writing skills is mostly associated with verbal ability, studies emphasize that cognitive and motivational variables are also important in the development of these skills (Zimmerman & Bandura, 1994). Self-regulation is one of the cognitive and motivational variables that are effective in the development of reading and writing skills (Schunk & Zimmerman, 2007). According to Bandura (1977), people do not shape their behavior only according to external influences. People can also shape their own behavior. Self-regulation is the way which people influence, direct and control their behaviors, thoughts and feelings on their own (Senemoğlu, 2012). Self-regulation includes processes such as setting goals for learning, using effective strategies, monitoring performance, using time effectively and asking for help when necessary. It indicates the degree of motivational, metacognitive and behavioral influence of a person on his own behavior (Schunk & Ertmer, 2000).

Two important determinants of self-regulation are selection and control. Students cannot develop self-regulation unless they have options for their learning and control the basic structures of learning. Telling them what, when and where to do, will reduce their chances of being self-regulation (Schunk & Ertmer, 2000). Although self-regulation is highly valued by teachers, it is an underdeveloped skill in students (Sanders, 2018). For this reason, there is a need for applications that will improve students' skills as well as improve their self-regulation skills and enable them to control this process. At this point, we come across with Self-Regulated Strategy Development model.

SRSD is a teaching model that integrates the direct teaching of an academic strategy with self-regulation skills (Sanders, 2018). While teaching strategy to students throughout the SRSD model, they are also supported to gain self-regulation skills (Harris & Graham, 1999). Throughout the model, the student is supported in the independent implementation of the learned strategy (Hagaman & Casey, 2016). Thus, the model provides both academic competence and the development of self-regulation skills (Harris & Graham, 1999).

Although the focus of the model is to teach the strategy, self-regulation is used to better understand and implement the strategy. The main purpose of this association is to provide competence in cognitive processes; use the strategy independently and self-regulated; positive attitude towards skills. Self-regulation procedures will help students reach their goals by guiding them about how and when to use the strategy and how it will be organized (Harris, Graham, & Mason, 2003).

According to Pintrich (2004), some stages must occur in order to ensure self-regulation in a curriculum. Within each stage, adjustments are made in cognitive, motivational, behavioral and contextual areas. These stages are the forethought stage, the monitoring stage, the control stage and the reflection stage. Zimmerman (1997), on the other hand, divided this process into three cyclical phases as forethought, performance and self-reflection (Aydın & Atalay, 2015). The forethought phase precedes action; It includes processes such as goal setting and modelling. The performance phase includes processes that occur during learning that affect attention and actions such as social comparisons, feedback, and the use of learning strategies. In the self-reflection stage that occurs after the performance, students evaluate their progress (Schunk & Zimmerman, 2007). In the SRSD model, the basic components of self-regulation were considered as goal setting, self-monitoring, self-instruction and self-motivation. Each component has an important place in behavior regulation (Cosentino, 2017).

Self-instruction is the self-conversations that regulate our behavior. These conversations help to understand the nature of a problem, identify effective strategies, and monitor how strategies are progressing, thereby strengthening academic performance (Graham, Harris, & Reid, 1992). The development of self-instruction primarily depends on the teacher's modeling of self-instruction. The teacher models self-instruction aloud. Over time, the student begins to practice self-instruction under the guidance of the teacher. As the student practices self-instruction, responsibility is gradually transferred to the student (Mason, 2002). In self-instruction, it is aimed that students use at least six self-learning expressions and teaching is planned accordingly. The self-learning expressions which are defining the problem, focusing attention and planning, strategy, self-evaluation and error correction, coping and self-control, and self-motivation expressions are thought (Graham, Harris, & Reid, 1992). The student first defines the problem. About the problem self-teaching expressions such as “What should I do here?”, “I must read the text first. “, “I should mark words I don't know" are used. With the statements of focusing attention and planning, students are expected to focus on the task and make a plan. Stating which strategy to use or what steps are necessary to solve a problem is an example for this. In the strategy section, students ensure the use of the strategy with the expressions they use. Example, when asked to find the main idea of a text, the student expresses to himself how the RAP strategy will be applied. Self-assessment and error correction statements enable students to evaluate their learning process, identify and correct errors. Coping and self-control statements are aimed at helping students cope with difficulties. The students responded to the difficulties they faced by saying “I can do this no matter how hard it is.” or "Even if I made a mistake, I can correct it later". The students who guides and supports themselves with the positive expressions throughout the process, eventually uses reward expressions such as “Great!”, “I did it!”, “Awesome!” to motivate themselves (Graham, Harris, & Reid, 1992; Mason, 2002; Mason, Meadan-Kaplansky, Hedin, & Taft, 2013).

One of the components of SRSD is goal setting. Goal setting provides motivation to achieve any goal. It helps to focus on a task, determine the strategies necessary for the task, and monitor progress towards the goal (Schunk, 2001). Goal setting guides

cognition, provides evaluation and monitoring of cognition (Pintrich, 2000). Thus, goals help the individual to regulate his behavior (Cosentino, 2017).

Another component of SRSD is self-monitoring. Self-monitoring is the awareness of individuals about own behavior during learning (Webber, Scheuermann, McCall, & Coleman, 1993). Self-monitoring provides feedback to the individual about his/her own behavior (Sanders, 2018). Webber et al. (1993) report three basic views on self-monitoring. According to the metacognitive view, it is estimated that the individual's awareness of his behavior by watching causes to change of the behavior. This cognitive awareness leads to self-regulation. According to another view, the act of self-monitoring results in an evaluation that implicitly reinforces or punishes itself. The third view states that self-monitoring functions are a cue or stimulus that provides external control of behavior. Self-monitoring refers to the individual's evaluation and recording of the own behavior. Determining whether a behavior has occurred or not, refers to self-evaluation (Graham, Harris, & Reid, 1992). Throughout the SRSD, students are taught to monitor and evaluate the process of achieving the goal. Students monitor their own progress in the strategy steps with the control charts they have created. When all the steps are completed, the students check all the steps again (Mason et al., 2013).

Self-motivation happens when a student completes a task and motivates oneself. This motivation can be as effective as extrinsic motivation. The student should be able to control a reinforcer that will motivate himself without any external influence. However, this control may not be possible at first. As in other self-regulation components, a gradual transition usually take place here (Graham, Harris, & Reid, 1992). After the teacher and students determine the reinforcers, the students choose the reinforcers with the approval of the teacher. When the student achieves the goal, he rewards himself. Reinforcers can be internal or external (Sanders, 2018). With SRSD, students are taught how to use positive self-expressions. For example, when a student completes all the steps of the strategy, student can reinforce ownself by saying “I did a great job!” (Adkins, 2015). Thus, a positive learning environment can be created (Sanders, 2018). In SRSD, after completing their tasks, students reinforce themselves with the graphs they fill in about their performance (Mason et al., 2013).

In Which Fields is SRSD Used?

Graham and Harris developed the SRSD model for teaching writing skills in students with learning disabilities (Festas, 2015). Most of the studies in this field were conducted on students with learning disabilities (Lane et al., 2008; Reid, Hagaman, & Graham, 2014). Apart from this, it has been seen that studies have been carried out in normal classrooms in recent years (Festas et al., 2015; Graham & Harris, 2003; Graham, Harris & Mason, 2005; Harris, Graham & Adkins, 2015; Tracy, Reid & Graham, 2009). It is seen that studies on teaching writing range from primary school to secondary school (Graham & Harris, 1993; Harris et al., 2003).

As a result of meta-analysis studies on SRSD, it has been revealed that SRSD is more effective than other writing teaching methods (Graham, S., McKeown, D., Kiuhara, S.ve Harris, K., 2012; Graham & Perin, 2007). SRSD has provided many types of development in writing teaching, such as personal narratives, story writing, persuasive essays, and informative essays. It was effective in planning and revising strategies such as brainstorming, self-monitoring, reading for information, and organizing with peers (Harris et al., 2003). Students have improved in indicators of student performance such as the quality of writing, writing knowledge, writing approach, and self-efficacy (Graham, Harris, McArthur, & Schwarz, 1991).

Although not as intensely as in writing teaching, SRSD has been applied in the field of reading in recent years (Johnson, Graham, & Harris, 1997; Mason, 2004; Mason, 2013; Mason et al., 2006; Mason et al., 2012; Mason et al., 2013; Özdemir and Kıroğlu, 2017; Regovich and Perin, 2008). Mason et al. (2013) taught low-achieving fourth-grade students a reading comprehension strategy using SRSD to understand informative texts. Regovich and Perin (2008) taught strategy to students with behavioral and attention disorders using SRSD. Hedin, Mason, and Gaffney (2011) taught strategy to two students with attention deficit disorder.

The effect of SRSD on metacognition, which is one of the important determinants of reading comprehension, has been tried to be revealed through studies. Roohani, Hashemian, and Asiabani (2016) revealed that strategy teaching in accordance with the SRSD improves the metacognition of second language learners. In a similar study, it was concluded that SRSD was effective on listening and metacognitive awareness (Samani & Biria, 2015).

Another area where SRSD used is mathematics. Studies have been conducted with students with learning disabilities in solving word problems in mathematics (Case, Harris, & Graham 1992; Cassel & Reid, 1996; Wong, Harris, Graham & Butler, 2003). Cuenca-Carlino, Freeman-Green, Stephenson, and Hauth (2016) used the SRSD model in teaching multi-step equations. The research was carried out with six students with an average age of 13 who had difficulties in mathematics. Cassel and Reid (1996) taught problem solving strategy to two third and two fourth grade students with mild disabilities with SRSD. Karabulut and Özmen (2018) taught the “Understand and solve” strategy with SRSD in order to gain problem-solving skills. Ennis and Losinski (2019) tried to teach addition and subtraction in fractions to fifth grade students with learning difficulties with this model.

Although not as intense as the fields mentioned above, studies have also been carried out to develop different characteristics of students. A group of teachers from primary school to high school investigated the effects of SRSD on homework completion and organization (Wong et al., 2003).

How is SRSD Applied in Teaching Reading Comprehension Strategy?

SRSD is a model that can be applied with many student groups (Graham & Harris, 2003). While teaching strategy with the model, six basic steps are emphasized. The use of these steps together constitutes the operation of the model (Sanders, 2018). The four basic components of self-regulation (goal setting, self-monitoring, self-teaching and self-motivation) are put in to the steps for supported to students learn the strategy and apply it independently (Harris, Graham, Mason, & Saddler, 2002). Although it is essential to complete all the steps, there is flexibility in this process. This flexibility between the steps allows teachers to focus on the steps according to the needs of the students while using the model. The steps can be repeated when necessary, more than one step may be emphasized in a lesson, or in some cases a step may be skipped (Graham & Harris, 2003; Harris et al., 2003). These steps are discussed in detail below.

1- Development of prior knowledge: This is the stage where teachers define the prior knowledge and skills required for the use of the strategy and reveal the existing knowledge of the students (Harris et al., 2003; Sanders, 2018). Words and concepts are explained at this stage for the student to practice strategy and self-regulation procedures. The development of prior knowledge is important in order to move on to other steps. The development of prior knowledge continues in the second and third stages (Harris et al., 2003).

In this step, two self-regulation procedures, goal setting and self-monitoring, are introduced to students (Harris et al., 2002). Emphasis is placed on the development of self-expressions. At this stage, the teacher helps students develop self-expression. At this stage, students who see themselves as inadequate are directed to make positive statements. A discussion environment is created in the classroom about how negative expressions will affect our behavior (Harris et al., 2003).

2- Discussion: In the discussion step, how and when to use the strategy is discussed. It also focuses on how to use the strategy in new situations (Harris et al., 2003; Sandler, 2018). In this step, the importance of the student's performance is emphasized in the good use of the strategy. Students are asked to make a written commitment to implement the strategy and self-regulation procedures. Thus, it is aimed to motivate the student to use the strategy (Harris et al., 2003). Since it is important to use the strategy independently in SRSD, the student is expected to adopt the strategy (Hagaman & Casey, 2016). Therefore, studies are carried out in this direction. In this step, the steps of the strategy are explained. Abbreviations related to the steps of the strategy explained are introduced to the students (Sanders, 2018). These abbreviations ensure that the steps of the strategy are memorable.

3- Modeling: In this step, the strategy is modeled systematically by the teacher. Strategic modeling is an important component that includes more than simply implementation of strategy steps. In a good modeling, the student is allowed to see the thinking processes that a skilled person uses to implement the strategy. Modeling provides important information about why the steps in the strategy are applied and how it helps in understanding (Hagaman & Casey, 2016). Think-aloud is applied in modeling the strategy. The teacher explains each step of the strategy aloud and shows the students how the strategy is implemented (Sanders, 2018).

4- Memorization: This step is necessary for students to use the strategy independently (Sanders, 2018). Memorizing the steps of the strategy will enable the students to apply the strategy automatically (Hagaman & Casey, 2017).

5- Supporting: Students' use of strategy is supported at this stage. Students implement the strategy, self-teaching and other components of self-regulation with the support of the teacher (Sanders, 2018). These components help support emotional and cognitive change and motivation (Harris et al., 2003). The teacher and student work together during this phase. While the teacher initially supports the student at every stage, this support is reduced over time. This phase lengthens or shortens as the student progresses. This is the longest step of the SRSD (Hagaman & Casey, 2016).

6- Independent implementation: At this stage, the student should be able to apply the strategy independently. The teacher follows the student to ensure the correct use of the strategy. Tests and lectures can be used to track student success. In some cases, the student can adjust the strategy according to their own needs. As long as the student's success is high, the student can arrange the strategy according to himself (Hagaman, Luschen, & Reid, 2010).

In SRSD, lessons are arranged between 20 and 60 minutes, at least three times a week. Lesson times can be adjusted according to the class level. For primary school students aged 8-12, 30-40 minutes of class time is sufficient for students to complete the sections (Graham & Harris, 2003).

What are the studies that the SRSD Model is used in Teaching Reading Comprehension Strategy?

The teaching of reading comprehension strategies with SRSD is given in the table below.

Table 1. Studies in which the ODSG model was used in teaching reading comprehension strategy

Research	Working Group	Teaching	Assessment Tools
Johnson, Graham & Harris (1997)	47 students with learning dissabilities from fourth to sixth grade	Story structure and story content analysis strategy	Comprehension tests
Mason (2004)	32 fifth grade students who have difficulty reading	TWA strategy	Oral repetition
Mason vd. (2006)	9 students with learning disabilities	TWA+PLANS strategies	Oral
Özmen and Vayiç (2007)	3 intellectually disabled students attending the fourth and fifth grade	Read-Underline-Segment-Blend strategy	Number of syllables and words read correctly
Regovich and Perin (2008)	63 middle school students with behavior disorder	TWA + written summary	Written summary
Mason (2008, akt.: Mason, 2013)	56 seventh and eighth graders with difficulty	TWA+PLANS strategies	Oral repetition TORC-3 OWLS
Hagaman and Reid (2008)	3 sixth graders	RAP strategy	Text recall percentage-Short answer questions
Hoyt (2010)	10 students from 6th to 12th grade with affective and behavioral disorders	TWA strategy	Written summary
Johnson (2011)	3 high school students with attention deficit hyperactivity disorder	TRAPeR strategy	Oral summary
Hedin, Mason and Gaffney (2011)	Two attention-deficit fourth- and fifth-grade students with poor understanding	TWA Stratejisi öğretimi + sözlü soru sorma	Oral repetition
Mason, Meadan, Hedin and Cramer (2012)	20 fourth graders who have difficulty reading and writing	TWA+PLANS strategy teaching	Reading Comprehension and writing
Johnson, Reid and Mason (2012)	3 ninth graders	TWA strategy	Number of main ideas-Percentage of auxiliary details
Hagaman, Casey ve Reid (2012)	6 ninth graders	RAP strategy	Short answer questions
Mason, Meadan-Kaplansky, Hedin, Taft (2013)	58 fourth-year students who have difficulty reading	TWA strategy + writing teaching	Interview form
Mason, Davison, Hammer, Miller and Glutting (2013)	77 fourth graders	TWA + PLANS strategies	Oral repetition
Mason (2013)	81 fifth graders	TWA strategy	QRI–3 TORC–3 Oral repetition
Lipari (2014)	110 sixth graders	ARTS strategy	MARSI, comprehension tests, summary rubric
Howorth (2015)	6 students with autism	Use of TWA strategy with digital implications	Oral repetition, accuracy of comprehension questions
Hagaman, Casey and Reid (2016)	7 students attending sixth and seventh grades	TRAP paragraphing strategy	Text recall rate Short answer questions
Li vd. (2016)	63 fourth and fifth graders	TWA / QT / TWA+QT	Comprehension test
Howorth, Lopata, Thomeer and Rodgers (2016)	Four male students aged 10-11 with autism	TWA strategy	Repetition, comprehension tests
Hagaman and Casey (2016)	Qualitative research	Teaching the TRAP strategy with SRSD	
Merson (2016)	10 ninth and tenth graders	Teaching TWA strategy with SRSD	Comprehension test
Roohani, Hashemian and Asiabani (2016)	70 students aged 16-26	SRSD-based reading instruction	Metacognitive awareness inventory, Oxford Placement Test
Ennis (2016)	3 students with emotional and behavioral disorders	TWA + PLANS strategy	Oral and written explanation
Roohani, Hashemian and Kazemian (2017)	60 students in total aged 20-25	Teaching TWA strategy with SRSD, Rhetorical	Reading comprehension, critical thinking

Research	Working Group	Teaching	Assessment Tools
		Analysis	
Cosentino (2017)	41 sixth-grade students with reading difficulties	SRSD	Reading comprehension test, motivational belief scale, reader perception scale
Mardani and Afghary (2017)	60 female students aged 17-26	Teaching TWA strategy with SRSD	Reading and summarizing, Metacognitive awareness scale
Özdemir and Kıroğlu (2017)	68 fourth graders	Teaching TWA strategy with SRSD	Reading comprehension test, Main idea identification test
Sanders (2018)	30 students attending fourth, fifth, and sixth grades at medium and high risk of reading	Teaching TWA strategy with SRSD	Six reading comprehension scales
Putri (2018)	30-35 second graders	Vocabulary teaching with edited SRSD	Vocabulary test
Jozwik, Carlino, Mustian ve Douglas, 2019	4 students with learning disabilities attending fifth grade	TRACK strategy teaching	Comprehension questions, Strategy use
Sanders (2020)	Students with learning disabilities	TRAP strategy teaching	Reading comprehension test
Sanders vd. (2020)	Students with emotional and behavioral disorders attending the fourth, fifth, and sixth grade	Teaching TWA strategy with SRSD	Reading comprehension
Fırat ve Ergül (2020)	3 students with learning disabilities attending 6th grade	Teaching TWA strategy with SRSD	Think-aloud technique, semi-structured interview
Teng (2020)	144 sixth graders	Collaborative text structure modeling with SRSD	Content comprehension, main idea summarization
Kılıç Tülü, Özbek ve Ergül (2021)	4 boys with learning disabilities attending fourth grade	Teaching TWA strategy with SRSD	Multiple choice test, Narration rubric

TWA= Think, While, After reading strategy; PLANS = *P*ick goals, *L*ist ways to meet goals, *A*nd make *N*otes, *S*equence notes; QRI–3 = Qualitative Reading Inventory–3: TORC–3 = Test of Reading Comprehension–3 (V. L. Brown, Hammill, & Wiederholt, 1995); OWLS = Oral and Written Language Scales (Carrow-Woolfolk, 1996): RAP: Read-Ask-Paraphrase; ARTS=Ask, Read, Tell and Summarize) MARSI= Meta- cognitive Awareness of Reading Strategies Inventory: QT= Quality Talk: TRACK=Think while reading, React, Ask question, Connect, Keep track of thinking with text codes

As seen in Table 1, the SRSD model has been frequently used in teaching reading comprehension strategy in recent years. Studies have generally been carried out on students who have a certain mental problem or have a low reading level even though they do not have it. Apart from this, some studies have been carried out on normal students. Apart from the experimental studies mentioned above, there are also qualitative studies explaining how the SRSD model is used in strategy teaching. Hagaman and Casey (2017) revealed how the teaching of TRAP strategy is done with a self-regulated strategy development model. Similarly Hagaman, Luschen, and Reid (2010) explained in their study how the RAP strategy is taught to reading comprehension.

When we look at the studies carried out on SRSD in Turkey, Özmen and Vayiç (2007) taught the strategy of Read-Underline-Divide-Combine with three mentally retarded students aged ten, eleven and twelve years old. Apart from this study, Özdemir and Kıroğlu (2017) taught the TWA strategy to fourth grade students with SRSD. In this study, the effect of strategy teaching on students' reading comprehension and main idea determination skills was tried to be revealed. In the literature no other reading comprehension strategy teaching study with SRSD was found in Turkey. The SRSD model has also been used in the teaching of writing in Turkey. Özmen, Selimoğlu, and Şimşek (2015) used the steps of SRSD in the Adapted Cognitive Strategy Teaching they developed in a study examining the writing skills of a sixth grade student with mental retardation. Apart from this, strategies to improve writing skills were taught in doctoral theses (Can, 2016; Çağlayan Dilber, 2014; Uygun, 2012) and master's theses (Akıncılar, 2010; Bi, 2020; Öğuldu, 2018; Sertoğlu, 2021).

DISCUSSION

Reading comprehension skill has an important role in human life. For this reason, practices aimed at improving reading comprehension have been a subject that has been emphasized in every period. One of the applications that improve reading comprehension is strategy teaching. Strategies are plans that help students, guide them, and check their understanding. By using these strategies, students can increase their reading comprehension levels (Pressley et al., 1992).

How these strategies are taught is as important as strategy teaching to students. Because in a good practice, there is a need for instructional support that can use the strategy in real learning environments, combine strategy knowledge and application knowledge, and also control this process alone. One of the models developed to provide this support is the self-regulated strategy development model (Harris & Graham, 1999). The SRSD model is a strategy teaching model that combines both strategy teaching and self-regulation procedures. The effectiveness of this model has been demonstrated with some studies (Hagaman, Casey, & Reid, 2016; Mason, 2004).

While teaching strategy in the model, strategy is taught in six stages. There are some critical features that practitioners should pay attention to while applying these steps. These critical features are important for the independent use of the strategy.

For example, with the individualization of strategy teaching, some criteria are tried to be provided instead of a certain time. Thus, each student is followed until they implement the strategy independently. In addition, explicit teaching of strategy is supportive to low-achieving students who need help in strategy teaching. Considering that strategy teaching is an ongoing process, it is considered important to include teaching different strategies over time, to make strategy use permanent and to improve metacognition (Lienemann & Reid, 2006). When we look at the direct teaching model it is seen that similar application steps are included in this model (Kuşdemir & Güneş, 2014). However, choosing and using the strategy to be applied during reading is a process that requires high-level thinking skills that the individual will decide for own self. In this process, applications are needed to help them. The four self-regulation procedures included in the steps in the SRSD model provide assistance to the strategy practitioner on how to implement the strategy. This situation helps the student to internalize the support he receives from outside in a sense. Thus, the model ensures both the independent implementation of the strategy and its transfer to different situations (Hagaman & Casey, 2017).

Looking at the studies on students' levels of applying reading comprehension strategies, Güngör (2005) states that secondary school students mostly use traditional methods. Ergen and Batmaz (2019) state that fourth grade students use strategies at the "sometimes" level. In another research, fourth grade students frequently use metacognitive reading strategies (Başaran, 2013). While Ergen and Batmaz (2019) revealed that strategy use is effective on reading comprehension even if the students' level of strategy use is "sometimes", Başaran (2013) concluded that strategies are not effective on reading comprehension even though they are used "often". This situation encountered in the literature shows that the cooperation of elements such as strategy knowledge, content knowledge, motivation has an important place in understanding (Harris et al., 2006; Zimmerman & Bandura, 1994). The goal of mastering cognitive processes, using the strategy independently, and creating a positive attitude about the learned skills (Harris et al., 2003) shows that the model emphasizes cognitive and motivational elements in the understanding process.

Although the SRSD model was initially developed for teaching writing, studies have also been carried out on reading comprehension recently. It has seen that reading comprehension strategies are taught using this model (Mason, 2004: Hagaman & Reid, 2008; Sanders, 2020; Teng, 2020). However, when the looking to strategy teaching studies, similar strategies are generally taught (Mason, 2004; Hedin, Mason, & Gaffney, 2011; Hoyt, 2010; Sanders, 2018). This situation requires the use of the model in the teaching of different strategies. In addition to writing and reading skills, the model is also used in applications that will improve students' mathematical skills, metacognition, and sense of responsibility (Case, Harris, & Graham 1992; Cassel & Reid, 1996; Wong, Harris, Graham & Butler, 2003).

When we look at the studies abroad, it is seen that there are studies on the effect of the SRSD model on reading comprehension. It can be said that the studies in our country are insufficient in this regard. As a result of the literature review conducted in Turkey, it was seen that the SRSD model was used in a few studies in the teaching of reading comprehension strategy (Kılıç Tülü, Özbek, & Ergül, 2021; Özdemir & Kıroğlu, 2017; Özmen & Vayiç, 2007). This situation can be considered as a deficiency, especially considering that we aren't very sufficient in terms of reading comprehension (MEB, 2016). In addition, the use of SRSD in other fields is not very common in our country. While SRSD is mostly used in the field of writing, it has not been applied in other fields.

CONCLUSION AND RECOMMENDATIONS

As a result of the research, it has been seen that strategy teaching with SRSD is mostly used in groups with learning difficulties and in teaching writing, but in recent years it has also been applied in groups without any cognitive problems and in teaching reading comprehension strategy. The model supports the independent use of strategy by combining self-regulation procedures with strategy teaching. Therefore, goal setting, self-teaching, self-monitoring and self-evaluation practices are modeled by the teacher to ensure self-regulation throughout teaching. These practices are embedded in the six steps of strategy teaching. While teaching the steps of developing prior knowledge, discussion, modelling, memorization, support and independent application, self-regulation practices are also included.

In recent years, many studies have been carried out abroad to reveal the effect of the model on reading comprehension. In Turkey, the number of studies in this sense is almost non-existent. In order to eliminate this deficiency in the research, it is recommended to carry out studies to determine the effect of the model on reading comprehension and the situations that may be encountered in practice. The model was generally used in teaching similar strategies. Therefore, the model should also be used in teaching different reading comprehension strategies. The model lays the groundwork for the individual to implement the strategy by himself, rather than just teaching strategy. In future studies, revealing the effect of the model on different dimensions of reading comprehension and the development of students' self-regulation skills will contribute to the field.

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Researchers' contribution rate

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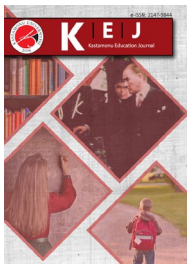

| Research Article / Araştırma Makalesi |

An Investigation of the Learners' Personalized Feedback Paths Based on E-Assessment

Öğrenenlerin E-Değerlendirmeye Dayalı Kişiselleştirilmiş Geri Bildirim Yollarının İncelenmesi[1]

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Keywords

1. Feedback
2. Personalized feedback
3. Personal characteristics
4. E-assessment

Anahtar Kelimeler

1. Geri bildirim
2. Kişiselleştirilmiş geri bildirim
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Abstract

Purpose: The purpose of the research is to investigate personalized feedback paths of learners based on e-assessment according to the feedback preferences of learners and their needs.

Methodology: The design-based research method consisting of two stages was used in this study. The study group comprised of 36 undergraduates in the department of Computer and Instructional Technology in the Education Faculty in one of the state universities was determined based on criterion sampling method. The data collection process has carried out with the same study group at both design stages by using blended learning method. Data collection tools are consisted of Motivation and Metacognition scales, learning management system records and semi-structured interview form. The descriptive analysis methods, Chi-Square independence test, multiple correspondence analysis, and content analysis have been used for data analysis.

Findings: According to the findings of the research, the effect of test anxiety and extrinsic goal orientation from motivation sources, metacognition, the judgment of learning and task level variables have determined on feedback preferences of the learner. Classify by these characteristics, a number of personalized feedback strategies have been developed based on the learner's preferences and needs for feedback. In addition, it was found that learners wanted to get feedback from teachers rather than peers because they found teacher's feedback more qualified and they did not trust their peers' feedback.

Highlights: In order to use the personalized feedback strategies developed in the research in different research groups and training programs, it should be important that the system is similar to those in this study. These should be similar systems that determine both the learner's preference and the needs for feedback according to the learner characteristics to support learning performance. Otherwise, it is thought that will be out of the context of personalization.

Öz

Çalışmanın amacı: Araştırmanın amacı, öğrenenlerin e-değerlendirmeye dayalı geri bildirim tercihleri ve ihtiyaçlarına göre kişiselleştirilmiş geri bildirim yollarını incelemektir.

Yöntem: Araştırmanın yöntemi iki aşamadan oluşan tasarım tabanlı araştırmadır. Bir Devlet Üniversitesi'nin Eğitim Fakültesi Bilgisayar ve Öğretim Teknolojileri Eğitimi bölümündeki 36 öğrenenden oluşan çalışma grubu, ölçüt örnekleme yöntemi ile belirlenmiştir. Veri toplama süreci her iki tasarım aşamasında aynı çalışma grubu ile harmanlanmış öğrenme yöntemi kullanılarak gerçekleştirilmiştir. Güdülenme ve Üstbiliş ölçekleri, öğrenme yönetim sistemi kayıtları ve yarı yapılandırılmış görüşme formu veri toplama araçlarıdır. Verilerin analizinde betimsel analiz teknikleri, Ki-Kare bağımsızlık testi, Çoklu Uyum analizi ve içerik analizi kullanılmıştır.

Bulgular: Araştırma bulgularına göre güdülenme kaynaklarından sınav kaygısı ve dışsal hedef düzenleme ile üstbiliş, öğrenme kararı ve görev seviyesi değişkenlerinin öğrenenin geri bildirim tercihinde etkisi belirlenmiştir. Bu özelliklere göre sınıflama yapılarak, öğrenen hem geri bildirim tercihine hem de ihtiyacına yönelik birtakım kişiselleştirilmiş geri bildirim stratejileri oluşturulmuştur. Ayrıca öğrenenlerin öğretmen geri bildirimini daha nitelikli bulmaları ve akranların geri bildirimlerine güvenmemeleri nedeniyle akran yerine daha çok öğretmenden geri bildirim almak istediği bulunmuştur.

Önemli Vurgular: Araştırmada geliştirilen kişiselleştirilmiş geri bildirim stratejilerini farklı araştırma grupları ve eğitim programlarında kullanmak için, sistemin bu çalışmadakine benzer olması önemlidir. Bunlar, öğrenenin hem geri bildirim tercihini hem de öğrenme performansını destekleyecek geri bildirim ihtiyacını, öğrenen özelliklerine göre belirleyen sistemler olmalıdır. Aksi takdirde kişiselleştirme bağlamından uzaklaşılacağı düşünülmektedir.

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INTRODUCTION

With the increasing impact of technology on education, learning for the individual now goes beyond the walls of the classroom, and besides formal education learning is continued non-formally, without interruption. Within the scope of Information Technologies and Software curriculum, MoNE (2018a, p. 6) emphasized that a measurement and assessment process that behaves with the principles of "suitable for everyone", "valid and standard for everyone" is against human nature. At this point, new technologies allow us to rethink and discover the ways of evaluating learning. The concept of e-assessment has emerged with the inclusion of technology-based tools in the assessment process and has started to become the subject of the research. E-assessment is the use of information technologies in all activities from the beginning to the end of the assessment process (Cabi, 2016, p. 95). E-assessment allows learners to self-organize and monitor their own learning by carrying out all the processes by storing their own learning tools individually, receiving and sending feedback, presenting and reflecting their learning progress. In this way, it helps in providing more meaningful and effective learning (JISC, 2010, p. 53-55).

In Turkey's 2023 education vision, teachers are expected to analyze e-assessment data in a qualified and detailed way, and to use this data in the organizing learning platform and planning new learning (MoNE, 2018b). Thus, giving feedback, which is one of the important components of the learning process, will be an effective way. Since feedback is a regulatory mechanism that allows the learner to close or reduce the gap between real and targeted knowledge (Black & Wiliam, 1998, p. 47). The study of Butler, Karpicke and Roediger (2008, p. 918) proved that the feedback including the correct answer is useful in correcting memory and metacognition-based errors and emphasized that it is a regulatory mechanism. The type and amount of information contained in the feedback message change the effectiveness of the feedback provided such as confirmation messages that provide information about whether the answer is correct such as yes-no, true-false, etc., and elaboration messages that provide clue, explanation, or example about the content of the answer using a conjunction, (Shute, 2008, p. 158). Butler, Godbole and Marsh (2013, p. 290) examined the usefulness of the additional information provided in the feedback message along with the correct response information and found that such feedback provides equal performance in repetitive questions, but they are very useful in transferring learning into new questions.

Apart from the research conducted about the effectiveness of feedback in learning and the information contained in the feedback messages, the relationship between the feedback and personal characteristics is also one of the compelling topics. In this sense, the personal characteristics that affect feedback, such as gender and prior knowledge, can play a role in the effectiveness of feedback (Narciss et al., 2014, p. 59). Smits, Boon, Sluijsmans and Van-Gog (2008, p. 190) reported that even though feedback containing a lot of information is more effective on the learners with high prior knowledge, more learning occurs in the feedback containing less information. Shute (2008, p. 174), on the other hand, made suggestions about the most appropriate feedback to be communicated according to the personal characteristics. Accordingly, immediate corrective or supportive feedback should be provided to unsuccessful learners without delay; whereas delayed, confirmatory feedback or feedback including clues facilitating the content that challenges the learner should be communicated with successful learners. In addition to gender, level of learning and achievement, metacognition skills such as motivation, self-efficacy and self-regulation were also addressed in the studies about the effectiveness of the feedback process, as important variables (Mory, 2004, p. 773-775; Narciss, 2008, p. 134; Schartel, 2012, p. 85).

The feedbacks adapted to the personal characteristics given in the e-assessment environment should be used by the learner at the desired time and place, which is an important stage expected to occur in learning (JISC, 2007, p. 16).Thus, personalized feedbacks given during the learning process can be used (Narciss, 2008, p. 126). Personalized feedback is a method that will strengthen the teacher to see the learning deficiencies, monitor their own development, organize the next learning process and support the learner to maximize the learning (Narciss et al., 2014, p. 59). In this respect, it is thought that an e-assessment system used to provide feedback by the teacher will be very useful to increase the time allocated to learning and to support learning (Bahar, 2014, p. 40).

In this study, the question of " which feature to increase learning performance of learners, what information will he/she need in the feedback message?" was addressed. It is thought that a research that will be developed to answer this question will contribute to the following literatures: research methods on the use of design-based research that helps develop educational practices; and personalized learning environments and feedback on drawing a framework for creating personalized feedback strategies. In this context, the purpose of the research is to investigate personalized feedback paths of learners based on e-assessment according to the feedback preferences of learners and their needs. For the variables that will create personalized feedback (PF) paths, a model prepared by the researcher as a result of the literature readings was used (Figure 1).

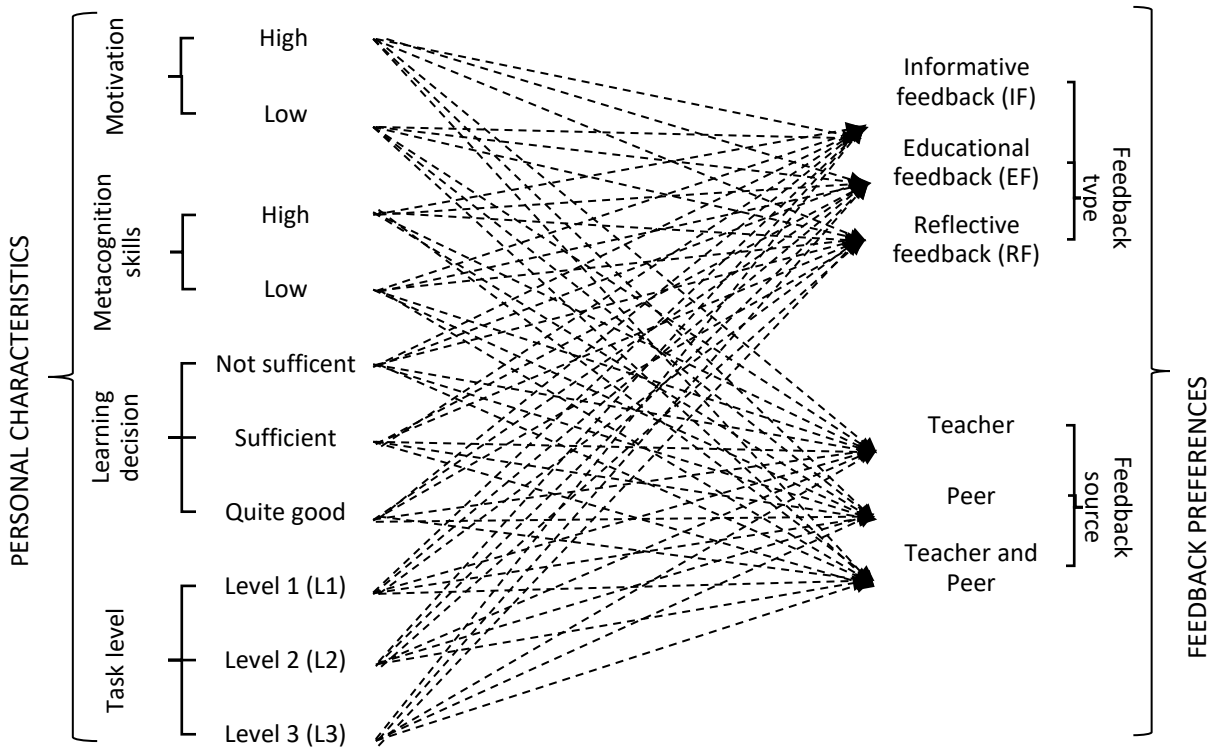

Figure 1. Personalized feedback strategy generation model

Huisman, Saab, Van Driel and Van den Broek (2018) have found that learners learn both from receiving peer feedback and from providing feedback. Therefore within the framework of the model created in Figure 1, the feedbacks were diversified according to the message content, namely informative (IF), educational (EF) and reflective feedback (RF), and also according to the source as teacher or peer. On the other hand, the personal characteristics of learners were examined in terms of motivation and metacognition skills, which can affect the decisions of the learners about feedback preferences. Metacognition, which is a form of metacognitive monitoring about the learning performance level of the learner, is an umbrella term that includes learning decision variables (Tabakçı & Karakelle, 2010, p. 55). On the other hand, learning decisions significantly affects the progressive learning process (Hu, Liu, Li & Luo, 2016, p. 383). For these reasons, besides motivation and metacognition, learning decision and task level variables were also included in the model in addition to the personal characteristics. The dashed lines in the model are used to indicate whether the determined path will be considered as a strategy at the end of the research. Depending on r these dashed lines to be accepted as a strategy, it is expected that the most preferred feedbacks are based on learners' personal characteristics, also should increase the learning performance as well. Within the framework of this model, the questions addressed in the research are as follows:

1. What are the feedback preferences of learners based on their personal characteristics?
    a. What is the feedback type preferences of learners based on their personal characteristics?
    b. What is the feedback source preferences of learners based on their personal characteristics?
2. What are the effects of feedback type preferences on learning performance based on the personal characteristics?
3. What are the learners' opinions on personalized feedback?

METHOD

In this research, a design-based research method consisting of design, analysis and redesign (Shavelson, Phillips, Towne, & Feuer, 2003, p. 26) steps was used. Design-based research is a research method used especially for the development of educational practices through repeated reviews in a systematic and flexible structure (Barab & Squire, 2004; Han & Bhattacharya, 2001; Wang & Hannafin, 2005, p. 5-6). In the first design of the research, the main problem is to determine feedback preferences according to the personal characteristics of the learners. The main problem of the second design is to analyze learner performances according to the feedback preferences set in the first design and get the opinions of the learners about PFs.

Participants

Participants were determined by criterion sampling, one of the purposeful sampling methods. Criteria sampling including all cases or individuals who have met some criteria considered important to improve the quality of the study (Patton, 1990, p. 176). This study is based on the criterion that learners are experienced in using a learning management system. According to this criterion, the participants consisted of 36 sophomore learners, 15 girls and 21 boys, who were studying in the Faculty of Education, Department of Computer Education and Instructional Technology was used.

Data Collection Tools

The data collection tools of the first design which were Motivation and Metacognition Scales and learning management system records used to determine the personal characteristics of the learners. Motivation scale is a seven-point Likert type scale developed by Pintrich, Smith, Garcia and McKeachie (1991) and adapted to Turkish by Büyüköztürk, Akgün, Özkahveci & Demirel (2004, p. 232). The scale has a modular structure and can be used as sub-scales as in this research (Pintrich, Smith, Garcia & McKeachie, 1993, p. 801). Metacognition Scale developed by Altındağ (2008, p. 44) is a five-point Likert-type scale consisting of 30 items with both one-dimensional and multi-dimensional features (Altındağ & Senemoğlu, 2013, p. 15). In the learning management system, data is recorded through the weekly work plan, e-assessment task and e-rubrics. These records include the data of personal learning decision and task level, learner feedback preferences, learner preferences regarding e- assessment tasks and learner performances.

The data collection tools of the second design were the semi-structured interview form prepared by the researcher to collect data, and the records of the learning management system. Semi-structured interview form consists of 6 questions prepared by the researcher. The opinions of two different experts about the applicability of the questions in the interview form were asked and a pilot interview was conducted with a learner from the study group. The learner participating in the pilot interview was excluded from the interview data. In addition, the scales used in the first design were not reused in the second one, however the data of motivation and metacognition scales were used in the second design.

Implementation

CANVAS learning management system has been used in both designs of the research because of its simple interface, ease of assessment of learners' tasks and ease of sending personalized feedback. The learners attended face-to-face courses, for seven weeks in the first design and four weeks in the second design with the same study group and completed weekly e-assessment tasks related to the concepts of the course on CANVAS. At the beginning of the first design, learners took an orientation and filled the scales, as well as the participating approval form in the research. The learners, who started to use the system, chose the task they want to take, the level of the task and the feedback type and source they want to take for their weekly courses. The components of the first design implementation material are summarized in Figure 2.

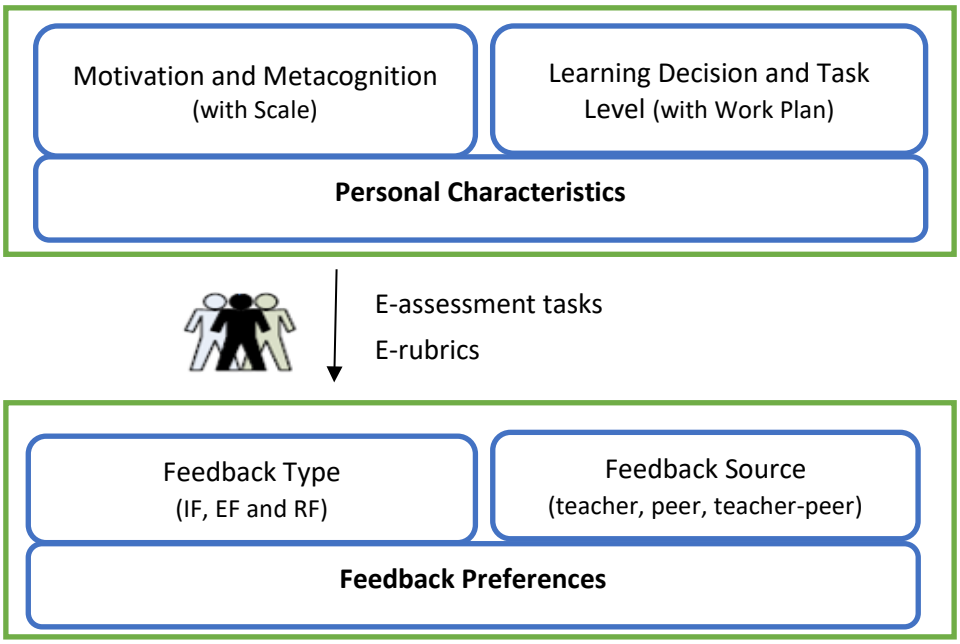

Figure 2. Implementation material

According to Figure 2, the implementation material is comprised of the following components:

(i). Weekly work plan: In the work plan, the learner evaluates the learning decision about how much he/she learned the concepts covered in the lesson, on three levels: "sufficient", "not sufficient" and "quite good". The learners were asked to consider their ability to answer repetition questions about the instructed concepts at the end of the lesson while determining the learning decision. After the learning decision, he/she specifies the concept of the task and the task level consisting of three levels. Each week, learners were assigned to the assessment tasks to be completed individually, based on their preferences in the work plan.

(ii). E-assessment tasks: These performance-based tasks were prepared at three different levels by the researcher and the lecturer. Cognitive processes of Bloom taxonomy were used to group e-assessment tasks according to their difficulty levels (Bümen, 2006, p. 5). According to this taxonomy, the tasks were classified as follows: L1 Recall-Understanding, L2 Practice-Analysis, and L3 Assessment-Creation.

(iii). Feedback preference survey: After completing the e-assessment task, the learners notify the feedback type they want to get and the feedback source via feedback preference survey. In this questionnaire, three different feedback types, namely informative, educational and reflective, were offered to the learners; and "teacher", "peer" or "both teacher and peer" options are offered as feedback sources. Learners asking for peer feedback are evaluated by another learner who is assigned to the same task. In this way, those who complete the same task take the role of evaluative peers for the other and their names are hidden in the system.

(iv). E-rubrics: E-rubrics include the assessment criteria for the e-assessment task prepared by the researcher and the lecturer. E-rubrics are analytical rubrics based on four criteria: "Totally wrong information", "Wrong and unnecessary information", "True but incomplete information" and "All information is correct and necessary". According to the choices made by the learners in the feedback preference survey, e-rubrics were used by both the teacher and the peer in scoring. In addition, peers are guiding by writing a feedback message. Besides peers, the researcher teacher is the person who communicated feedback messages. The researcher used both e-rubrics and feedback sending format for this and wrote messages addressing each learner with his/her name.

Although the implementation material of the second design was the same as the first one, it was revised according to the learner feedback preferences and some modifications were made. Peer feedback, level 3 assessment tasks and reflective feedback type, which were not preferred by the learners, have been removed from the second design material. In addition, the learning decision options in the work plan has been reduced to two, as "sufficient" and "not sufficient". This time the focus was not learners' feedback preferences, thus feedback preference survey was removed. The feedback type they preferred the most in the first design was communicated with the learners by the teacher. Another important change was the provision of similar repetitive tasks on the same concept. Accordingly, a total of 12 e-assessment tasks were divided into two, as first tasks and repetitive tasks.

First task: These are the e-assessment tasks that were given in the first three weeks and about which one of the most preferred feedback types (IF or EF) has been given after completion. Four tasks were sent to the learners for each of the L1 and L2 levels.

Repetitive task: These are the tasks given in the fourth week, after which no feedback has been given, and in which the tasks involving the concepts of the first three weeks were repeated. Four repetitive tasks at L2 level were sent to the learners.

The first and repetitive tasks involving the same concept were scored as correct answer (1) and wrong answer (0) via e-rubric. In this way, whether the learners corrected the wrong answer of the first task, in the repetitive task was examined. Accordingly, the contribution of the feedback type communicated after the first task to the correction of the answer at the repetitive task was interpreted. At the end of the second design, interviews were conducted with 12 volunteer learners about their opinions on PF. Of these learners, who participated in e-assessment tasks in both designs, 6 preferred EF and the other 6 preferred IF for the tasks they completed.

Data Analysis

In the data analysis of the first design, descriptive analysis techniques, Multiple Correspondence Analysis and Chi-square independence test were used to investigate learner profiles related to feedback preferences. Multiple correspondence analysis was used for the following purposes (Husson & Josse, 2014, p. 163).

(i). Deriving the typology of the individuals, in other words working on the similarities between individuals.

(ii). Evaluate the relationship between variables and explore the relationship between categories.

(iii). To examine the association of connections to characterize individuals with a number of variables.

The purpose of using this analysis in this paper was to investigate learner profiles by characterizing their feedback preferences based on their personal characteristics. Chi-Square independence test was used to check whether the relationship (difference between observed and expected frequencies) between two qualitative variables is statistically significant (Güngör & Bulut, 2008, p. 84).

In the second design data analysis, it was aimed to determine the effect of feedback type preferences of the learners, who were grouped according to personal characteristics, on their learning performance. However, due to the low number of learners and the fact that all learners did not participate in all related tasks, a statistical difference test was not performed for measuring the effectiveness or significance of learning performance of each feedback type. Instead, the average correct answer of the learners in the repetitive tasks based on the feedback type preferences were interpreted as bar graphs. Content analysis was also used in the data analysis of the second design to analyze the interview data obtained for PF system. In this analysis method, what is hidden in the data is revealed, and it consists of various stages such as processing qualitative data, coding and setting the themes, organizing and grouping the codes according to the themes, defining and interpreting the findings (Yıldırım & Şimşek, 2006, p. 246).

In order to synthesize the findings of the first and second design, assimilation and configuration methods were used (Voils, Sandelowski, Barroso & Hasselblad, 2008, p. 14). The findings obtained in the assimilation stage can be combined with each other, co-arranged around a theoretical model or argument consistently (Sandelowski, Voils & Barroso, 2006, p. 7). This method is possible when there are findings confirming each other or combined in the same direction. On the other hand, the findings handled in the configuration stage, are the findings that cannot be combined with each other, but complement each other, or findings that can be intertwined. Here, one finding explains the other or expands each other (Voils et al., 2008, p. 6).

Validity and Reliability of the Research

In both stages of the research, some measures have been taken to ensure validity and reliability. Accordingly, for the internal validity of the research, care taken to ensure that the methods used in the study group, data collection and analysis are consistent with the whole study and they are reported with the reasoning behind it. In order to confirm the reliability of the results, similar researches in the literature were reviewed, and the research findings were discussed and supported. For the internal reliability of the research, different data collection methods and analysis strategies were used. For the external validity of the research, direct quotations taken from the raw data were included in the presentation of the findings. It was reported that the results of the research can be generalized for similar cases and environments. For the external reliability of the research, the researcher received support from specialists for the cases that lack required expertise. The research data were stored in their original and digital form for reference.

FINDINGS

Feedback preferences of learners were divided in two as feedback type and feedback source based on their personal characteristics. Feedback preference frequencies of learners were investigated according to the task levels completed by the learners in the first design (Table 1).

Table 1. Feedback preference frequencies of learners according to the task levels

Feedback Type	Feedback Source	L1	L2	L3	Total
Informative Feedback (IF)	Teacher	125	31	1	157
	Teacher-Peer	18	4	0	22
	Total	143	35	1	179
Educational Feedback (EF)	Teacher	60	42	1	103
	Teacher-Peer	27	24	0	51
	Total	87	66	1	154
Reflective Feedback (RF)	Teacher	7	2	0	9
	Teacher-Peer	10	5	0	15
	Total	17	7	0	24
Total		**247**	**108**	**2**	**357**

According to Table 1, 36 learners completed 357 tasks in total, and reflective feedback was preferred only in 24 of them and Level 3 was preferred only in 2 of them. On the other hand, no learner wanted to receive peer feedback alone. For this reason, these variables are not reported in the findings.

Feedback Type Preferences of Learners

The findings of multiple correspondence analysis of learners' feedback type preferences according to the motivation source and metacognition variables are given separately for L1 and L2 tasks in Figure 3a and Figure 3b.

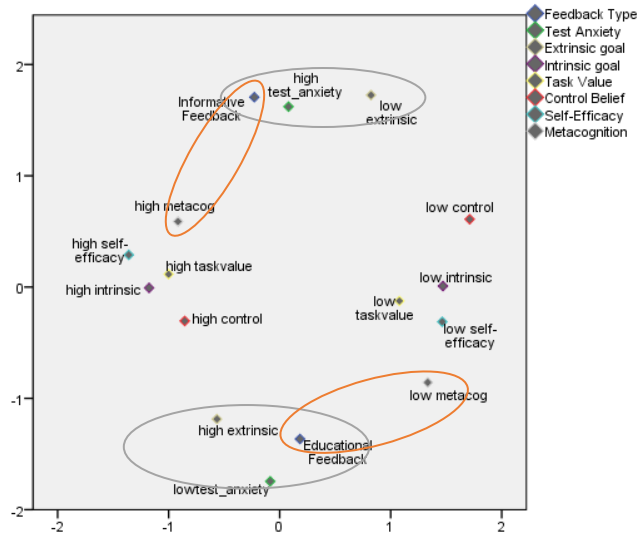

Figure 3a. The results of multiple correspondence analysis of feedback type for L1

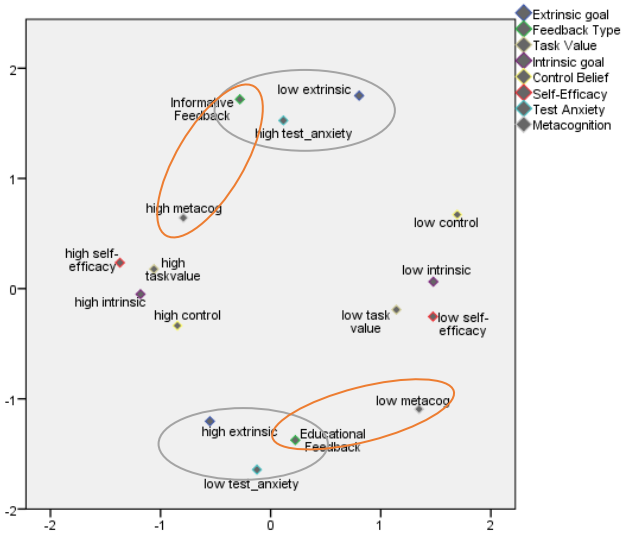

Figure 3b. The results of multiple correspondence analysis of feedback type for L2

As seen in the figures, the results of Multiple Correspondence Analysis for feedback type preferences are similar for L1 and L2 tasks. In this sense, the findings of the tasks at recall-understanding and practice-analysis levels support each other. Accordingly, the variables that have the highest correlation with feedback type were observed to test-anxiety and extrinsic goals from motivation sources, and these variables act together with feedback type. On the other hand, self-efficacy, task value, intrinsic goals and control belief variables from motivation sources were observed to be grouped together and they were independent of feedback type. This means that, regardless of the feedback type preference, if one of these characteristics is high in one learner, the other three are observed to be high as well. Therefore, regarding feedback type preferences of learners it can be said that those with high test anxiety and low extrinsic goals prefer IF, whereas those with low test anxiety and high extrinsic goals prefer EF. Regarding metacognition, which is another variable highly correlated with feedback type, those with higher metacognition skills tend to choose IF and those with low metacognition skills tend to choose EF.

Other personal characteristics that were addressed in feedback type preferences were learning decision and task level. These variables were first addressed separately. Accordingly, Pearson Chi-Square results are statistically significant with an effect size of 0.13 ($\chi2 = 6.20$, SD = 2, p=0.04 <0.05) for learning decision and feedback preferences; with an effect size of 0.25 for task level and feedback preferences ($\chi2 = 21.38$, SD=1, p = 0.00 < 0.05). In this case, regardless of the level of the task, learners who think that they are sufficient or quite good at learning prefer IF type, while those who think that they are not sufficient prefer EF, although the preferences are close to each other. Learners who take recall-understanding level tasks prefer IF, and those who take practice-analysis level assessment tasks prefer EF.

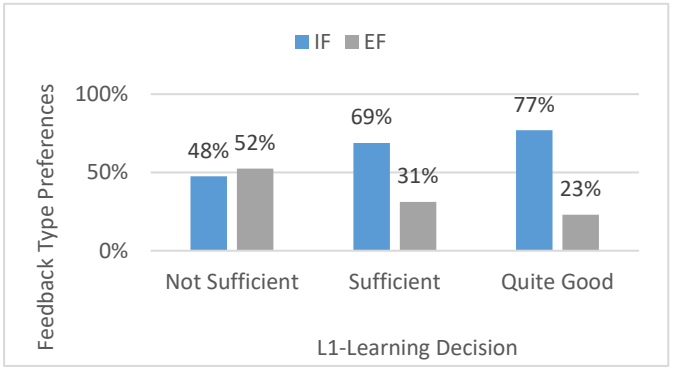

Figure 4a. Feedback type preferences according to L1 and learning decision

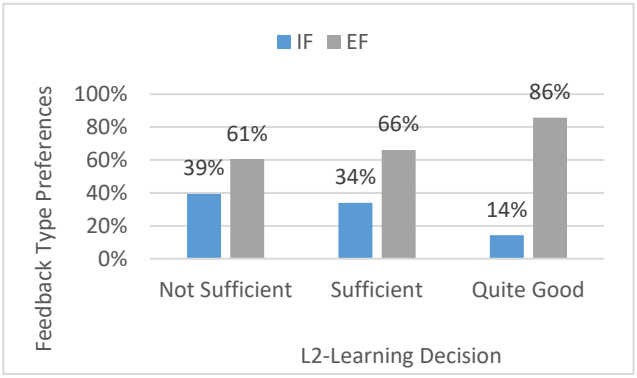

Figure 4b. Feedback type preferences according to L2 and learning decision

Regarding the grouping of the learning decision according to task level, Chi-Square results are statistically significant only for L1 learning decision and feedback type with an effect size of 0.23 ($\chi2 = 12.164$, SD = 2, p = 0.002 <0.05) (Figure 4a). Chi-Square results between L2 learning decision and feedback type ($\chi2 = 1.68$, SD = 2, p = 0.43> 0.05) are not significant (Figure 4b). In this

case, those who believe that their learning is sufficient or quite good in recall-understanding level tasks prefer IF, while those who think that their learning is not sufficient prefer EF, although the preferences are close to each other.

Feedback Source Preferences of Learners

Multiple Correspondence Analysis results between learners' feedback source preferences according to the motivation source and metacognition variables are given separately for L1 and L2 tasks in Figure 5a and Figure 5b.

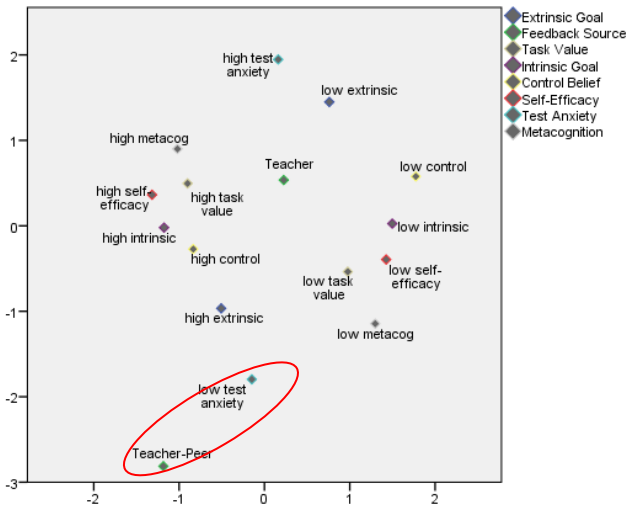

Figure 5a. The results of multiple correspondence analysis of feedback source for L1

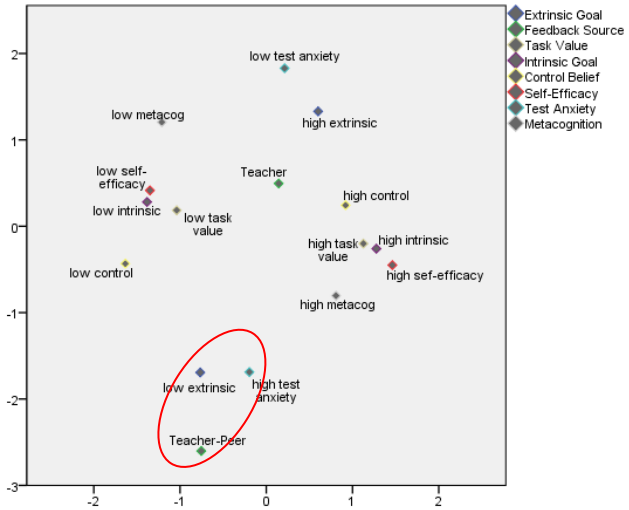

Figure 5b. The results of multiple correspondence analysis of feedback source for L2

As seen in Figures 5a and 5b, at some point Multiple Correspondence Analysis results of feedback source preferences differ for L1 and L2 tasks. Accordingly, in recall-understanding level, namely L1, learners who have low test anxiety prefer teacher-peer feedback; whereas in practice-analysis level, namely L2, those who have this preference are the ones with high test anxiety and low extrinsic goals. On the other hand, all other variables are grouped around the feedback from the teacher.

Other personal characteristics that were addressed in feedback source preferences are learning decision and task level; their Chi-Square independence test results are illustrated (Figure 6a; 6b).

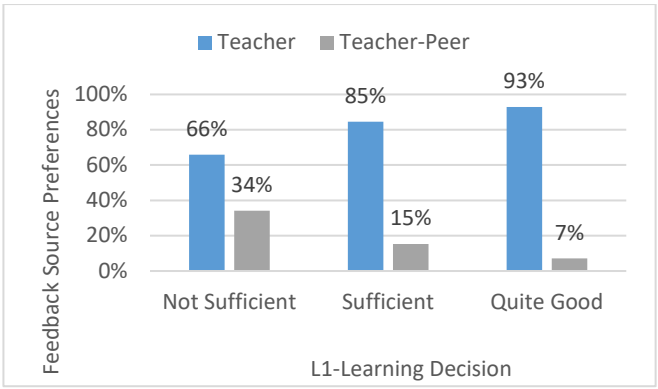

Figure 6a. Feedback source preferences according to L1 and learning decision

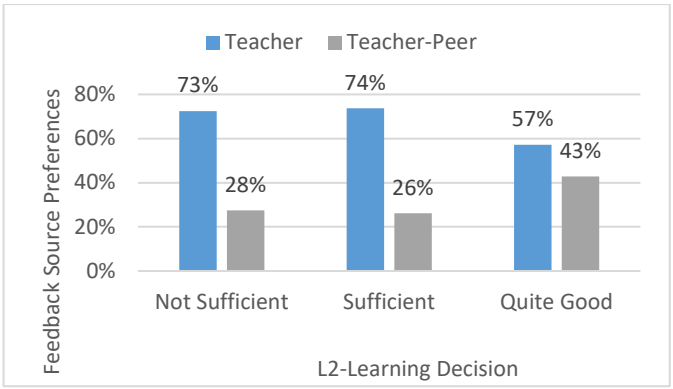

Figure 6b. Feedback source preferences according to L2 and learning decision

Regarding the grouping of the learning decision according to task level, Chi-Square results are statistically significant only for L1 learning decision and feedback source with an effect size of 0.25 ($\chi2=15.2$, SD=2, $p=0.00 < 0.05$) (Figure 6a). Chi-Square results between L2 learning decision and feedback source ($\chi2=0.86$, SD=2, $p=0.65 > 0.05$) are not significant (Figure 6b). In this case, learners in recall-understanding level tasks want to get feedback from the teacher regardless of the learning decision.

Learning Performance According to Feedback Type Preferences of Learner's

To examine the effect of feedback type preference, which were determined according to the personal characteristics of learners, on learning performance, first of all the percentages of tasks completed by learners in the second design is given (Table 2).

Table 2. Percentages of completed tasks in the second design

Feedback Type	First Task		Repetitive Task
	L1	L2	L2
IF	0.44 (10)	0.13 (3)	0.57 (13)
EF	0.17 (4)	0.26 (6)	0.43 (10)
Total	**0.61(14)**	**0.39 (9)**	**1.00 (23)**

Note. Frequencies are given in parentheses.

According to Table 2, in the L1 tasks of the second design, IF were sent to 44% of learners for the first completed task, and EF were sent to 17% of them. Regarding L2 tasks, IF were sent to 13% of learners for the first completed tasks, whereas EF was sent to 26%. Accordingly, 57% of the repetitive tasks submitted to test the first completed task were completed after IF and 43% after EF.

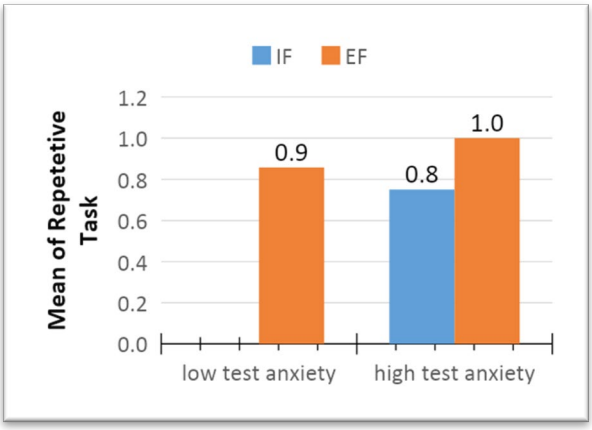

Figure 7a. Mean of repetitive task according to test anxiety

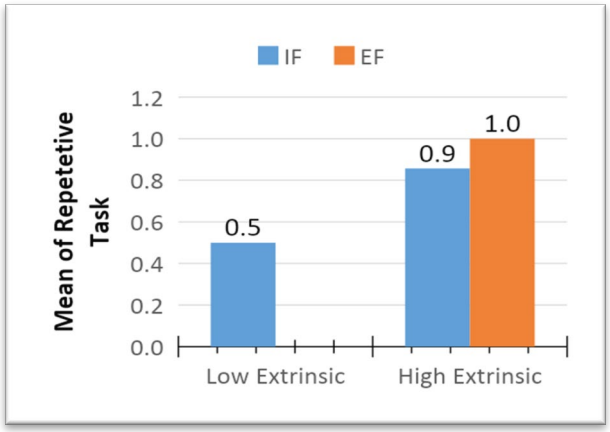

Figure 7b. Mean of repetitive task according to extrinsic goal

About feedback type preferences of learners based on motivation sources, it was found that students with high test anxiety and low extrinsic goals prefer IF, whereas those with low test anxiety and high extrinsic goals preferred EF. The average correct answers in the repetitive task is higher when learners get EF compared to IF, whether their test anxiety is low or high (Figure 7a). On the other hand, learners with low extrinsic goals achieve more correct answers when they get IF, whereas this rate is higher for those with higher extrinsic goals when they get EF (Figure 7b). Accordingly, the feedback type preference of learners with low test anxiety and high extrinsic goals is also supported by the learning performance graph. However, feedback type preference of learners with high test anxiety and low extrinsic goals is not consistent with their learning performance.

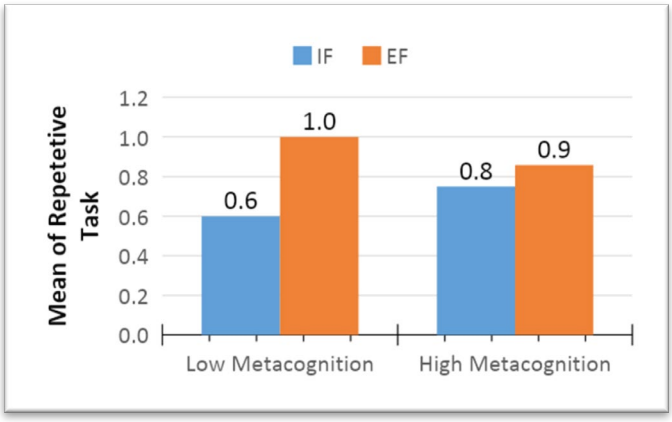

Figure 8. Mean of repetitive task based on metacognition

About feedback type preference of learners based on the metacognition, it was found that learners with higher metacognition skill prefer IF and those with higher metacognition skill prefer EF. The average correct answers in the repetitive task is higher when learners get EF compared to IF, whether their metacognition skill is low or high (Figure 8). Accordingly, only the feedback type preference of learners with low metacognition is supported by the learning performance graph. However, although those who have higher metacognition skill are observed to prefer IF, it can be said that they achieve more performance after EF with a small margin.

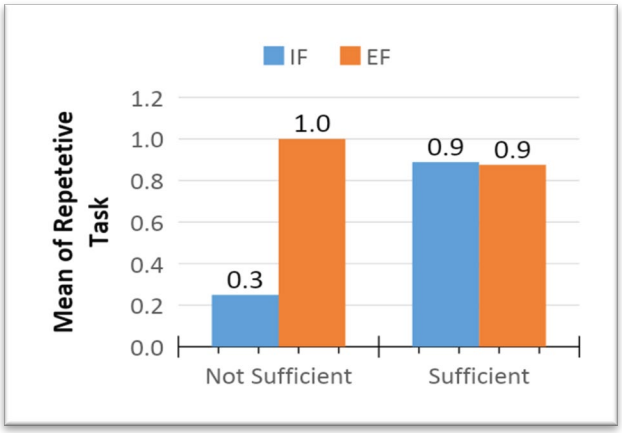

Figure 9a. Mean of repetitive task based on learning decision

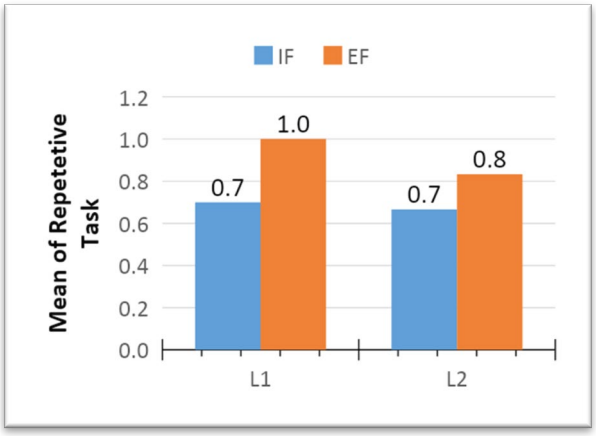

Figure 9a. Mean of repetitive task based on task level

About feedback type preference of learners based on the learning decision, it was found that learners with insufficient learning prefer EF more and those with sufficient learning prefer IF more. According to the learning performance graph in Figure 9a, the average correct answers of learners with insufficient learning in the repetitive task is higher when they get EF compared to IF. On the other hand, the average correct answer of learners with sufficient learning are similar either they get IF and EF. In this case, feedback type preference of learners according to learning decisions was also supported by the learning performance graph.

About feedback type preference of learners based on the task level, it was found that learners prefer IF in L1 tasks and EF in L2 tasks. According to the learning performance graph in Figure 9b, the average L1 and L2 correct answers in the repetitive task is higher when they get EF compared to IF. Accordingly, feedback type preference of learners for L2 tasks is supported in the learning performance graph; whereas these preferences are observed to be inconsistent with learning performance for L1 tasks. On the other hand, learners with sufficient learning in L1 tasks prefer IF and those with insufficient learning prefer EF. The average correct answers of learners whose learning decision is sufficient in L1 tasks are equal after both IF and EF, whereas those who have insufficient learning showed better learning performance after EF. In this way, feedback preference of the learners' in L1 tasks are also supported by the learning performance.

Synthesis of the Findings

Table 3 shows the process of synthesizing the findings regarding whether the findings of the first and second design are confirmatory, complementary (explanatory), or distance from each other. Accordingly, if a finding in the first design agrees with or confirms a finding of the second design, it is coded as [CONF #finding]. If two findings are complementary, expansive or explanatory, they are coded as [COMP #finding], but the findings that are not compatible or explaining each other. These findings coded as [DIS #finding] because they are distant from each other. In this table, findings on qualitative data are also combined.

Table 3. Synthesized the findings of the first and second design [Confirmatory (CONF), Complementing (COMP), or Distance from (DIS) each other]

	Feedback Type Preferences		**Learning Performance**	
	IF [#finding]	*EF [#finding]*	*IF [#finding]*	*EF [#finding]*
Set A	1. High test anxiety –Low extrinsic goal & L1 [CONF #2; COMP #5; DIS #6]	3. Low test anxiety –High extrinsic goal & L1 [CONF # 4; COMP #8, 7]		6. High test anxiety *(IF_{mean}=0.8 < EF_{mean}=1)* [DIS #1, 2] 7. Low test anxiety *(IF_{mean} =0 < EF_{mean}=0.9)* [COMP #3, 4]
	2. High test anxiety –Low extrinsic goal & L2 [CONF #1; COMP #5; DIS #6]	4. Low test anxiety –High extrinsic goal & L2 [CONF #3; COMP #8, 7]	5. Low extrinsic goal *(IF_{mean}=0.5 > EF_{mean}=0)* [COMP #1, 2]	8. High extrinsic goal *(IF_{mean} =0.9 < EF_{mean}=1)* [COMP #3, 4]
Set B	9.High Metacognition & L1 [CONF #10; DIS #14]	11. Low Metacognition & L1 [CONF # 12; COMP #13]		13. Low Metacognition *(IF_{mean}=0.6<EF_{mean}=1)* [COMP #11,12]
	10. High Metacognition & L2 [CONF #9; COMP #14]	12. Low Metacognition & L2 [CONF #11; COMP #13]		14. High Metacognition *(IF_{mean} =0.8 < EF_{mean}=0.9)* [DIS #9, 10]
Set C	15. L1 *(IF_{perc}=62% > EF_{perc}=38%) (χ^2=21.38, p=0.00*)* [CONF #23; COMP #23, 25; DIS#17, 24, 26]	16. L2 *(IF_{perc}=35% < EF_{perc}=65%) (χ^2=21.38, p=0.00*)* [COMP #18]		17. L1*(IF_{mean} =0.7 < EF_{mean} =1)* [DIS #13] 18. L2 *(IF_{mean} =0.7 < EF_{mean} =0.8)* [CONF #15; COMP #14]
Set D	19. Sufficient or Quite good *(IF_{perc}= 58%; 64% > EF_{perc} = 42%; 36%) (χ^2=6.2, p=0.04*)* [CONF #23; COMP #21, 25]	20. Not sufficient *(IF_{perc}= 45% < EF_{perc} =55%) (χ^2=6.2, p=0.04*)* [CONF #24; COMP #22, 26]	21. Sufficient *(IF_{mean} = EF_{mean} =0.9)* [CONF #25, COMP #19, 23]	22. Not sufficient *(IF_{mean} =0.3< EF_{mean} =1)* [CONF # 26, COMP #20, 24]
Set E	23. L1 & Sufficient; L1 & Quite good *(IF_{perc}=69%; 77% > EF_{perc}=31%; 23%) (χ^2=12.16, p=0.00*)* [CONF #15, 19; COMP #21, 25; DIS #17]	24. L1 & Not sufficient *(IF_{perc}= 48% < EF_{perc}= 52%) (χ^2=12.16, p=0.00*)* [CONF # 20; COMP #22, 26; DIS #15, 17]	25. L1 & Sufficient *(IF_{mean} = EF_{mean} = 1)* [CONF #15, 19; COMP #23; DIS #17]	26. L1 & Not Sufficient *(IF_{mean} = 0.3 < EF_{mean} =1)* [CONF #17, 22; COMP #20, 24; DIS #15]

Qualitative Findings on Feedback Preferences			**Qualitative Findings on Learning Performances**	
Task Level	*Feedback Type*	*Feedback Source*	*Effective Feedback*	*Learning Performance*
○ Learning Status (*f*=10) ○ Perception of difficulty (f=9) ○ Desire to Reinforce (*f*=4) ○ Not taking time (*f*=2)	○ Content of Message (*f* =10) ○ Task Performance (*f*=3)	○ Quality (*f* =7) ○ Reliability (*f* =7) ○ Complementarity (*f* =3)	○ Correcting mistakes – Completing shortcomings (*f* =12) ○ Repetition-Reinforcement (*f* =8) ○ Monitoring learning (*f* =2)	○ Full-Permanent learning (*f* =8) ○ Working style-Willingness to work (*f*=4) ○ Being Ready for Exams (*f* =4)

Note. p*= Significant value; IF (Informative Feedback); EF (Educational Feedback); perc (percentage); *f* (frequency)

In Table 3, learner preferences are summarized in the "feedback type preference" column, and the findings of the learning graph according to the learning performance of learner's feedback type preference are summarized in the "Learning performance" column. Regarding the results in Set A, findings 1 and 2 support each other, but these findings contradict with finding 6 and they are explained by finding 5. Likewise, findings 3 and 4 support each other, and they are explained by findings 7 and 8. Accordingly, when an EF is sent to those who have high test anxiety, more learning performance is obtained, whereas learners with low extrinsic goals showed more learning performance when they received IF. However, learners who have high test anxiety, but low extrinsic goals prefer IF. In this case, regardless of the difficulty of the task, feedback type preference of learners who have high test anxiety and low extrinsic goals is not consistent with their learning performance. On the other hand, those who have low test anxiety but have high extrinsic goals prefer EF more and their learning performances are also higher.

Regarding Set B, findings 9 and 10 support each other, but they were coded away from finding 14 because they contradict with it. On the other hand, findings 11 and 12 support each other, and they are explained by finding 13. According to this, learners who have high metacognition skills prefer IF more, although they achieve more learning performance when they get EF. In this case, regardless of the task level, the feedback type preference of learners with higher metacognition skill is not consistent with their learning performance. On the other hand, learners who have low metacognition skills prefer EF more and thus their learning performances get higher.

Regarding Set C, finding 15 is supported by finding 23 and explained by findings 23 and 25. In addition, finding 15 is distant from findings 17, 24 and 26 because it contradicts with them. Finding 16 is explained by finding 18. Accordingly, although learners in L1 recall-understanding tasks achieve more learning performance when they get EF, they prefer IF more. In this case, feedback type preference of learners in recall-understanding tasks is not consistent with their learning performance. On the other hand, learners in L2 practice-analysis tasks prefer EF more and thus their learning performances get higher.

Regarding Set D, finding 19 is supported by finding 23 and explained by findings 21 and 25. Finding 20 is supported by finding 24 and explained by findings 22 and 26. Accordingly, learners who think that they are sufficient or quite good in learning prefer IF more and their learning performance is higher. Similarly, learners who think that they are not sufficient in learning prefer EF more and their learning performances are higher. In this case, learners' feedback type preferences according to the learning decision moved consistently with their learning performances.

Regarding Set E, finding 23 is supported by findings 15 and 19, explained by findings 21 and 25, and contradicts with finding 17. In addition, finding 24 is supported by finding 20, explained by findings 22 and 26, and contradicts with findings 15 and 17. Accordingly, learners who are sufficient or quite good in learning L1 recall-understanding tasks, prefer IF more and their learning performance gets higher. Likewise, those with insufficient learning in recall-understanding tasks prefer EF more and their learning performances get also higher. In this case, learners' feedback type preferences in recall-understanding tasks according to the learning decision moved consistently with their learning performances.

Regarding qualitative findings, a total of 15 codes were reached under five themes. Accordingly, learners consider the followings on their feedback preference;

- Task level, according to understanding the concept well or not (learning status, f=10); thinking that the task can be difficult (perception of difficulty, f=9); wanting to reinforce the concept although it was learned, (desire to reinforce, f=4) or not wanting to spend time on the task (not taking time, f=2).
- Feedback Type, according to the amount of information in the feedback message (the content of the message, f=10) or the performance shown after completing the task (task performance, f=3),
- Feedback source, according to getting a useful feedback message (quality, f=7), trusting the knowledge of the source because of his/her the expertise (reliability, f=7), teacher and peer feedbacks support each other (complementarity, f = 3)

In addition, learners stated that;

- The Feedbacks they received were effective because of allowing them to correct their mistakes or complete their shortcomings (f=12); making repetition or reinforcement (f=8); allowing them to monitor their own learning (f=2);
- The Feedbacks they received were effective on learning performance because of enabling full or permanent learning (f = 8); changing their working style or increasing their willingness to work (f = 4); feeling that they are ready for the exams about the concepts without any extra effort.

DISCUSSION

The review of PF strategies as a whole showed that especially educational feedback supports learning performance in both learner preference and learner needs. In addition, educational feedback brought more learning performance than informative feedback. Regarding the research results supporting this fact in the literature, Butler et al. (2013, p. 290) reported that the feedback detailed with additional information provides equal performance in repetitive questions, but they are quite useful in the transfer of the learning to new questions. Meyer et al. (2010, p. 62) found that learners who got detailed feedback in the reading comprehension test carried out better performance in a web-based teaching environment than those who got feedback indicating only the correct answer. In another study, Bozorgian and Yazdani (2021) suggested that metalinguistic explanation provided as part of the feedback to language learners' writing is conducive to a higher level of cognitive engagement and leads to better learning outcomes. In this point, a metaanalysis results showed that the impact is substantially influenced by the information

content conveyed. (Wiśniewski, Zierer and Hattie, 2020). In study, the other result is learners mostly prefer explanation feedback for tasks based on practice-analysis. Similarly, Coral and Carpenter (2020) showed that learners performed best on application questions, particularly when explanatory feedback was provided.

Learners think that they can perform complete and permanent learning with the PFs they receive, they don't have to make much effort for the exams, and there are positive changes in their working style or desire. Supporting these results, Dawson et al. (2019, pp. 33-34) stated that one of the objectives of the feedback is supporting learners to put more efforts on working better and learning more, encouraging them or making them feel better about their own work. In addition, Shute (2008, p. 166) stated that feedback can be a powerful motivation tool when communicated as a response to targeted efforts. On the other hand, Woods (2015, p. 39) emphasized that in order to get the most benefit from the feedback, learners should convert it into thoughts and reflect it on their behavior. Accordingly, after conveying the educational feedback, the learner must read and understand it well before putting into practice. In this sense, in order for feedback to be effective, care should be taken for the features and aspects of the feedback, and each learner should internalize it. When learners were asked about the effectiveness of the feedback conveyed in this research, only one learner mentioned this important point with the following words *Actually I think it is effective ... But I am not sure about how much we processed it or added it to our notes or not.*

Mason and Bruning (2001, p. 14) provided a framework for instruction designers to decide which feedback to send in the computer-aided teaching environment. According to this framework: in easy tasks, if successful learners have high prior knowledge, then the correct answer and a supportive teaching material should be sent; however, if they have low prior knowledge, then the correct answer should be sent. In difficult tasks, if they have high prior knowledge, then a teaching material that repeats until the correct answer is achieved and that supports the correct answer should be sent; if they have low prior knowledge, then the correct answer or a feedback correcting the wrong answer should be sent. However, learners want to select the materials they know or learned well first and proceed from the easy to the difficult (Metcalfe, 2009, p. 161). These study results support the PF strategies established in the research. Learners actually need simpler feedback in their recall-understanding tasks if they know the subject well, or more detailed feedback if they think they don't know the subject well or as the task gets harder.

The results of learning decision and metacognition skills should not be considered independently. Because, metacognitive decisions play an important role in prospective metacognitive monitoring. A learner with high metacognition skill can monitor what he/she knows and can make a clear decision about it. Therefore, metacognition appears as a broad term that also covers learning decisions (Tabakçı & Karakelle, 2010, p. 55). In this sense, it is expected that those who are successful in monitoring their own learning theoretically will have good performance, because they will take the right steps in their learning decisions and choosing study topics (Callender, Franco-Watkins, & Roberts, 2016, p. 216). According to results obtained in this study, feedback preferences of learners with high metacognition skill and feedback preferences of learners who think that their learning is sufficient is consistent with each other. which is a result that should not be neglected. These are results that should not be neglected and should be investigated more detailed.

Regarding the results of the research whether the feedback should be communicated by the teacher or by the peer, learners wanted to get either teacher feedback alone or teacher and peer feedback at the same time. Peer feedback alone was not preferred at all. Because learners find teacher feedback more qualified, don't trust their peers' feedback, or think that teacher and peer feedback are complementary. Supporting this result, Cabi (2016, p. 94) reported that learners' least preferred measurement tool was peer reviews. In addition, Hattie (2012, p. 4) stated that peer feedback doesn't work effectively, emphasizing that the feedback of the peers for the works in the classroom were mostly wrong. Therefore, it was suggested that a rubric, which shows both the wrong and right paths of a task and guides in giving feedback, can help peers (Hattie, 2012, p. 4). In this research, e-rubrics were used to prevent these problems. In addition, it was thought that limiting peer feedback only with the virtual environment would be a strength in terms of interaction. But, learners nevertheless experienced mistrust against peer feedback. To take precautions against this, Wu and Schunn (2020) argued that it may simply be that explanations produced by peers were often overly terse or themselves confusing. For that they suggest that further research should investigate the quality of the explanations found in the peer comments.

CONCLUSION AND RECOMMENDATIONS

In the study, the PF strategy generation model was drawn and the dashed lines in the model to determine the personalized feedback paths. Some of these lines which are according to both learner's feedback type preference and their needs formed KM strategies. PF strategies that are created can be listed as follows:

(i). For students with low metacognitive, or for students with low test anxiety and high extrinsic goals could be sent EF.

(ii). For students with high metacognitive, or for students with high test anxiety and low extrinsic goals could be sent preference-based feedback.

(iii). For recall-understanding tasks could be sent preference-based feedback, while for practice-analysis tasks EF.

(iv). For students who believe to understand the subject in recall-understanding tasks sufficiently could be sent IF and to the others EF.

PF strategies obtained in this context can be adapted to different learning groups or different educational programs. But an important point to be considered for the PF strategies is that they can be used in the personalization of the system-like

environments within the scope of this research. These are the systems that support his/her learning performance according to both feedback preference of learners and their feedback needs. Otherwise, it is thought that the context of personalization will be withdrawn. Based on the results of the research, some suggestions for practitioners are following:

(i). E-assessment environments designed with PF can also be considered as a personal learning material.

(ii). In the e-assessment environment, personalization can be done by letting some of the processes to the learner control, such as choosing the topics to study, receiving feedback, choosing the content or source of the feedback message.

(iii). Collective research results explaining the relationship between personal characteristics and feedback in online environments should be used. Feedbacks in certain types or contents can be conveyed to individuals who are grouped according to one or more personal characteristics of these results.

(iv). PF environments can be developed not only according to the personal characteristics of the learner, but also according to their interests, desires and needs.

In order to develop a PF strategy about the feedback sources, further studies on teacher and peer feedback are needed. The strengths of peer review should be examined in detail with different research designs. Learners' trust to their peers can be achieved by increasing the quality of peer reviews and feedback. In this sense, the effect of peer assessment can be examined by giving professional training to learners on the issues such as peer feedback and rubric usage in e-assessment. Another method to improve the quality of peer reviews and to overcome peer trust problems may be that peer feedback can be provided by those who have high prior knowledge. For example, learners who have already taken the course can provide feedback to new learners.

Studies involving big data analysis that collect learners' feedback preferences from e-assessment environments along with some personal characteristics and that can predict their future choices will improve PF environments. In this way, systems that automatically send the most appropriate feedback to learners with similar characteristics or that can predict learning performance according to the feedback type they prefer can be developed such that they can be included in the same system in a few years.

Declaration of Conflicting Interests

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Statements of publication ethics

We hereby declare that the study has not unethical issues and that research and publication ethics have been observed carefully.

Researchers' contribution rate

The study was conducted and reported with the equal collaboration of the researchers.

Ethics Committee Approval Information

"Ethics Committee Approval Document" for the study was approved by the Committee for Humanities Researches in Eskisehir Osmangazi University Education Science Institute on 13.02.2017 (Meeting No: 2017-1).

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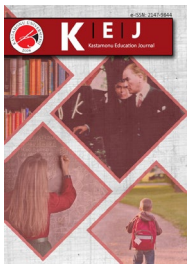

| Research Article / Araştırma Makalesi |

The Effect of Argumentatıon Modal Implemented in The Unit "Change of Matter" on Students' Achievements, Argumentative Attitude, Perceptions of Problem Solving

"Maddenin Değişimi" Ünitesinde Uygulanan Argümantasyon Modelinin Öğrencilerin Başarılarına, Tartışmacı Tutumlarına, Problem Çözme Algılarına Etkisi[1]

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Keywords

1. Maddenin değişimi
2. Argümantasyon
3. Başarı
4. Tartışmacı tutum
5. Problem çözme algısı

Anahtar Kelimeler

1. Change of matter
2. Argumentation
3. Achievement
4. Argumentative attitude
5. Problem solving perception

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Abstract

The study aims to investigate the effect of using the argumentation model in the "Change of Matter" unit in the 5th grade Science course on students' science achievement, argumentative attitudes and problem solving perceptions. The study group was selected with the convinience sampling method and a secondary school in Defne/ Hatay, and the experimental group consisting of 35 students and the control groups consisting of 33 students were determined by random assignment. At research used pretest- posttest nonequalized control group quasi- experimental design. Data collected by "Change of Matter Achievement Test" prepared by reseacher, "Arguer Attitude Scale" adapted by Kaya and Kılıç (2008) and "Problem Solving Inventory" adapted by Şahin, Şahin and Heppner (1993) and Taylan, (1990). Data analysis by using SPSS packet programme, benefit from descriptive and inferental statistic method. Lessons performed the activities of recommended by the Ministry of National Education (2013) in control group and argumentation activities in experimental group. After appliying pretests, lessons started at the same time in both groups and aplication continued 20 hours (5 weeks). After aplication the same tests appliying as posttests. In conclusion ABSL (Argumentation Based Science Learning) method didn't creat statistically significant different as far as present programme in academic success and problem solving skills sense; besides determined effected positively to argumentative skills sense.

Öz

Çalışma, argümantasyon modelinin 5. Sınıf Fen Bilimleri dersindeki "Maddenin Değişimi" ünitesinde kullanımının öğrencilerin fen başarılarına, tartışmacı tutumlarına ve problem çözme algılarına etkisinin incelenmesini amaçlamaktadır. Çalışma grubu uygun örnekleme yöntemiyle Hatay ili Defne ilçesindeki bir ortaokul seçilerek, 35 öğrenciden oluşan deney ve 33 öğrenciden oluşan kontrol grupları yansız atama yoluyla belirlenmiştir. Çalışmada ön test- son test eşitlenmemiş kontrol gruplu yarı deneysel desen kullanılmıştır. Veri toplama aracı olarak araştırmacı tarafından hazırlanan "Maddenin Değişimi Ünitesi Başarı Testi", Kaya ve Kılıç (2008) tarafından uyarlanan "Tartışmacı Tutum Ölçeği" ve Şahin, Şahin ve Heppner (1993) ve Taylan, (1990) tarafından uyarlanan "Problem Çözme Envanteri" kullanılmıştır. Verilerin analizinde SPSS paket programı kullanılarak betimsel ve çıkarımsal istatistik yöntemlerinden yararlanılmıştır. Çalışmanın kontrol grubunda dersler MEB (2013)'in önerdiği Fen Bilimleri öğretim programına göre işlenirken deney grubunda argümantasyon modeline uygun hazırlanan etkinlikler kullanılarak işlenmiştir. Ön testler uygulandıktan sonra her iki grupta çalışma aynı zamanda başlanmış ve uygulama 20 saat (5 hafta) sürmüştür. Uygulama sonunda aynı testler son test olarak uygulanmıştır. Sonuçta argümantasyon modelinin mevcut programa göre akademik başarıda ve problem çözme becerileri algılarında istatistiksel olarak anlamlı bir farklılık oluşturmadığı, fakat öğrencilerin tartışmacı tutumlarını olumlu yönde değiştirdiği tespit edilmiştir

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INTRODUCTION

The modern scientific world emphasizes that scientific knowledge is a body of knowledge that is actively structured by scientists and argues that facts are not just the whole. In other words, scientists focus on how and why something happens rather than what knowledge is. With these questions, which form the basis of the constructivist approach, it is aimed to develop students' skills of questioning, scientific reasoning, decision making and expressing themselves effectively. As stated in the Ministry of National Education (2018), the constructivist approach requires; It is an activity that provides social interaction, to create the necessary learning environments for students to be active in the learning process, to ensure their active participation, to construct knowledge in the scientific process, to develop analytical thinking and decision-making skills. It is stated that discussion methods have an important place in fulfilling the stated requirements of the constructivist approach (Güneş, 2012; Kardaş, 2013; Seferoğlu & Akbıyık, 2006). The scientific discussion model, which is based on the constructivist approach and its practices in the field of learning, and which is based on active learning, is the argumentation model. Understanding science with the argumentation model is an approach that is gaining increasing attention. Argumentation applied in scientific discourse includes justifying claims, constructing counter-claims, presenting evidence, discussing and presenting data and theories in a social setting (Sadler & Fowler, 2006). Based on this view, argumentation, which is an important part of the construction of scientific knowledge, is a fundamental practice of science. Therefore, argumentation is considered as a practice that directs students to develop their understanding of science. Particularly, it will be ensured that students participate in the epistemic practice of science by participating in the discussion, which has an important place in the development of the skills of inquiry, scientific reasoning, decision making and expressing themselves effectively (Güneş, 2012; Kardaş, 2013; Seferoğlu & Akbıyık, 2006).

Although the argumentation model is suitable for the constructivist approach and the Science curriculum organized in 2018, the number of studies conducted in primary education is insufficient (Chen, 2011). When the results obtained from the study organized with the argumentation activities conducted by Chen (2011) were evaluated, it was seen that the students were able to develop more complex understanding, share their ideas with their peers, engage in more complex scientific processes, and take responsibility for their scientific learning as a result of the argumentation practices in the fifth grade. Based on this, it is thought that it would be beneficial to introduce students to the argumentation model at an early age. Because it is thought that this way, students can develop their inquiry skills, bring rational solutions to the problems they encounter in daily life, and develop decision-making skills (Chen, 2011). Argumentation practices provide students with the opportunity to identify the strengths and weaknesses of their understanding and enable students to participate in the organization of their thinking as well as the comparison and reconciliation of different rational accounts when they try to persuade others in scientific discourse (McNeill, Lizotte, & Krajcik, 2006). In this context, the importance of meeting the students with Science and the scientific method at an early age was realized, and the curriculum was changed and the Science course, which was taught in a limited way depending on the Life Studies course content in the 3rd grades of primary school, has been offered as a separate course since the 2014-2015 academic year started to appear in schools. The main purpose of the Science Curriculum is to raise scientifically literate individuals who have research-inquiry skills, can make effective decisions, can solve problems, are self-confident, can cooperate, communicate effectively, and learn lifelong with the awareness of sustainable development (MEB, 2013).

The Science Curriculum, which adopts a holistic approach in terms of learning-teaching theory and practices; In general, the inquiry-based learning strategy, in which the student is responsible for their own learning and actively participates in the learning process, is primarily and frequently used (MEB, 2013). The argumentation model included in this strategy is included in the 2013 Science Curriculum and its effectiveness has been widely researched in recent years (Arlı, 2014; Aslan, 2010; Bilir et al., 2020; Demirbağ, 2011; Demirbağ & Günel, 2014; Demirci, 2008; Domaç). , 2011; Erdoğan, 2010; Eroğlu and Yıldırım, 2020; Gültepe, 2011; Günel, Kıngır and Geban, 2012; Hacıoğlu, 2011; Kabataş-Memiş, 2011; Kara, Yılmaz and Kıngır, 2020; Küçük, 2012; Okumuş, 2012 ; Okumuş and Ünal, 2012; Soysal, 2012; Tekeli, 2009; Uluay, 2012; Uluçınar-Sağır, 2008; Uluçınar-Sağır and Kılıç, 2013; Yalçın-Çelik, 2010; Yıldırım, 2020). While argumentation is used in the educational environment, the student has the tasks like both defending his own argument to the other party in a reassuring way and expressing the weaknesses of the argument of the other party (Kuhn, 2009). For these purposes, the use of the argumentation model creates an environment where there is no winner or loser, it is not aimed to find the absolute truth, relations are established between thoughts, and an argumentative attitude can be developed in students instead of quarrel (Aymen-Peker, Apaydın, & Taş, 2012). In the classroom environment where argumentation is used, students defend their claims about a subject or use scientific theories, data and evidence to refute (Kaya, Çetin, & Erduran, 2014, Kabataş-Memiş, 2017). Argumentation, which is also defined as grounding scientific knowledge, is an argumentation model that consists of six elements proposed by Toulmin. While the basic elements that make up the skeleton of the argumentation model are data, claim, justification and support; limiters and rebuttals are auxiliary elements (Toulmin, 2003). However, there are differences in the literature in terms of the implementation of the model and the creation of activities (Arlı, 2014; Küçük, 2012; Okumuş, 2012; Okumuş & Ünal, Özer, 2009; 2012; Tekeli, 2009).

It has been determined that studies on argumentation are generally aimed at secondary school 7th and 8th grade and high school students or teacher candidates (Arlı, 2014; Aslan, 2010; Demirbağ, 2011; Demirbağ & Günel, 2014; Demirci, 2008; Domaç, 2011; Gültepe, 2011; Günel, Kıngır and Geban, 2012; Hacıoğlu, 2011; Kabataş-Memiş, 2011; Kutluca, Çetin and Doğan, 2014; Küçük, 2012; Okumuş, 2012; Okumuş and Ünal, 2012; Soysal, 2012; Tekeli, 2009; Uluay, 2012; Uluçınar-Sağır, 2008; Uluçınar-Sağır and Kılıç, 2013; Yalçın-Çelik, 2010). There are few studies based on argumentation for the fifth grade (Ceylan, 2012; Chen, 2011; Erdoğan, 2010; Kardaş, 2013; Taşpınar, 2011). However, as stated before, this study was carried out on 5th grade students, since

it is thought that it is important for students to encounter the discussion environment at an early age in terms of using the model effectively and applying it to their daily lives.

In this study, it was aimed to determine the effect of teaching the " Change of Matter " unit of secondary school 5th grade Science course with argumentation activities on students' academic success, their argumentative attitudes that help students to learn meaningfully, and their perception of problem solving skills, which are indicators of science literacy.

METHOD

In the research, a quasi-experimental design with unequal pretest-posttest control group, which is one of the quantitative research methods, was used (Fraenkel, Wallen, & Hyun, 2012). The quasi-experimental design requires the unbiased assignment of two participant groups (one as the experimental group and the other as the control group). Although the pre-test and post-test were applied to both groups, the practice whose effectiveness will be examined is applied only to the experimental group (Creswell & Creswell, 2017). The pretest-posttest unequalized quasi-experimental design with the control group used in the study is given in Table 1.

Table 1. Pretest-posttest unequal quasi-experimental design with control group

	Pretest	Process	Posttest
AG	Change of Matter Achievement Test Argumentative Attitude Scale Problem Solving Inventory	Argumentation Model	Change of Matter Achievement Test Argumentative Attitude Scale Problem Solving Inventory
EPAG	Change of Matter Achievement Test Argumentative Attitude Scale Problem Solving Inventory	Methods Suggested by the Current Program	Change of Matter Achievement Test Argumentative Attitude Scale Problem Solving Inventory

Study Group

The study group consists of 5th grade students in two separate classes in a secondary school selected by convenient sampling method from secondary schools in Defne district of Hatay province. One of these classes was determined as the experimental group (N=35) and the other as the control group (N=33) by impartial assignment.

Data Collection Tools

The data collection tools of the study are the Change of Matter Achievement Test (CMAT) , the Argumentative Attitude Scale (AAS), and the Problem Solving Inventory (PSI).

Change of Matter Achievement Test (CMAT)

In the development of the Change of Matter Achievement Test, a total of 26 open-ended questions were prepared by the researcher, including 6 achievements of the relevant unit and 4 or 5 questions from each achievement. While preparing the questions, they were formed in line with the opinions of experts by using various test books at the 5th grade level. In order to determine the suitability of the questions for the learning outcomes, the opinions of 2 lecturers who are experts in their fields, a Science teacher with 10 years of experience to determine their suitability for the age level, and a Turkish teacher with 8 years of experience were consulted to determine the compatibility of the questions with grammar rules.

In line with the opinions received, necessary corrections were made in the Change of Matter Achievement Test and the test was administered to 50 6th grade students in a secondary school in Defne district of Hatay province, who had covered the relevant subject before. Based on student answers, 25 multiple-choice test questions from open-ended questions were formed by choosing one correct option and three incorrect options, again from student answers.

In order to test the suitability of the questions, they were shown again to the lecturers who are experts in their fields and necessary corrections were made. The "explanation" part was added to the bottom of each question and applied to 60 students studying in the 6th grade of a secondary school in Izmir. In line with the students' answers, three wrong explanations and one correct explanation were added to the questions, and the final version of the two-stage test was given after taking the opinions of experts in the field of science and grammar again.

In order to calculate the validity and reliability of the test, 5th grade students were expected to complete the activities in the Change of Matter unit. Thus, it is aimed to be more up-to-date and give more accurate results. The test consisting of 25 questions was applied to 218 students in 4 different secondary schools in the province of Hatay and its descriptive statistics are given in Table 2 to make reliability calculations.

Table 2. Descriptive statistics of the Change of Matter Achievement Test

Variable	x	Ss	Kurtosis	Swekness
CMAT	5,701	4,152	-,462	,657

When the descriptive statistics data of the test are examined in Table 2, it is seen that the data belonging to CMAT show a normal distribution since the kurtosis and skewness values are between -3 and +3 (Kalaycı, 2006). The substance discrimination indexes of the test are given in Table 3.

Table 3. Substance index of distinctiveness of test questions

Question number	Distinctiveness	Question number	Distinctiveness	Question number	Distinctiveness	Question number	Distinctiveness	Question number	Distinctiveness
1	0,61	6	0,81	11	0,69	16	0,28	21	0,26
2	0,70	7	0,19	12	0,26	17	0,67	22	0,15
3	0,65	8	0,50	13	0,70	18	0,41	23	0,22
4	0,67	9	0,61	14	0,13	19	0,63	24	0,30
5	0,57	10	0,61	15	0,54	20	0,48	25	0,30

When Table 3 is examined, questions with an substance discrimination index below 0.30 were excluded from the test. As a result, 18 questions, 2 of which are distinctive and 16 of which are very distinctive, were taken to the test. After discarding the non-discriminatory questions in the test, the average distinctiveness of the test was calculated as 0.57. When the distinctiveness of the test questions is evaluated in general, it can be said that the test is very discriminating. The substance difficulty indexes of the test questions are given in Table 4.

Table 4. Substance difficulty index of test questions

Question number	Difficulty of the substance	Question number	Difficulty of the substance	Question number	Difficulty of the substance	Question number	Difficulty of the substance	Question Number	Difficulty of the substance
1	0,42	6	0,57	11	0,36	16	0,16	21	0,15
2	0,48	7	0,09	12	0,17	17	0,35	22	0,15
3	0,42	8	0,27	13	0,39	18	0,22	23	0,17
4	0,35	9	0,45	14	0,08	19	0,43	24	0,15
5	0,36	10	0,44	15	0,29	20	0,30	25	0,15

As can be seen in Table 4, there are no easy questions in the test questions with an substance difficulty of more than 0.60. Since the difficulty of 7 questions in the test is between 0.60 and 0.40, 7 questions in the test are of medium difficulty. Since the difficulty of the 18 questions in the test is below 0.40, those questions are the hard questions in the test. 7 questions with low substance distinctiveness were calculated as very difficult questions and were excluded from the test. There are 18 questions left in the test, 7 of which are medium difficulty, 9 are difficult and 2 are very difficult. The average difficulty of the remaining questions in the test is 0.34. So it can be said that the test is a difficult test. The KR20 reliability coefficient was calculated using the formula given below.

$$KR_{20} = \frac{K}{K-1}\left[1 - \frac{\sum pq}{S_x^2}\right]$$

K = number of questions in the test
p = substance difficulty
q = 1-p
S_x^2 = variance of the test (Büyüköztürk, Çakmak, Akgün, Karadeniz, & Demirel, 2010).

The KR-20 internal consistency coefficient of CMAT, calculated according to the above formula, is 0.82. According to the data obtained, the final version of the test consisting of 18 questions is suitable for the 5th grade level of secondary school, it is a very distinctive (0.57), difficult (0.34) and reliable test. Finally, the researcher determined that the test was also valid by preparing an indicator table to check the content validity after the questions were removed. The highest score that can be obtained from CMAT is 18 and the lowest score is 0. Scoring of the test was done according to table 5.

Table 5. Scoring of CMAT

Situation	Score given to the substance
Response and Explanation is Correct	1
Response Correct, Explanation Wrong	0
Response Wrong, Explanation Correct	0
Response and Explanation is Wrong	0

When the scoring method of CMAT given in Table 5 is examined, it is seen that 1 point is given when the correct answer option is marked with the correct explanation to the questions.

Argumentative Attitude Scale (AAS)

The Argumentative Attitude Scale (AAS), prepared by Infante and Ranger (1982), is a 5-point Likert-type, 20-substance scale applied to determine individuals' interest or avoidance in scientific discussion. While 10 of the substances in the scale, which was adapted into Turkish by Kaya and Kılıç (2008), measure positive attitudes towards scientific discussion, the other 10 measure individuals' negative attitudes towards discussion. For each question in the scale, the highest 5 points from positive to negative points and the lowest 1 points can be obtained. In substances for negative attitudes, scoring is done in reverse. The scores that can be obtained from the scale range from 20 to 100.

While Yalçın-Çelik (2010) completed the validity-reliability studies of the scale for high schools, the validity-reliability studies for middle school were carried out by Öztürk (2013), and the Cronbach Alpha internal consistency reliability coefficient was calculated as 0.73 in the study for secondary school.

Problem Solving Inventory (PSI)

The Problem Solving Inventory (PSI), which aims to measure how individuals react to personal and daily life problems and how individuals behave, was developed by Heppner and Peterson (1982). The adaptation of the scale to Turkish culture was done by Şahin (1993) and Taylan, (1990), and this scale is generally used in studies conducted with university and high school level and adults (Korkut, 2002; Şahin, Şahin, & Heppner, 1993; Taylan, 1990; Tümkaya & İflazioğlu, 2000).) used. Kardaş, Anagün, and Yalçınoğlu (2014) adapted the PSI to the 5th grades of primary education and conducted validity and reliability studies of the scale.

The original version of the scale consists of 35 6-point Likert-type substances and 3 dimensions: "confidence in problem solving ability", "approach-avoidance" and "personal control". After being adapted to the primary education level, the scale became a 4-point Likert-type scale consisting of 20 substances. The lowest score that can be obtained from the scale is 20, and the highest score is 80. The negative substances of the scale, which includes both positive and negative substances, are scored inversely.

Taylan (1990) states that a low score in scoring indicates the development of problem-solving ability, and a high score indicates that effective solutions to problems cannot be found. The Cronbach Alpha internal consistency reliability coefficient of the PSI was calculated as 0.74 and the Sperman-Brown split half reliability coefficient as 0.80 (Kardaş, 2013; Kardaş, Anagün, & Yalçınoğlu, 2014).

Practice of Teaching Approaches Used in the Research

The study was carried out with 5th grade students studying in two separate branches in a secondary school in Defne district of Hatay province in the 2015-2016 academic year. The practice was carried out by the researcher in both branches. Practice; It was completed in a total of 6 weeks, of which 20 course hours (5 weeks) were applied to the methods and 4 course hours were data collection. One of the branches where the practice will be made was randomly determined as the Argumentation Group (AG) and the other as the Existing Program Activities Group (EPAG) and the research process was started. Before the start of the study activities and at the end of the study, both groups were administered the Change of Matter Achievement Test (CMAT), Argumentative Attitude Scale (AAS) and Problem Solving Inventory (PSI) as pre-test and post-test.

Implementation of Argumentation Activities

Before the research, the necessary information about the practice process of the model was given to AG by the researcher and the relevant measurement tools were applied to determine the students' initial levels in terms of the variables to be evaluated in the study.

The activities to be applied to the argumentation group were prepared by the researcher by examining Timms questions, based on the achievements in the 2013 Science Curriculum. After taking the opinion of a faculty member who is an expert in the field of

activities, the opinions of an experienced Turkish Teacher for language suitability and an experienced Science Teacher for suitability for the 5th grade level were taken. In order for them to internalize the argumentation model, the "Constructing an Argument" activity was carried out as a large group discussion with an example from daily life, according to the scheme Toulmin suggested (2003) in the first lesson. In order for the discussion groups to be able to conduct the discussion scientifically and not to turn it into personal discussions, the precautions to be taken were explained to the students. In the discussion process, the researcher prevented the criticism from being directed to individuals by making appropriate guidance to the students when deemed necessary and directed them to care about each other's ideas.

The students were informed that the lessons will be conducted with 11 activities prepared for the achievements of the third unit (Change of Matter). For the implementation of the activities, the class of 35 people was divided into 6 groups, 5 groups of 6 people and 1 group of 5 people, in a heterogeneous way in terms of success, considering the pre-test scores of CMAT. Tasks were distributed in groups such that one student was the speaker, one was the writer, and the other students were the idea counselors. The activity directive prepared by the researcher was distributed to the groups at the beginning of the practices. The students in the group were asked to write their predictions about the questions in the first part of the instruction and their final answers to the related question in a small group discussion. After all groups completed this section, group spokespersons shared their ideas. Then, the second part of the activity, the "observation" part, was passed and the materials required for the activity were given to each group by the researcher. The writer recorded his observations in the activity guide, taking into account the ideas of the group members. In the last part of the practice, "explain", the students compared their observations with their predictions in their own groups. They tried to identify the supporting and refuting aspects of their ideas. At the end of the lessons, a large group discussion was held, allowing the students to defend their own ideas and to identify the shortcomings of the other groups. At the end of the discussion, the students were asked how their ideas had changed. During the stages of the practice, the researcher wandered between the groups and became a guide in cases where they were lacking or having difficulties. All activities were implemented through the same stages. In the sixth week, which is the last week of the study, CMAT, AAS and PSI were applied as post-tests, and the study was terminated.

Implementation of Existing Program Activities

In the branch chosen as the existing program activities group (EPAG), the courses were carried out with the activities in the current program. The activities were created by considering the regulations of the Ministry of National Education in 2013, and the Science textbook was also used. Students were encouraged to participate in the lesson by using active learning methods such as large group (class) discussion, demonstration, and question-answer techniques. In the experiments conducted on the subject in EPAG students, the subject was covered by using the notation method. At the beginning of the experiment, the students were asked about their predictions about the results of the experiment, and at the end of the experiment, class discussions were held. Class discussions were guided by the researcher's open-ended questions (How?, Why do you think so?...). When the subject did not include an experiment activity, students' prior knowledge was measured with open-ended questions, and examples from daily life were included to reinforce the subject. In EPAG and AG, the same topics were covered in the same week, at the same time. In the sixth week, which is the last week of the study, CMAT, AAS and PSI were applied as post-tests, and the study was terminated.

Analysis of Data

In the research, descriptive and inferential statistical methods were used by using the statistical package program for the analysis of the data. With these statistical methods, the normality status of the experimental and control groups was checked for pre-test-post-test evaluations, and independent groups t-test, dependent group t-test and ANCOVA were applied for data showing normal distribution.

FINDINGS AND DISCUSSION

In order to decide which test will be used in the evaluation of the data obtained from the pre-tests applied to the groups in the research, the normality of the tests should be examined. Because of this situation, Kolmogorov-Smirnov Test, which is one of the normality tests that will be used in case the study group has more than 30 people, was used to see whether the tests show a normal distribution (Kalaycı, 2006). The descriptive statistics and normality test results applied to the pre-tests of the data collection tools are given in Table 6.

Table 6. CMAT, AAS and PSI pretest descriptive statistics and normality test results

Group	Test	N	$\bar{x}$	S^2	S	Kurtosis	Swekness	Kolmogorov- Smirnov	p
	CMAT		4,800	4,812	2,194	-,556	-,599	,194	,002
	AAS		62,743	167,667	12,949	-,079	-,313	,082	,200
AG	PSI	35	33,371	82,887	9,104	,885	1,186	,170	,012
	CMAT		3,121	4,172	2,043	-,654	,505	,163	,026
	AAS		56,485	168,320	12,974	-,324	,007	,074	,200
EPAG	PSI	33	39,455	67,318	8,205	-,798	,367	,178	,009

When the AG Kolmogorov- Smirnov test results in Table 6 are examined, it is seen that the CMAT pretest and PSI pretest data do not show normal distribution (p<.05), while the AAS pretest shows normal distribution (p>.05). However, since the kurtosis and skewness values of these tests vary between -3 and +3, it was decided that they were suitable for normal distribution (Kalaycı, 2006). According to EPAG Kolmogorov- Smirnov Test results, AAS preliminary results showed normal distribution (p>.05), while CMAT preliminary and anterior PSI results did not show normal distribution (p<.05). However, since the kurtosis and skewness values of these tests were between -3 and +3, it was decided that they were suitable for normal distribution (Kalaycı, 2006). From this point of view, it was decided to use parametric tests in the analysis, assuming that the pre-test data of the groups showed a normal distribution.

The descriptive statistics and normality test results applied to the posttests of the data collection tools are given in Table 7.

Table 7. CMAT, AAS and PSI post-test descriptive statistics and normality test results

Group	Test	N	$\bar{x}$	S^2	S	Kurtosis	Swekness	Kolmogorov- Smirnov- Z	p
	CMAT		7,686	17,634	4,199	-,092	,042	,092	,200
	AAS		64,029	255,734	15,992	-1,020	-,098	,098	,200
AG	PSI	35	33,400	76,953	8,772	,196	,852	,175	,008
	CMAT		5,758	17,064	4,131	-1,464	,311	,202	,001
	AAS		55,121	225,047	15,002	,016	,598	,130	,170
EPAG	PSI	33	40,061	97,559	9,877	-,470	,099	,124	,200

According to the AG post-test Kolmogorov-Smirnov test results in Table 7, while CMAT and AAS showed a final normal distribution (p>.05), PSI final data did not show a normal distribution according to Kolmogorov- Smirnov test results (p<.05), and kurtosis and skewness values were checked. Since these values were between -3 and +3, it was concluded that they showed a normal distribution. According to the EPAG posttest Kolmogorov- Smirnov test results, AAS posttest and PSI posttests show normal distribution (p>.05), while CMAT posttest data do not show normal distribution (p<.05). However, since the kurtosis and skewness values of these tests were between -3 and +3, it was decided that they were suitable for normal distribution (Kalaycı, 2006). As a result, it was decided to use parametric tests in the analysis, assuming that the post-test data of the groups showed a normal distribution.

Independent t-test was applied to determine whether there was a difference between the mean scores of the groups' CMAT pre-test scores and the results are given in Table 8.

Table 8 Independent t-test results of the CMATpretest of the groups

Group	N	x	S	df	t	p
AG	35	4,800	2,194	66	3,261	,002*
EPAG	33	3,121	2,043			

*p< ,05

As can be seen in Table 8, a statistically significant difference in favor of AG was found between the CMAT pre-test mean scores of the groups (t = 3.261; p< .05). In this respect, it can be said that the groups' prior knowledge about the relevant unit before the practicewas not equivalent. Many of the researchers (Altun, 2010; Erdoğan, 2010; Gültepe, 2011; Hacıoğlu, 2011; Özkara, 2011; Taşpınar, 2011; Ceylan, 2012; Küçük, 2012; Okumuş, 2012; Uluay, 2012; Aydın, 2013; Öztürk, 2013) ; Arlı, 2014) worked with

groups that were equivalent to each other in terms of pre-test success. However, the fact that Uluçınar-Sağır (2008) and Aslan (2010)'s study groups showed a significant difference in the pre-test success in favor of the experimental group supports the research result. It is thought that the fact that different teachers attended the classes in the primary school of the classes that make up the groups may have created a difference in success between the groups.

Since there was a significant difference between the CMAT pretests of the groups, analysis of covariance (ANCOVA) was used to control the effect of CMAT pretest scores on CMAT posttest scores in the analysis of the mean CMAT posttest scores. Descriptive statistics of the CMAT post-test are given in table 9, and ANCOVA test results are given in table 10.

Table 9. Descriptive statistics of the CMAT posttest of the groups

Group	N	Unreformed x	Ss	Reformed x
AG	35	7,685	4,199	6,491
EPAG	33	5,757	4,131	7,025

Table 10. ANCOVA test results of the CMAT posttest of the groups

Source of Variance	Sum of Squares	Df	Avarage of Squares	f	p	η^2	Power
Pretest	639,130	1	639,130	82,025	,000	,558	1,000
Group	4,173	1	4,173	,536	,467	,008	0,111
Mistake	506,473	65	7,792				
Total	4307,000	67					

When Table 10 was examined, when the mean CMAT pre-test scores were taken as the common variable, no statistically significant difference was found between the mean CMAT post-test scores of the groups (p> ,05). According to Cohen (1988), if the Eta Square value is between .01 and .02, the small effect value; .06 is the medium effect value; If it is between .14 and .20, it is interpreted as a large effect value. Looking at the Eta Square value in Table 10, it can be said that the research conducted has a small effect on academic achievement (η^2= ,008). In other words, the applied methods did not cause a statistically significant difference on the achievements of the groups. In this respect, it can be argued that the constructivist approach and argumentation model on which current curriculum activities are based increase student achievement in groups at approximately the same level.

Considering the studies in the literature, it was determined that there was a significant difference between student achievements in favor of the group to which the argumentation model was applied and that the argumentation model increased success (Altun, 2010; Ceylan, 2012; Okumuş, 2012; Okumus & Unal, 2012; Özer, 2009; Taşpınar, 2011; Tekeli , 2009; Uluay, 2012; Uluçınar- Sağır, 2008; Yalçın- Çelik, 2010; Yalçınkaya, 2018; Yeşiloğlu, 2007). The findings of the study do not agree with this result in the literature. However, when the methods applied to the control groups compared with the argumentation model of the mentioned studies are examined (except for Kara, Yılmaz, & Kıngır, 2020; Okumuş, 2012; Taşpınar, 2011) have been found to be traditional methods in most of them. In other words, it can be said that the implementation of the constructivist approach activities on which the Science Curriculum is based in the control group of the study may have caused the success of the control group to increase in the ratio of the success of the experimental group and that there was no significant difference between them.

In order to determine whether there is a statistically significant difference between the mean scores of the groups in the AAS pre-tests, the groups t-test, independent of the parametric tests, was applied. The independent t-test results of the data are given in Table 11.

Table 11. T-test results of the AAS pretest of the groups

Group	N	$\bar{x}$	S	df	t	p
AG	35	62,743	12,949	66	1,990	,051
EPAG	33	56,485	12,974			

According to Table 11, since there is no statistically significant difference between the groups' AAS pre-test scores (p> ,05), it can be said that the argumentative attitudes of AG and CMAT are similar to each other before the practice. Looking at the literature, it is seen that similar studies (Öztürk, 2013) support this finding.

In order to understand whether there is a statistically significant difference between the averages of the groups' AAS post-test scores, the independent t-test was applied and the analysis results are given in Table 12.

Table 12. T-test results of the AAS posttest of the groups

Group	N	$\bar{x}$	S	df	t	p	ŋ²
AG	35	64,029	15,992	66	2,365	,021*	,078
EPAG	33	55,121	15,002				

N> 30, *p< ,05

When Table 12 is examined, a statistically significant difference in favor of AG was found between the mean AAS post-test scores of AG and EPAG (t = 2, 365; p= .021; p< .05). With the data obtained, it can be said that the argumentation model affects the argumentative attitudes of the students in the groups more positively than the methods predicted by the current program. In addition, the eta square (ŋ²) value of .078 indicates that the argumentation model has a moderate effect on attitude (Cohen, 1988).

According to Deveci (2009) and Yalçın- Çelik (2010), group work has a more positive effect on students' argumentative attitudes than individual or class discussions. The reason for this situation can be shown as the inclusion of both small group discussion and class discussions in each activity in the practice process of AR. Whereas, in EPAG only class discussions were included and it was applied less frequently and generally at the end of the lesson compared to AG. When the related studies (Demirci, 2008; Erdoğan, 2010; Öztürk, 2013; Tekeli, 2009; Uluçınar- Sağır, 2008; Yalçın- Çelik, 2010) are examined, it is seen that they support the findings of this study. development is emphasized.

In order to analyze whether there is a statistically significant difference between the mean scores of the groups in the PSI pre-tests, the t-test independent of the parametric tests was applied and the results are given in Table 13.

Table 13. T-test results of the PSI pre-test of the groups

Group	N	$\bar{x}$	S	df	t	p
AG	35	33,371	9,104	66	-2,888	,005*
EPAG	33	39,455	8,205			

N> 30; *p< ,05

Looking at Table 13, a statistically significant difference in favor of AG was found between the mean PSI pre-test scores of the groups (t = -2, 888; p< ,05). In other words, the problem solving self-confidence of the groups is not equal before the practice and it can be said that AG students' problem-solving perceptions are stronger than EPAG students.

Analysis of covariance (ANCOVA) was applied to control the effect of PSI pretest scores on PSI posttest scores of the students in the groups, and the test results are given in Table 14 and Table 15.

Table 14 Descriptive Statistics of the PSI scores of the groups

Group	N	Unreformed x	Ss	Reformed x
AG	35	33,400	8,772	35,480
EPAG	35	40,061	9,877	37,854

Table 15. ANCOVA test results of the PSI scores of the groups

Source of variance	Sum of Squares	Df	Avarage of Squares	F	p	ŋ²	Power
Pretest	2469,103	1	2469,103	49,092	,000	,430	1,000
Group	84,984	1	84,984	1,690	,198	,025	0,249
Mistake	3269,176	65	50,295				
Total	6491,809	67					

According to the ANCOVA test results in Table 15, no statistically significant difference was found between the mean PSI post-test scores of the groups (p> ,05). Looking at the Eta Square value in Table 15; Since ŋ²= ,025, it can be said to have a small effect value (Cohen, 1988). In other words, it is seen that the constructivist approach and the argumentation model on which the current curriculum activities are based do not make a statistically significant difference on the problem solving perceptions of the groups.

The study of Kardaş (2013), which is included in the relevant literature, supports this finding obtained from the research. In his study with undergraduate students, Rebello (2012) found that students improved their problem-solving repertoire with argumentation activities. Although Korkut (2002) found that problem solving perceptions develop more as the age decreases, he attributed this to the fact that they may not have given realistic answers due to their age. The reason why students do not trust their problem solving skills enough can be shown as being young and not having a little experience and experience (D'Zurilla, Maydeu, & Kant, 1998). In addition, the short duration of the study may have been insufficient to develop problem-solving

perceptions, which are high-level thinking skills (MEB, 2018) (Küçük, 2012). Long-term studies can further develop higher-order thinking skills (Aslan, 2010; Gültepe, 2011). Apart from these, there are studies showing that many factors such as gender, age, school type, parents' job, and the people they get help from in solving their problems make a difference in problem solving (Korkut, 2002). It can be concluded that the difference between the problem solving perceptions of AR and EPAG students may be due to the fact that they are equal groups in terms of factors such as age and school type, and that the current program activities are based on the constructivist approach (MEB, 2013).

CONCLUSION AND RECOMMENDATIONS

In the research, it was aimed to determine the effects of the activities envisaged by the current program and the implementation of argumentation activities in the teaching of the Change of Matter unit of the 5th grade Science course on the academic success, argumentative attitudes and problem solving skills of the students.

At the end of the practice, no significant difference was found between the groups in terms of academic achievement (Table 10). When the relevant literature is examined, there are many studies showing that the argumentation model increases academic success (Altun, 2010; Arlı, 2014; Ceylan, 2010; Demirbağ, 2011; Demirbağ & Günel, 2014; Deveci, 2009; Domaç, 2011; Erdoğan, 2010; Kabataş. - Memiş, 2011; Özer, 2009; Özkara, 2011; Uluay, 2012; Uluçınar- Sağır; 2008; Uluçınar- Sağır and Kılıç, 2013; Yalçınkaya, 2018; Yeşiloğlu, 2007). However, control group activities in related studies are based on the traditional method. In this study, the unit in EPAG, which is the control group, was processed with activities prepared in accordance with the constructivist approach envisaged by the current program. According to MEB (2013) and MEB (2018), the argumentation model is also a model suitable for the constructivist approach. In other words, this result can be interpreted as the inability to detect a statistically significant difference between the averages of AG and EPAG CMAT post-test scores, since the models and methods applied in AG and EPAG are suitable for the same approach. According to Taşpınar (2011) scientific discussion activities increase content knowledge more than the constructivist approach. In addition, it is a condition of being scientifically literate that individuals can adapt their knowledge to new situations they encounter and use knowledge (MEB, 2018). The model applied in AG in this study was insufficient to guide students on how to use the content information they acquired, therefore, there was no significant difference between the AG and EPAG final CMAT averages, which may be the reason for this result. In addition, in the absence of a significant difference between student achievements; It is thought that some students from AG and EPAG attended the Science course, which is one of the courses given in schools, but the participation of the students in the course was not taken into account while the study was being evaluated. When the relevant literature is examined, it has been emphasized that the length of the implementation period of scientific discussion activities is important in terms of affecting success (Uluçınar- Sağır, 2008; Uluçınar and Kılıç, 2013). Considering this dimension, it is thought that the implementation period of the study may have affected the success.

At the end of the practice, a significant difference was found between the groups in favor of the experimental group in terms of perceptions of discussion skills (Table 12). Studies in the literature in which the argumentation model positively affects perceptions of discussion skills support this finding (Demirci, 2008; Okumuş, 2012; Prudchenko, 2014; Shoulders, 2012; Tekeli, 2009; Uluçınar- Sağır, 2008; Uluçınar- Sağır & Kılıç, 2013).). It is thought that making students have discussions in each activity in AG and carrying out these discussions as a group is effective in the emergence of this finding. Günel and Demirbağ(2012) found that there is a high correlation between teachers' questioning strategies and the formation of classroom discussions. Based on this, it can be said that the support of the discussions with open-ended questions by the researcher is effective in the continuation of the discussions and thus in the adoption of the discussion by the students. In addition, it is thought that including examples from daily life in the activities used during the practice may have improved AR's argumentative attitudes. On the other hand, according to Cho (2001), the use of graphics along with the text in the discussions ensures that more and more quality arguments are produced. There are also studies reporting that modal descriptions (figures, pictures, graphics, tables) have a positive effect on discussion skills (Demirbağ, 2011; Demirbağ & Günel, 2014). Graphics, tables and other visual elements were also used in the activities implemented in AG, thus encouraging active participation of the students in the discussion. This may also have had an effect on the change in students' attitudes.

At the end of the practice, no statistically significant difference was found between the groups in terms of perceptions of problem solving skills (Table 15). Although there are studies in the related literature (Cho, 2001; Rebello, 2012) showing that practices organized with argumentation activities improve problem-solving infrastructures, according to Cho (2001), the type of problem affects student argument significantly. In addition, there are studies in the literature that emphasize the importance of the effect of personal experience and interest in the subject, which were not evaluated in this study, on problem-solving skills (Karışan, 2011; Kutluca, Çetin, & Doğan, 2014). Apart from this, although Sampson II (2007) stated in his study that students who work in groups are better at solving problems; They found that student groups could not produce better products than students working alone, and they interpreted this as the inability of individuals to always adopt and internalize group outputs. The study of Yıldan-Aslan (2018) on the effect of the argumentation model, in which he could not detect a difference in problem solving skills between the experimental and control groups, also supports this study. In addition, it is thought that the constructivist approach applied in the control group may cause no difference between the problem solving perceptions of the groups.

Based on these results, longer-term studies should be conducted to investigate the effect of argumentation activities on success. In order to develop problem solving perceptions, the discussion should include ill-structured problems that increase the

frequency of identifying opposing views and the quality of individual problem-solving arguments, and it can be said that choosing a topic that is intertwined with daily life in the discussion may be more beneficial.

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Statements of publication ethics

We hereby declare that the study has no unethical issues and that research and publication ethics have been observed carefully..

Researchers' contribution rate

While the application part of the research was carried out by the first author, all other stages were carried out with the cooperation of both authors.

Ethics Committee Approval Information

This study was carried out by obtaining the necessary permissions from the Hatay Provincial Directorate of National Education for the first author's master's thesis applications in the 2015-2016 academic year.

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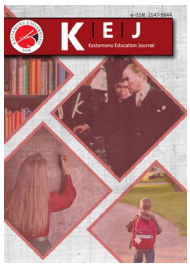

|Araştırma Makalesi / Research Article|

The Analysis of Instructional Behavıor of Inclusive Classroom Teachers in Science Classes

Kaynaştırma Sınıfı Öğretmenlerinin Fen Bilimleri Derslerindeki Öğretim Davranışlarının İncelenmesi [1]

Mustafa KURT[2]**,**

Keywords

1. Inclusive Education
2. Students with Visual İmpairments
3. Science Classes
4. Instructional Behaviors
5. Effective Teaching

Anahtar Kelimeler

1. Kaynaştırma
2. Görme Yetersizliği Olan Öğrenciler
3. Fen Bilimleri Dersi
4. Öğretim Davranışları
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Abstract

Purpose: The present study aimed to describe the instructional behaviors of the inclusive classroom teachers (the provided learning opportunities, whether the teachers conducted a clear and comprehensible instruction, and the inclusion of the students with visual impairments in instructional activities) in science classes attended by students with visual impairments.

Model: The present study was conducted with Single Screening Model. The study participants included 11 classroom teachers employed in primary schools located in the central districts of Ankara Province and 11 visually impaired students who attended their classes. The study data were collected with videos recorded in science classes instructed in the participating teachers' classrooms. The study data were analyzed with the "Instructional Behavior Assessment Tool (IBAT)" developed.

Findings: The study data demonstrated that the instructional behavior of the participating teachers was inadequate based on provided learning opportunities for the students, clear and comprehensive instruction, and inclusion of the students with visual impairment in educational activities

Öz

Çalışmanın Amacı: Araştırmanın amacı, görme yetersizliği olan öğrencilerin kaynaştırma eğitimine devam ettiği sınıflardaki öğretmenlerin fen bilimleri derslerindeki öğretim davranışlarını (öğrencilere sundukları öğrenme fırsatları, öğrencilere öğretimi açık ve anlaşılır bir biçimde sunup sunmadıkları ve görme yetersizliği olan öğrencileri bu derslerde gerçekleştirilen öğretim etkinliklerine katmaları bakımından) betimlemektir.

Materyal ve Yöntem: Bu amaç doğrultusunda araştırma modeli olarak tarama modellerinden Tekil Tarama Modeli kullanılmıştır. Araştırmanın katılımcıları, Ankara İli'ne bağlı merkez ilçelerdeki ilkokullarda görev yapan 11 sınıf öğretmeni ve bu öğretmenlerin sınıflarında eğitimine devam eden 11 görme yetersizliği olan öğrencidir. Verilerinin toplanması için veri toplama aracı olarak, sınıf öğretmenlerinin fen bilimleri derslerinde gerçekleştirilen video kayıtları ve toplanan video kayıtlarının değerlendirilmesi için geliştirilen "Öğretim Davranışları Değerlendirme Aracı (ÖDDA)" kullanılmıştır.

Bulgular: Araştırma bulguları, araştırmaya katılan öğretmenlerin öğretim davranışlarının; öğrencilere sundukları öğrenme fırsatları, öğrencilere açık ve anlaşılır bir öğretim sunmaları ve görme yetersizliği olan öğrencileri öğretim etkinliklerine katmaları bakımından yetersiz olduğunu göstermektedir.

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INTRODUCTION

Visual impairment is a rare disability (Kirk, Gallagher, Coleman, 2017; Tuncer, 2011). Compared to their peers with typical development, the limited use of observation and imitation opportunities by individuals with visual impairment due to their limited eyesight or the lack of it significantly limits their learning through observation and imitation (Tuncer, 2011). This may cause an individual with visual impairment to depend on others to learn about the environment. In the absence of special arrangements during preschool and school-age, children with visual impairment may experience cognitive and social development problems, and their learning skills and personal aptitudes may not develop (Bailey and Wning; 1994, McAlliste and Gray; 2007). In addition to all these developmental and disciplinary areas, one of the areas where individuals with visual disabilities may experience problems in science education (Durre, 2010).

Since the science class content includes complex concepts with a structure that requires the use of eyesight, such as experiments, observation, classification, communication, measurement, and prediction, it could be rather difficult for students with visual impairment to learn science class topics (Fraser and Maguvhe, 2008; Kumar, Ramasamy, and Stefanich, 2001; Penrod, Haley and Matheson, 2006; Schleppenbach, 1996). Durre (2010) explained the limitations of blind students in the science class. These limitations are the examples given only verbally; it takes a lot of time for students to detect visual elements such as graphic maps in printed materials, and teachers are able to study without considering the limitations of the tools (Braille tools, computers, etc.) used by visually impaired students to make notes. The lack of systematic instruction to eliminate these limitations could result in these individuals' unavailability of science classes (Kumar, Ramasamy, and Stefanich, 2001).

In a study conducted by the American Research Institute in 2002, it was reported that the performances of the individuals with sensory loss (visual or auditory) in scientific topics were alarmingly lower when compared to their peers (American Research Institute, cited in Penrod, Haley, and Matheson, 2006). In a similar study, Akkuş (2006) compared the achievement levels of elementary school students with and without eyesight in Mathematics and Science classes in Turkey and concluded that individuals with visual impairment exhibited lower achievement levels when compared to their peers. On the other hand, research has shown that students with visual impairment need physical environment adaptations (seating arrangement, access to materials, lighting, etc.), educational material adaptations (Braille printed materials, etc.), support staff (laboratory assistant, etc.), and instructional adaptations (explicit teaching, alternating assessment technique, effective student-teacher interaction, etc.) to better benefit from a science education (Şahin and Yörek, 2009; Zorluoğlu and Sözbilir, 2017). In this context, science teaching visually impaired students should be capable of meeting different educational needs and maximizing the level of education performance. One of the key principles of educational arrangement for visually impaired students is the setting of the least educational environment.

The inclusion, developed based on the least restrictive educational environment concept, was clearly defined mainly in decree no. Five hundred seventy-three enacted in 1997 in Turkey, and the final form was published in the Special Education Services Directive. The expected benefits of inclusive applications for students with disabilities depend on the quality and adequacy of the supportive special education services (Diken and Batu, 2010; Kargın, 2004; Sucuoğlu and Kargın, 2010). Inclusive education without special education services means bringing together students with special needs and typically developing peers only physically (Kargın, 2004).

It is not possible for inclusive environments that allow only physical equity to adequately meet the needs of students with disabilities (environmental, material, and educational needs). Effective inclusive practices could only lead to expected benefits with the collaboration of experts from various disciplines and systematic planning.

Specific studies in Turkey demonstrated the effectiveness of special education services support for teachers in inclusive classrooms (Duman-Sever, 2007; Timuçin, 2008; Ünal, 2008). However, there is no data on the educational support services available for special education, the responsible parties, and the duration of these services in inclusive classes in Turkey. Furthermore, the findings of the studies where the views of preschool, classroom, and field teachers on inclusive practices are determined revealed that teachers considered themselves inadequate or required training on inclusive practices (Akdemir-Okta, 2008; Atay, 1995; Babaoğlan & Yılmaz, 2010; Battal, 2007; Batu, Kırcaali-İftar & Uzuner, 2004; Bilen, 2007; Bozarslan-Malkoç, 2010; Ertunç, 2008; Gök, 2009; Kaya, 2003; Kaya, 2005; Sanır, 2009; Sart, Ala, Yazlık, & Yılmaz, 2010; Şekercioğlu, 2010; Özengi, 2009), stated that they did not receive related training (Akdemir-Okta, 2008; Aslan-Aydoğan, 2003; Kaya, 2005) and they could not get adequate support from the available experts (Sanır,2009; Saraç and Çolak, 2012; Kaya, 2005), there were no special education teachers at the school (Batu, 1998; Bilen, 2007), the physical properties of inclusive classrooms were inadequate (Bilen, 2007; Kaya, 2005), and the inclusive class sizes were not adequate (Bilen, 2007). These findings suggested that special education support and services were inadequate in Turkey.

The facts mentioned above on inclusive education raise several questions: Are the students affected by disabilities adequately involved in the instructional activities in inclusive classrooms? Could classroom teachers implement adequate methods and techniques that would allow the involvement of the students with disabilities in instructional activities? These and similar questions indicate the nature of the teachers' instructional behavior. Variables such as the teachers' employment of the class hours effectively, their focus on the students during the class hours, the management of teacher-student interaction, and their success in the implementation of the instruction and evaluation stages would determine the quality of the teachers' instructional behavior.

Repeated studies on educational practices in schools demonstrated that instructive behavior exhibited by teachers had a significant impact on student learning (Mastropieri and Scruggs, 2002). Thus, the authors compiled the findings obtained in various studies based on different theories (behavioral, cognitive, social learning, etc.) and converted teacher behavior that improved student achievements into various instruction principles (Borich, 2018; Ellis and Worthington, 1994; Kindswatter, Wilen and Isher, 1988). Teacher behavior, which could be described as the inclusion of practices that improve student achievement and social behavior (Mastropieri and Scrugss, 2002), were categorized into various groups.

Repetitive studies on educational practices in schools demonstrated that the teachers' instructional behavior makes a significant difference on student learning (Mastropieri & Scruggs, 2002). Thus, previous studies compiled the findings obtained based on various theories (e.g., behaviorist, cognitive, social learning, etc.) and transformed teacher behavior that improved student achievement into different instructional principles (Borich, 2018; Ellis & Worthington, 1994; Kindswatter, Wilen, & Isher, 1988). Teacher behavior that could be described as the inclusion of practices that improve student achievements and social behavior (Mastropieri & Scrugss, 2002) has been categorized as follows: (a) student engagement in learning, (b) achievement rate, (c) providing learning opportunities (opportunities to learn), (d) questioning, (e) providing feedback, (f) guided and independent practices, (g) daily, weekly and monthly reviews, and (h) evaluations (Borich, 2018; Ellis et al. Worthington, 1994; Kindswatter, Wilen, and Isher, 1988; Mastropieri and Scruggs, 2002).

Teachers' demonstration of teaching behavior will generally be a factor that increases the quality of education, which will produce valuable results in responding to the needs of students with special needs in classrooms. However, the data obtained in studies that investigated the teacher practices and the environmental and behavioral variables that exist for students with special needs in the inclusion environment in Turkey demonstrated that there were differences in the rules adopted in these classes and further applications that support the instructional behavior of teachers in inclusion classes are required (Akalın, 2007; Sucuoğlu, Akalın and Sazak-Pınar 2008; Sucuoğlu, Akalın and Sazak-Pınar, 2010, Vural and Yıkmış, 2008). There is no study in the literature on what teachers of students with visual impairment have done in educational or environmental regulations and how these students benefit from this instruction. The direct monitoring of the process in inclusive classes will help make more accurate decisions in work carried out to identify problems and requirements. Knowing the **structure** and nature of teachers' teaching behavior in inclusive classes will help determine the type, content**,** and quantity of support services that classes require. This study aimed to describe the instructional behaviors of the inclusive classroom teachers (the provided learning opportunities, whether the teachers conducted a clear and comprehensible instruction, and the inclusion of the students with visual impairments in instructional activities) in science classes attended by students with visual impairments.

METHOD

The Research Model

The current study analyzed various instructional behavior of the inclusive classroom teachers during the class hour. Thus, multiple variables were observed during the instructions. The present study was conducted with the single screening approach. In this approach, the event, item, individual, group, institution, topic, etc., associated with the phenomenon are described individually. Since the study was limited to the science class, a single survey model employed the "sectioning" approach (Karasar, 2009).

Participants

Official approval was obtained from the Ministry of National Education to reach the participants. Then, to determine the fourth and fifth-grade students with visual disabilities who attended Yenimahalle, Keçiören, Mamak, Altındağ, Sincan, Çankaya, and Etimesgut Counseling and Research Centers (CRC) during the 2012-2013 academic year in Ankara province, the authors contacted the CRCs. During the meetings, it was determined that no students with visual disabilities attended these schools' fourth and fifth grades. The efforts to identify the potential participants started in September 2012; however, it took about two months to access the student data in other CRCs due to the lack of records and archives in CRCs. After the data were obtained, all schools were contacted or visited to confirm the students who attended these schools. Because, in the meetings conducted with the schools, it was determined that about 15 students had changed schools.

After the student lists were clarified, the study content and significance were communicated in face-to-face meetings conducted with school administration and teachers in these schools. Their approval was requested to conduct the study. Few teachers agreed to participate since the school administrations or teachers opposed recording the classes or their negative attitudes towards the study. These meetings were conducted in about three months. The author contacted the administrators and teachers in 48 schools while identifying the participants, and 11 classroom teachers volunteered to participate in the study. The demographics of the classroom teachers who participated in the study are presented in Table 1.

Table 1. Teacher demographics

Teacher	Gender	Professional Experience (Year)
1	Female	12
2	Female	16
3	Female	15
4	Female	20
5	Female	31
6	Female	9
7	Female	16
8	Female	14
9	Female	33
10	Female	17
11	Male	12

Table 1 is examined; 10 of the teachers are female, one is male, and the professional experience of all teachers varies between nine and 33 years. In Table 2, the demographic information of the visually impaired students in the teachers' classrooms is presented.

Table 2. Demographic information of the students with visual impairment.

Student	Grade	Gender	Legal Diagnosis	Educational Diagnosis
1	4th grade	Male	Oculacutaneous Albinism + Nystagmus	Low Vision
2	5th grade	Male	Other disorders of the eyeball + Nystagmus	Low Vision
3	5th grade	Female	Psödofak + AKL + Nistagmus	Low Vision
4	5th grade	Male	Nystagmus + Other irregular eye movements + Strabismus	Low Vision
5	5th grade	Male	Okulokutanoz Albinizm	Low Vision
6	4th grade	Female	Congenital cataract aphakic maculopathy	Low Vision
7	5th grade	Female	Hereditary retinal dystrophy	Low Vision
8	4th grade	Male	Optic atrophy	Low Vision
9	4th grade	Male	Optic nerve coloboma + Iris coloboma + Esotropia + Hycrophthalmia + Astigmatism	Low Vision
10	4th grade	Female	Blindness in one eye + Aphakia	Low Vision
11	4th grade	Male	Hereditary retinal dystrophy	Low Vision

Table 2 is examined, six of the students with visual impairment in the classrooms of the teachers participating in the research are girls, and five are boys. Although the legal diagnoses of these students are different, the educational diagnosis of all of them is low vision.

Data Collection Instruments

The research used video recordings and the "Instructional Behavior Assessment Tool (IBAT)" to collect the study data.

The development of the IBAT

The IBAT includes two sections. The first section aims to analyze the learning opportunities offered by the classroom teachers to all students in the science class. Teacher behavior is explored in this section based on

1. The time used for the instruction of academic skills, and
2. Instructional behavior for clear and comprehensive learning:
    a. Presentation of objectives and content before the instruction,
    b. Brief review of prior student knowledge and skills,
    c. Providing corrective and confirmative feedback during this process,
    d. Presentation of new instructional material in steps that would allow the students to examine and practice these materials,
    e. Allowing the students adequate time to react to instructional activities
    f. Providing corrective and confirmative feedback during instruction,
    g. Evaluation of the student comprehension and the outcomes of the instructional activities.

The following teacher behavior is analyzed in the second section of the instrument:

1. The total time spent to include the students with visual disabilities actively in the instruction of academic skills,
2. The total time spent on the academic interaction between the classroom teacher and students with visual disabilities,
3. Instructional behavior to include students with visual disabilities in instructional activities:
    a. Inclusion of students with visual disabilities in the brief review of prior student knowledge and skills,
    b. Providing corrective and confirmative feedback to the reactions of students with visual disabilities during this process,

c. Presentation of new instructional material in steps that would allow the students with visual disabilities to examine and practice these materials
d. Providing corrective and confirmative feedback to students with visual disabilities during the instruction activities, and
e. Control of the student comprehension and inclusion of the students with visual disabilities in the evaluation of the outcomes of the instructional activities

The sections of the IBAT that aimed to determine the time spent were developed in time recording format, and the second section on the instructional behavior of the classroom teachers in science classes and the inclusion of students with visual impairment in the instruction process was developed in rubric format. The rubric development process proposed in the literature was reviewed to develop the rubric section of the data collection instrument, and adequate steps were adopted (Kan, 2007, Kutlu, Doğan & Karakaya, 2010; Stevens & Levi, 2005). During the development of the rubric sections of the IBAT, the primary resources for effective instructional practices, namely Anderson (1989), Carroll (1989), Borich (2004), Ellis and Worthington (1994), Jacobsen, Eggen, and Kauchak (2002), Kindswatter, Wilen and Isher, (1988), Mastropieri and Scruggs (2002), Orlich Harder, Callahan, Trevisan and Brown (2004), and Ornstein and Lasley II (2004) were used to determine the performance criteria.

The Validity and Reliability of the IBAT

The validity of the IBAT was determined based on a literature review and expert opinion on the rubric content, structure, and criteria. Expert opinion was provided by an associate professor in special education with previous studies on academic skills instruction. Based on the expert opinion, the IBAT was revised and finalized after the second tour of views of the same expert.

Inter-observer reliability was measured to determine the reliability of the time records in the first section of the IBAT. Thirty percent of the collected data was selected randomly, and the data were reviewed by a doctoral candidate research assistant to manage the inter-observed reliability data. Inter-observer reliability was calculated with the formula “small number/large number x 100” (Kırcaali İftar & Tekin, 1997). The inter-observer reliability coefficient for the data on the first section item “time allocated for the instruction of academic skills to students” was 99% on the item “the time where the students with visual impairment participated in the instruction of academic skills,” it was 93%, and on the item “the time where the teacher and the students with visual impairment interacted,” it was 97%.

To test the reliability of the scores obtained with the rubrics in the second section of the IBAT, the reliability was calculated with both inter-observer and intra-observer agreement methods. In both inter-observer and intra-observer reliability tests, Cohen's Kappa agreement coefficient was calculated for each rubric item score (Viera and Garret, 2005). The calculations revealed that the inter-observer reliability score for the section on the instructional behavior of the classroom teachers for clear and comprehensible instruction in science class was .73, which was interpreted as “significant agreement.” It was determined that the intra-observed reliability score was. 86. This coefficient was interpreted as “almost perfect agreement.” The inter-observer reliability score for the section on the teachers’ instructional behavior about the inclusion of the students with visual impairment in science classes was .73, and the intra-observer reliability for the same section was .80. These values were interpreted as “significant agreement.”

Data Collection

The video was recorded with the intermittent observation technique. In intermittent observations, the events or phenomena are observed at a specified time interval. The researcher determines the observation interval and duration based on the aim of the research (Karasar, 2009). The present study employed the intermittent observation technique since the research problem was limited to the science class. In the video-recorded classrooms, the video camera was placed to center the visually impaired student and include the rest of the classroom as much as possible during the science classes. All science classes were recorded with a camera. The classroom teachers were told not to alter their instruction before the class and follow their previous methods as closely as possible. They considered that the presence of a camera would affect the teacher and student behavior in the classroom, two or three classes were recorded in each classroom. The last recording was used in the analysis.

Data Analysis

The data collected to describe the instructional behavior of the inclusive classroom teachers in science classes attended by students with visual impairment are presented in the form of tables in the following findings section.

FINDINGS

The Findings and Comments on Instructional Behavior of Classroom Teachers

In this section, findings, and comments on the instructional behavior of inclusive classroom teachers that a) aimed to provide learning opportunities for the students, b) behavior to provide clear and comprehensive instruction, and c) behavior aimed to involve the students with visual impairments in instructional activities are presented.

Instructional Behavior that Aims to Provide Learning Opportunities for the All Students

Table 3. Instructional behavior that aims to provide learning opportunities for all students

Teacher	Class hour (min)	Engaged time in the instruction of academic skills		The time when students with visual disabilities actively participated in the instruction of academic skills		Engaged time in the academic interaction of classroom teachers and students with visual disabilities	
		Minutes	Percentage (%)	Minutes	Percentage (%)	Minutes	Percentage (%)
1	*18:20	*10:39	58,09	*05:51	*31.09	0:42	3.81
2	31:23	22:07	70.47	20:23	64.94	0:28	1.48
3	29:43	23:42	79.75	19:15	64.77	0:16	0.89
4	27:26	23:43	**86.45	12:33	45.74	2:05	**7.59
5	**38:32	24:40	64.01	13:02	33.82	0:15	0.64
6	33:22	24:50	75.25	**22:42	68.78	0:04	0.2
7	32:52	23:52	72.43	17:07	51.94	**2:26	7.38
8	29:23	24:25	84.19	16:01	55.22	0:10	0.57
9	32:18	21:39	67.02	14:14	44.06	0	*0
10	36:19	16:09	*44.46	12:09	33.45	0:14	0.64
11	32:18	**26:20	81.52	22:37	**70.02	0:53	2.73

(*) Lowest time/percentage (**) Highest time/percentage

As seen in Table 3, the duration of the science class was 35 minutes or more only in the classes of two teachers, while it was between 18:20 and 32:18 in the classes of nine teachers.

Three participating teachers engaged time to instruction academic skills in the science class was over 80%, while it varied between 44.46% and 79.75 for eight teachers.

The time where the students with visual disabilities actively participated in the academic skill instruction activities in the science class was 60% in the classes of four participating teachers, and it was between 31.09% and 55.22% in the classes of seven teachers.

The time devoted to the academic interaction between classroom teachers and students with visual impairments in science class was over 7% in the classes of only two teachers, while the same rate was between 0% and 3.81% in the classes of nine teachers.

Teacher behavior that aimed clear and comprehensive instruction

Table 4. Teacher behavior that aimed clear and comprehensive instruction

Teacher	Instructional behavior scale score (Maximum: 3)							Total Score (Maximum:21)
	B-1	B-2	B-3	B-4	B-5	B-6	B-7	
1	0	0	0	0	1	0	0	*1
2	0	0	0	0	1	0	0	*1
3	0	0	0	0	1	2	0	3
4	0	2	3	0	2	2	0	9
5	1	0	0	0	1	1	0	3
6	1	0	0	2	3	3	1	**10
7	0	0	0	0	3	3	2	8
8	0	0	0	0	2	3	0	5
9	0	0	0	0	2	1	0	3
10	0	0	0	0	2	1	0	3
11	3	0	0	0	3	3	0	9

(*) The lowest score (**) Highest score

B-1: Presentation of objectives and content before the instruction.
B-2: Brief review of prior student knowledge and skills.
B-3: Providing corrective and/or confirmative feedback during this process.
B-4: Presentation of new instructional material in steps that would allow the students to examine and practice these materials.
B-5: Allowing the students adequate time to react to instructional activities.
B-6: Providing corrective and/or confirmative feedback during instruction.
B-7: Evaluation of the student comprehension and the outcomes of the instructional activities.

As seen in Table 4, the total instruction behavior scale scores of the classroom teachers on clear and comprehensive instruction in science class were between one and 10. Furthermore, the findings demonstrated that ten teachers did not present the objective and content before the instruction. In contrast, one teacher presented the objective and content with only one sentence (B-1). The findings demonstrated that only one teacher reviewed the students' prior knowledge/skills before instruction (B-2), while other teachers neglected this stage.

The findings on the feedback provided during the activities to mobilize prior knowledge (B-3) indicated that only one classroom teacher provided confirmatory and explanatory feedback to student responses during the above-mentioned short review on prior knowledge/skills, while others did nothing. They do not include review practices or give any confirmatory and/or explanatory feedback. Findings on the review of new material (B-4) demonstrated that one classroom teacher introduced the material after instructing the material or introduced the material briefly without providing details and presenting the material to the students from a distance, while other teachers either did not use any materials or conducted the instruction without presenting the material.

The findings presented in Table 4 demonstrated that four tries allowed the reaction of most students for only a few objectives, while other teachers allowed the response of only a few students on specific instructional goals. The study findings demonstrated that three teachers provided only confirmatory feedback to student reactions (B-6); however, feedback was quite late when compared to the time of the response, and two teachers did not provide any confirmatory or explanatory feedback. Finally, the study findings demonstrated that one classroom teacher evaluated only a few students immediately after the instruction activity (B-7), while one teacher only evaluated a few student reactions after the instruction activity and conducted other applications, while nine teachers did not evaluate student reactions.

Instructional behavior that aimed the inclusion of students with visual disabilities in instructional activities

Table 5. Instructional classroom teacher behavior that aimed the inclusion of students with visual disabilities in instructional activities

Teacher	Instructional behavior scale scores (Maximum: 4)								Total Score (Maximum:32)
	C-1	C-2/a	C-2/b	C-3	C-4	C-5/a	C-5/b	C-6	
1	0	0	0	0	0	0	0	0	*0
2	0	0	0	0	0	0	0	0	*0
3	0	0	0	0	0	0	0	0	*0
4	2	2	1	0	2	2	1	0	**10
5	0	0	0	0	0	0	0	0	*0
6	0	0	0	0	0	0	0	1	1
7	0	0	0	0	2	1	1	2	6
8	0	0	0	0	2	2	1	0	5
9	0	0	0	0	0	0	0	0	*0
10	0	0	0	0	2	2	2	0	4
11	0	0	0	0	2	3	1	0	6

(*) The lowest score (**) Highest score

C-1: Inclusion of students with visual disabilities in the brief review of prior student knowledge and skills
C-2/a: Providing corrective feedback to students' reactions with visual disabilities during this process.
C-2/b: Providing explanatory feedback on students' reactions with visual disabilities during this process.
C-3: Presentation of new instructional material in steps that would allow the students with visual disabilities to examine and practice these materials.
C-4: Allowing reactions of the students with visual disabilities during instructional activities.
C-5/a: Providing corrective feedback to students with visual disabilities during the instruction activities*.*
C-5/b: Providing explanatory feedback to students with visual disabilities during the instruction activities.
C-6: Control of the student comprehension and inclusion of the students with visual disabilities in evaluating the outcomes of the instructional activities.

As seen in Table 5, the analysis of the total scores on the instructional behavior associated with the inclusion of visually impaired students in science class instructional activities revealed that the total scores of the participating teachers varied between zero and 10. The findings demonstrated that only one classroom teacher sometimes included the visually impaired students in the process (C-1). On the other hand, the data showed that ten teachers did not briefly review the students' previous knowledge/skills or did not include students with visual impairments in these practices.

It was determined that only one classroom teacher included students with visual disabilities in the brief review of previous knowledge/skills of the students (C-2/a) and seldom provided confirmatory feedback to the reactions of students with visual

disabilities, while ten teachers who provided feedback either did not review students' previous knowledge/skills or did not provide confirmatory feedback about the reactions of students with visual disabilities.

It was determined that only one classroom teacher provided feedback about the students' reactions to visual disabilities during the activities conducted to mobilize prior knowledge (C-2/b), while one classroom teacher briefly reviewed prior student knowledge/skills. Ten teachers rarely provided confirmatory feedback, neither briefly reviewed prior knowledge/skills nor provided explanatory feedback about students' reactions with visual disabilities.

Furthermore, the findings indicated that the classroom teachers either did not employ any instructional material or conducted the instructional activities without allowing the students with visual disabilities to examine or experiment with the new instructional material (C-3). The other findings demonstrated that five teachers sometimes allowed instructional reactions of students with visual disabilities during instructional activities. In contrast, others did not allow any response from students with visual disabilities.

The study findings on the confirmatory teacher feedback (C-5/a) to the reactions of students with visual disabilities to instruction indicated that one classroom teacher usually, three teachers sometimes, and one teacher rarely provided confirmatory feedback during instructional activities. Six teachers never provided confirmatory feedback on students' reactions with visual disabilities.

It was determined that one classroom teacher sometimes, one teacher rarely, and six teachers never provided confirmatory feedback on students' reactions with visual disabilities to instruction (C-5/b).

Finally, it was observed that only one classroom teacher sometimes evaluated the comprehension of the students with visual disabilities and outcomes during instruction, while one teacher rarely and nine never evaluated the comprehension of the students with visual disabilities and outcomes during instruction or did not include students with visual disabilities in the evaluation.

DISCUSSION

The study aimed to describe the instructional behavior of the inclusive classroom teachers in science classes attended by students with visual impairment. The study data demonstrated that only two teachers instructed the science classes for over 35 minutes, three teachers instructed the science classes for less than 30 minutes and one teacher instructed the science classes for under 20 minutes. In the literature, it was reported that increasing the time allocated for the instruction of a particular topic would improve the learning opportunities for the students (Borich, 2018; Ellis & Worthington, 1994; Özyürek, 2009), while losing time during class would have a negative effect on the learning opportunities.

Since the study was limited to 11 inclusive classes and 11 classes, it could not be suggested that the findings are valid for all classes. However, the findings led to various questions on time use in the classes. It was determined that eight out of eleven participating teachers instructed the class on academic skills during less than 80% of the time allocated for instruction. In certain cases, this rate was 44%. This demonstrated that the time that most of the participating teachers devoted to the instruction of academic skills was about half of the total class hours, namely, approximately 40 minutes. Previous studies reported that effective use of class hours and providing adequate learning opportunities were effective on the improvement of the academic achievements of the students (Blondal & Adalbjarnartottir, 2012; Dotterer & Lowe, 2011; Ladd & Dinella, 2009).

On the other hand, Ellis and Worhtington (1994) stated in the literature that an effective teacher should spend less than 15% of the class hour on task management and classroom organization and more than 50% on interactive activities.

The present study findings demonstrated that the learning opportunities provided for the students in inclusive classes were low level. The punctuality of the teachers is an administrative matter, and the school administration should check it. However, the participating teachers spent significant time taking attendance, for instructional preparations, or controlling the pupils. Supporting teachers on these issues is an essential requirement to provide adequate learning opportunities for the students attending these classes (Blondal and Adalbjarnartottir, 2012; Dotterer and Lowe, 2011; Ellis and Worthington, 1994; Ladd and Dinella, 2009).

The analysis of the instructional behavior of classroom teachers to provide clear and comprehensive instruction in science classes based on their behavior to provide a short introduction to the pre-instruction objectives demonstrated that almost all participating teachers (10 teachers) did not present the objectives and content before instruction. It is stated in the literature that to conduct clear and comprehensible instruction, the teacher should inform the students about the aim and content at the beginning of the class. However, the observations conducted in the present study demonstrated that the teachers usually started the class with the question, "Where were we?" This observation gave the impression that teachers started the class unprepared. (Borich, 2018; Fisher and Frey, 2010; Kluger and Denisi, 1996).

The study findings revealed that almost all classroom teachers (10 teachers) never included brief review practices to activate prior student knowledge. Furthermore, teachers did not provide confirmatory and/or explanatory feedback for student reactions since they did not review the previous student knowledge. However, it is stated in the literature that each class should begin with a daily review, including the review of prior knowledge. These practices allow students to review their knowledge during the class, correct their mistakes, and provide the teacher with feedback, reinforcing learning by repeating the knowledge, skills, and concepts associated with the class. Ellis and Worthington (1994) reported that effective teachers should devote the first five to eight minutes of the class to the repetition of previously learned topics, check the assignments, and review prior student knowledge on the topic (Ellis and Worthington, 1994; Serafini, 2002; Mastropieri and Scrugss, 2002).

On the other hand, the study data showed that almost all participating classroom teachers (10 teachers) did not use any instructional material during the instruction or did not provide adequate opportunities for students to examine the instructional material. Furthermore, the observations demonstrated that the teachers preferred to instruct the entire class verbally or allowed the students to watch a video on the topic during the instruction of the class. It is stated in the literature that effective teachers spend more time on the presentation of new material when compared to others, guiding the students in this process (Ellis and Worthington, 1994; Serafini, 2002; Mastropieri and Scrugss, 2002).

The analysis of the teacher behavior when attempting to get student reactions about the instruction during the instructional activities demonstrated that most teachers (8 teachers) tried to get responses on certain sub-objectives or from only a section of the students during the class. This finding indicated that teachers did not ask questions, conduct activities associated with the topic during the class, or seldom conduct these activities. Even when they conducted these activities, they included only very few students. During the study data analysis, it was observed that the instruction method adopted by a teacher was particular. This teacher instructed the students on some things related to the topic throughout the class. Still, during the whole period, the teachers did not ask the students any relevant or irrelevant questions, did not allow the students to take a note on the topic, and did not conduct any activity. However, it is stated in the literature that the effective use of the question/answer process focuses the student on the learning process and helps the students to be more active in the classroom. Effective use of the question/answer process should include most of the students, even all, when possible, to attract the interest of the students to the topic, instructional activities, and process during the class, and to engage and include the students in the instructional process (Borich, 2018; Fisher and Frey, 2010; Harbour, Evanovich, Sweigart and Hughes, 2015)

The analysis of the classroom teacher behavior of providing regulatory and confirmatory feedback to student reactions during instructional activities in science classes demonstrated that most teachers (7 teachers) did not give feedback to student reactions during instruction, provided feedback later, or only provided confirmatory feedback. However, it is stated in the literature that the feedback on instructional activities should be preorganized and provided immediately after instructional reactions. Feedback should be adapted based on the type of question posed by the teacher, the student performance levels, and the type of the reaction to the question, and the predetermined feedback should be provided immediately after the student reaction, including explanations about the student reaction and in a straightforward way to promote comprehension by all students (Hattie and Timperley 2007; Mastropieri and Scruggs, 2002; Ornstein and Lasley II, 2004; Pisacreta, Tincani, Connell and Axelrod, 2011). These findings suggested that the participating teachers required well-planned support services to adopt accurate and effective feedback strategies.

The teacher evaluations' analysis to check whether students comprehended the instructed topic and to observe the outcomes of the instructional activity demonstrated that almost all teachers (9 teachers) did not conduct post-instructional evaluations. However, it is stated in the literature that for teachers to conduct clear and comprehensible instruction, they should include post-instructional evaluations about the instruction, and the measurement tool they would use in this process should be designed for the instructional goals of the related class (Engellman and Carnine, 2016; Fisher and Frey, 2010; Kindswatter, Wilen and Isher, 1988)

Among the instructional behavior that classroom teachers exhibited, including students with visual impairment in the instructional activities in science classes, the study data demonstrated that the most prolonged time devoted by the teachers to academic interaction with students with visual impairment was 7.38% of the total class hours, the same ratio was below 1% in six classes. It was 0 or close to 0 in two. These data could suggest that most participating classroom teachers almost ignored the students with visual impairment during the instruction. In other words, classroom teachers excluded students with visual impairments when accepting student reactions and providing feedback to these reactions in most classes. This finding was consistent with a report by Akalın (2007). In that study, Akalın reported that teachers addressed the whole class; however, their one-on-one interactions with special needs and typical development students were below 1%.

The analysis of the time where the teachers actively included the students with visual impairment in the instruction of academic skills demonstrated that the most extended period where the classroom teachers allowed active participation of the students with visual impairment in the instruction was 70% of the total class hours. For almost all teachers (10 teachers), the abovementioned process was less than 70%. It is observed that this ratio was below 40% in three teachers' classes. Considering that most of this student behavior includes listening to the instruction and taking notes by students with visual impairment, it could be suggested that classroom teachers did not make adequate effort to include students with visual impairment in the instructional activities. The observations conducted during the data analysis demonstrated that although the students with visual impairment raised their hands to answer questions in most classes, the teachers did not allow them to speak. This data also demonstrated that teachers experienced difficulties in classroom management. Because the periods that excluded the periods where the students with visual impairment actively participated in the class could be considered extra-curricular behavior, which was consistent with the findings reported by Akalın (2007), in that study, it was determined that inclusive students exhibited extracurricular activities in 21% of the class hours.

The analysis of the classroom teacher behavior scores on the inclusion of the students with visual impairment in science classs determined with the instruction behavior assessment instrument demonstrated that almost all participating teachers (10 teachers) did not include short review practices that activate prior student knowledge/skills. Thus, they did not provide confirmatory or explanatory feedback to the student responses during the review practices, and they did not include the students

with visual impairment in these processes. Only one participating teacher provided short reviews that activated prior student knowledge/skills and provided feedback on student responses during these practices. The same teacher was the only teacher who attempted to include the student with visual impairment in these practices. It is unknown whether other participating teachers would include the students with a visual impairment when they make arrangements to include short review practices that activate prior student knowledge/skills when designing their science classes and provide confirmatory and explanatory feedback. However, the efforts of these teachers to include the students with visual impairments during other instructional activities provide certain clues.

The analysis of the other study data on the inclusion of students with visual impairment in science class instruction by participating classroom teachers suggested that none of the teachers utilized new instructional material or did not adequately present the material, allowing the students with visual impairment to examine and practice with the material, most teachers (6 teachers) did not attempt to get a reaction from the students with visual impairment during instructional activities, and accordingly did not provide feedback on the responses of the students with visual impairment. Almost all teachers (9 teachers) did not conduct post-instructional evaluations or did not include the students with visual impairment in the evaluation even when they conducted the post-instructional evaluation. These findings demonstrated that students with visual disabilities predominantly participated as audience members in instructional classrooms. Even the time they listened to the instruction was limited (31.09% - 70.02% of class hours).

CONCLUSION AND RECOMMENDATIONS

The study data analysis demonstrated that the overall view of the instructional behavior of the inclusive classroom teachers in science class was hopeless. It was clear that these teachers required serious support in instructional behavior. Furthermore, the instructional behavior analyzed in the study did include the behavior exhibited towards the students with disabilities and the whole class. This finding revealed that the general instructional behavior in the classrooms should be investigated, and the teachers should be supported in the fields where they require support. Naturally, these findings were limited to the 11 inclusive classrooms, the teachers and students in these classes, and the science class; however, the data on the teachers' instructional behavior in their classes demonstrated that the experienced instructional problems were severe. Thus, it is obvious that teachers require services that would positively support their instructional behavior and solve their classroom problems.

Previous studies reported effective applications to support the professional development of teachers and help them cope with the problems they encounter in educational environments. The previous study findings demonstrated that practices such as coaching (Fidan, 2018; Kıyak, 2020; Tekin-İftar, Collins, Spooner, & Olçay-Gül, 2017), mentoring (Akay & Gürgür, 2018), behavioral counseling (Kurt, 2015), and direct behavioral counseling (Timuçin, 2008) effectively supported the professional development, problem-solving efficacy in the classroom environment, and improved instructional behavior across inclusive classroom teachers. Thus, it could be suggested that establishing school support departments for inclusive classroom teachers and direct support via the strategies proven to improve their efficacy would lead to beneficial outcomes.

On the other hand, given the present limitations, similar studies with a wider population and sample should be conducted, and qualitative and quantitative properties of the instructional practices conducted in inclusive classrooms should be determined. Also, there is a need for further studies that would reveal the fields of support required by the teachers in inclusive classrooms. But most importantly, future studies that would determine the type, quality, and quantity of the support services (in-service training, counseling, in-classroom assistance, etc.) for inclusive class teachers are perhaps the most essential requirement in inclusive education.

Researchers' contribution rate

The research was designed and conducted by the first author.

Ethics Committee Approval

The current paper was based on a dissertation submitted before 2020. The Ministry of National Education approval was obtained for the study; however, ethics committee approval was not. Ethics committee approval was not required for scientific research before 2020.

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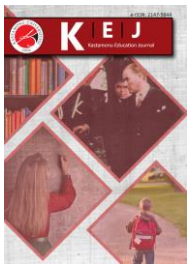

| Research Article / Araştırma Makalesi |

Impact of Education Level of Women in Russia on the Position of Women in Society (historical summary)

Rusya'da Kadınların Eğitim Düzeyinin Kadınların Toplumdaki Konumuna Etkisi (tarihi özet)

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Keywords
1. Women
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Abstract

Purpose: Since the 18th century, discrimination against women was part of official government policy in higher education institutions within Russia, as across the world until the beginning of the twentieth century. For many years, only men had the advantage of attending higher education. Thus, it can be said that women of lower socio-economic status had barely any rights in Czarist Russia. They had no right to divorce and extremely limited rights to own private property.

Design/Methodology/Approach: Only women who were at least of median socio-economic level could consider leaving their husband. Effects of both the industrial revolution in the western world and the labour movement within Russia during the 19th century along with a number of socio-economic changes within society, led to a system of values which ultimately allowed women to participate in educational life.

Findings: As it observed in most societies, a long period of awakening and raising awareness is required in order to ensure the desired level of equality of opportunity between genders in both education and work areas, as well as in other areas of society in Russia too.

Highlights: When it comes to the historical process in Russia's women's education, it can be said that the path taken in the field of women's education, considering the changes in the political, socio-economic and value system is practical and beneficial.

Öz

Çalışmanın amacı: 18. yüzyıldan itibaren dünya genelinde olduğu gibi Rusyada da yükseköğretim kurumlarında kadınlara yönelik ayrımcılık, yirminci yüzyılın başlarına kadar resmi devlet politikasını oluşturuyordu. Uzun yıllar boyunca, yükseköğretim kurumlarında sadece erkekler eğitim alma fırsatına sahipti. Düşük sosyo ekonomik düzeye mensup kadınlar Çarlık Rusya'sında neredeyse hiçbir bir hakka sahip olmadığı söylene bilir. Boşanama hakları yoktu, son derece sınırlı özel mülk haklarına sahiplerdi.

Materyal ve Yöntem: Sadece orta sosyo ekonomik düzeye mensup kadınlar kocalarını terk etmeyi düşünebilirlerdi. 19. Yüzyılda hem batıdaki sanayi devriminin hem de Rusyadaki işçi hareketının etkileri toplumda yaşanan bir takim sosyo-ekonomik ve değerler sistemindeki değişiklikler kadınların eğitim hayatına katılımını tetikleyen önemli etmenlerdendir..

Bulgular: Çoğu toplumlarda gözlendiği gibi Rusya'da da hem eğitim hem de çalışma alanlarında olduğu gibi toplumun diğer alanlarında da cinsiyyetler arasında istendik düzeyde fırsat eşitliğinin sağlanması için uzun sürecek bilinçlenme ve bilinçlendirme süresi gerekmektedir.

Önemli Vurgular Rusya'nın kadın eğitimindeki tarihsel sürece bakıldığında yaşanılan politik, sosyo-ekonomik ve değerler sistemindeki değişimler göz önünde bulundurulduğunda kadının eğitimi konusunda katedilen yolun pratik ve faydalı olduğu söylenebilir.

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1. INTRODUCTION

The role of women in the history of Russia is currently an important issue. As in other parts of the world, the status and roles of all social groups within Russia, especially women, have been affected by the natural environment, geographical position of the country, lifestyle of the many ethnic groups, the social value system, religion as well as socio-political and economic development. Our concern was to determine the degree of women's involvement in the periodical enlightenment process and to keep track of the determination of their position in society. Therefore, our aim was to evaluate the image of woman in Russian society by referring to the historical facts, statistics, and scientific literature. The education level of women and recognizing the opportunities from which women themselves and the society benefited were the most crucial issues in this regard. The socio-political, scientific, and technical changes increased the educational and professional level of women and caused a need for increasing women's role in society. Thus, the degree of change in the role and importance of women in society increased the overall attention to women in various social, political, scientific, industrial, and creative fields. In Russian society, women's emotional state, social, and physiological behaviours are affected by their social role, status, involvement in education, and business life. The recent socio-political change, Soviet disintegration, and formation of new socio-political administration has affected the position of women in society and the family unit. Women are often the first to be fired in Russia as is the case of the societal transition process throughout the world. This has increased the desire of women to participate in education and be qualified employees for the purpose of protecting their position in society (Мороз В.А., Аверкина Т.О.2016).

It is known that societal events are formed through individual behaviours, thus they are related to self-praise or protecting one's self-esteem. The aim of ensuring gender equality during the Soviet period contributed to the participation of women in education and business life. However, during the transition process from the Soviet Union to Russia, the weakening of the economy, change in political balance, and financial difficulties negatively affected the position of women in society. As the reasons mentioned are considered, women tended towards protecting their self-esteem and position within society by breaking the gender roles (Баскакова М.Е. 2005).

2. Body

As is known, the issue of gender inequality has been an important research topic since the early stages of the development of capitalist society. There has been a significant amount of research regarding women's educational attainment in Russia. This issue was an inseparable part of governmental policy and scientific interest both during the Soviet period and modern era. Due to the fact that the policy towards women was primarily aimed at using woman for the labour force, development of the education system, and starting new businesses was to be ensured. Also, the historical aspects of this issue should be analysed for comparative analysis as well as the ideological propaganda used. The specialists in this field are N. Kozlova, O. Bayyukova, M. Y. Baskakova, D. Bondarenko, E. B. Demintseva, O. I. Kavykin, I. V. Sledzevsky, and D. A. Khalturina. These scholars have attempted to research this issue in various ways, including historical, psychological, cultural, economic, political, gender, and the national aspect.

Education is an important manifestation of the development level of any society. It is quite understandable that the opportunities lost in women's education so far may affect the development of Russian society, because Russia is a country with vast potential in human capital. To illustrate, women's business life was restricted to the service sector until the 20th century, and women did not occupy other sectors of the economy at a desirable level correlate to the society, and as a result, women were repeatedly directed to certain sectors of education. Importantly, throughout the world, as in Russia, the third millennium may be considered the millennium of women. As a result, women are increasingly represented within society and should be considered as a service to education. As stated earlier, education itself is directly related to social and environmental conditions.

Women's Education in Modern Society

If globalization, as a process of integrating knowledge within education, firstly requires increasing the general education level of society as well as the development of all social groups who may effectively work and/or study in the most current fields of science and learning, it is highly probable that the most crucial global need for educators is to adopt the concept of toleration. Tolerance can be considered as an essential part of personality, and a crucial and inseparable part of social skills. The following characteristics and indicators define the skills of individuals and social groups such as a tendency towards sustainability, establishing and developing social and intercultural relations, settlement of disputes, managing emotions, and accomplishing objectives (Бондаренко Д. М., Деминцева Е. Б., Кавыкин О. И., Следзевский И. В., Халтурина Д. А.2007).

In today's world, modern women are independent in every aspect of life within Russia, therefore, they have the right to plan an independent life, study in higher education institutions, have a business life and/or decide on marriage as well as the right to choose their spouse, sexual freedom, and/or birth control. The concept of family has lost some of its cachet for modern women compared to its historical significance because they often do not restrict themselves to the maternal role and instead attach greater importance to their career. Studies indicate that it is important for modern women to clearly understand their role in society as well as fulfil their responsibilities in this regard. Consequently, the successful implementation of crucial and exciting social roles brought together for students within the university environment is extremely important (Мороз В.А., Аверкина Т.О. 2016).

Social equality between men and women was not achieved in the past. The position of women, who manage the responsibilities of family and the maternal role, have often occupied the lowest level of society. Even though historians and sociopsychologists have recognised a leading role of women in public life (i.e., matriarchal societies), the image of women during the Soviet period was observed as female mother, female employee, and socially active female. Firstly, we should look at the current education status of women in Russia. In 2010, only 12,000 out of 33 million women in Russia, listed as having worker status, had not received any form of primary school education. This becomes concerning for men because 22,000 men had only received primary school education out of a total of 33.4 million men.

Moreover, when the education level of men and women over 15 is analysed in Russia, this fact changes dramatically. For example, 469,000 women out of a female population of 64 million received primary school education while 244,000 men out of a male population of 53 million received primary education. Thus, the number of men completing primary school education in Russia is approximately half the number of women. In general, these figures show that there has been an improvement in women's education in Russia over the past half century. On the contrary, a setback has been observed in men's education. Women have almost surpassed men in terms of higher education. For example, 16 million women out of a female population of 64 million over the age of 15 are university graduates while 11.5 million men out of a male population of 53 million are university graduates. This rate will not change even if the employees within the field of economics are considered. That is to say, 11.5 million women and 9.2 million men have earned more than one diploma in higher education (https://vz.ru/economy).

A pattern of development dynamics can be recognised in this regard. However, certain conditions must be considered. For example, transition to an open society with socio-political and economic processes during the independence period required new forms of connection (relations) within all fields of social life such as at the level of public awareness, including the formation of political culture. This includes women as an important social and demographic group. In this regard, an increase in the political activities of women requires researchers in the fields of social and political activities to conduct longitudinal studies regarding gender relations.

Additionally, the formation of public policy within the market economy to include women accelerates the expansion of women in these overall activities. Providing scientific reasoning regarding the elimination of women's unemployment, gender education, achieving gender equality, and standards of living should be based on the principle of ensuring social rights and additional social assistance for women's maternal and family needs as well as various benefits and essential improvements to their working and living conditions. Furthermore, it has been observed that these principles may vary according to the current conditions at each stage of development within Russian society.

Marriage, as one of the most crucial social institutions in modern society, involves important challenges, one being the sharp increase in divorce due to high levels of conflict within families. Every year, gaps in raising the younger generation, the number of single parent families, children with a single parent, and children who have both parents but are sent to boarding schools or child welfare institutions has increased.

Importantly, there have been many political changes in Russia over the last two centuries. For example, capitalism has gradually started to replace colonialism. During this time, specialization in fields and professions dramatically changed the pace of economic and social development as well as expanded the direction of socio-economic development. Women, however, have unfortunately not been able to fully participate within the fabric of social change and growth at what is considered a desirable level.

History of Women's Education in Russia

Studies show that women's participation in education has a long history in Russia. Historical facts indicate that…

> "Girls started to receive education in Russia in the 11th century and Anna Vsevolodovna, sister of Vladimir Monomax, founded a girl's school at St. Andrew's Monastery in Kiev in 1086. The first schools where girls could receive education in Moscow and St. Petersburg, which were private and provided secular education, were founded during the period of Peter I. The nuns were instructed to educate orphans of both genders and teach girls to sew and other handcrafts in 1724. The first schools providing midwifery education were founded in Moscow and St. Petersburg, and then in the other cities in 1754. While private boarding houses funded by foreigners were founded for women in Russia starting from the middle of the 18th century" (http://izron.ru/articles/pedagogika-psikhologiya).

Research shows that historically the choice of educational specialization has been considerably restricted among women even though the overall education level of women continues to increase each year. In general, education, health, the food industry, and agriculture sector have been the primary areas of educational specialization among women in Russia. Today, this continues to be the case, and to illustrate this fact, open secondary education for women started to improve within the Mariinsky educational institution beginning in the 19th century. While a general education and training program was prepared for all 34 education institutions in 1817, six more schools were founded between 1817 and 1827, and it was recorded that approximately 23,000 orphan girls received education within these schools (Козлова, Н.И. 2006).

Considering the myriad of developments in this regard, several issues remained to be resolved regarding the education of women in Russia. There has been rapid improvement regarding the education of women from the end of 19th century to the present. For example, in 1897, a Women's Medical Faculty was founded, and in 1900 there were women's higher education institutions established in Moscow, Odessa, and St. Petersburg. Also, Lesgaft's higher education institution course was active in

1910 with higher education institution courses opened in Kharkov, Kazan, Novocherkassk, and several other locations as well as private technical courses being organized between the years of 1905 and 1910. Eventually, women also earned the right to work in higher education institutions in St. Petersburg (Козлова, Н.И. 2006).

Considering this general overview, the history of women's education in Russia is rich and complex. Firstly, gymnasiums and schools were founded, however only a small number of girls from the upper class of society had the advantage of education, while girls and boys from the lower class did not receive the opportunity of education. It can be said that education covers a narrow framework in the 19th century. Thus, the number of specialization fields was limited and restricted to areas of moral life, the household, and family. As a result, educated women playing a leading role in family and participating in business life did not seem plausible.

Courses such as foreign language, the arts, literature, ethics, moral conduct, and handicrafts were provided to children in the gymnasiums for girls (Ахундов.Ф.2001). The living conditions of women and their status in society has changed over time as well as their need for knowledge and education has increased. They have also tended towards various professions which require education at the level of secondary and/or higher education. As a result of these factors, it can be stated that the overall education level of women has increased.

The development of science and technology has to be related with this increase. As is known, the problems of modern people have increased the need for knowledge and the ability to acquire this knowledge. The content and quality regarding claims and tendencies of human beings continually change and every human attempt to overcome obstacles in accordance with their mind, will, and socio-economic conditions. This starts with family because the moral and psychological environment within the family unit defines the attitude of each family member towards the family as a whole. To solve the problems individuals face, self-structure, and a material and non-material values system should be shaped, thus an individual may "avoid" mistakes or instead make the correct choices when faced with undesirable situations within society.

After the collapse of the USSR and formation of independent republics, some factors such as regional conflicts, the transitional period, integration into the world community, migration, social change and global economic problems, affecting almost all countries, appeared. It can be said that factors such as moral, cultural and socio-psychological problems, new norms and values, changes in international relations, and family situations have had significant impacts on the educational status of women.

According to some researchers, the issue of organization of research in education as well as the relation between the socio-political activities of women, the role of family, and the optimal balance of control over the primary direction of social policy of the state ultimately plays an important role in shaping the social status of women (Бондаренко Д. М., Деминцева Е. Б., Кавыкин О. И., Следзевский И. В., Халтурина Д. А. 2007).

In this regard, the process of shaping the basic characteristics of women and the issues of managing these processes should be continually researched.

Modern Education Level and Status of Women in Russia

As can be understood from the above explanations, the opportunities and methods for women in social life differ based on the political and socio-economic status and lifestyle within Russia. However, the literacy, knowledge, and education level of women has increased steadily, thus accelerating their integration into society. As a result, women have started to be further involved within the socio-economic, political, and values system. It can be said that there are issues, which remain to be solved in this regard. When the context of a capitalist system covering a massive historical stage is considered, all social powers in society including women should be relied on.

Thus, there are key factors necessary to solve issues regarding women. According to specialists, discrimination regarding overtime pay and wage discrepancies for women in Russia has been observed even though their education level is higher than men's. Statistics show that 37% of women are educated, whereas only 29% of men have received higher education. Also, the wages of women are only 73% of men's average wages, thus discrimination is clearly observed according to this data. Specialists explain this by stating that women are integrating their professional responsibilities with the responsibilities of housework and child-raising. Thus, a specific strategy for females regarding this situation was developed and implemented by the Russian government (https://www.rbc.ru/rbcfreenews/).

Researchers have determined the primary reason for these processes through the two world wars which occurred in the 20th century. According to demographic statistics, it has been observed that the rate of women among university professors has constantly increased within Russia since 1990. To illustrate this point, in 1995, 107,000 (45%) of university instructors were women out of a total of 240,000 university instructors in the society as a whole. While the number of female university instructors reached 168,000 in 2013, making up 57% of the total number of these university instructors which was 288,000. Thus, it was determined that the rate of women working in higher education within Russia was 10%, while the level in G7 countries was 16% in 2013 (http://www.forbes.ru).

The primary reason for a high participation rate of women in education and social fields was the massive demographic loss for Russia during World War I and the Russian Civil War. Also, according to calculations, especially during World War II between 1941 and 1945 (the number of losses remains controversial) is estimated that 10 to 15 million people killed between 1917 and 1922,

and almost 26.6 million lost between 1941 and 1945. These losses were primarily from the male population. Consequently, one percent of the entire male population in Russia from these generations were lost (http://www.forbes.ru).

On the other hand, the developing market economy in Russia during the 1990s, created a massive demand for professionals who could swiftly adapt to the new market conditions. All the accounting specialists, teachers of economics, and lawyers were mostly women, as a result, they suddenly faced a massive demand and became an influential class of society. Therefore, the increase in demand for higher education in law caused an increase in the number of specialists and teachers within this field, especially in the social and economic sciences. Consequently, these two factors increased the rate of women in education based on the drastic demand for higher education within Russia during the 1990s and 2000s (Рослякова А.И. 2001) .

3. Conclusion

The necessity for reform to the education system in Russia is based on several contradictions between the needs of specialists within a variety of fields as well as the opportunities for providing the needs of the system. As a result, the analysis of the aspect of gender in educational reform, impacts of these contradictions on the formation of social status among girls and boys, and the social equality of genders may be determined. In this regard, it was important in the current study to monitor and analyse the following:

- Determining acceptance plans for certain specialities in different education institutions;
- Formation of new social, professional, and value trends;
- Ensuring the freedom of choice for professions in the future;
- Creating democratic and humanist culture between teachers and students;
- Establishing high-quality and creative relations between education institutions and academic institutions, media and public institutions;
- Creating a mechanism for children from the upper class of society to help transfer property and culture; ensuring the horizontal and vertical transition from one social group to another;
- Creating an environment for continuing education, employment, and professional education;
- Role of education in the development of personal qualities related to modern civilization;
- Implementation of new education models meeting modern requirements;
- Implementation of issues regarding curriculum in the formation of national culture, moral and ethical values among young people;
- Material and non-material work incentives of teachers;
- Democratization of relations between teachers and students;
- Student-centred education process; and
- Organization of education processes in different universities and the impact of this on gender equality.

As in most societies, if we are to evaluate the issue of women by considering them both historically as well as under the current conditions, women in Russia have directly or indirectly, struggled against past social-economic oppression and continue to suffer both within their families and society at-large. Conflicts with their social role, inequality of opportunity in many areas of society, restriction to the right of education, and wage inequality in the labour market are some examples of social oppression experienced by women in Russia. Thus, it can be posited that these factors have increased the anxiety level of women in Russian society and have negatively affected their overall socio-economic success. As a result, it is necessary to foster the long-term awareness of this deleterious situation and seek to ensure an equality of opportunity in all fields of society including the fields of education and business.

In this current research, it was pointed out that the education of women in Russia has been related to the general attitude of society towards women. During a considerable part of history, Russian society held a negative attitude towards the education of women. For example, women, especially those of low socio-economic status, have had difficulty in attending education. Ultimately, the needs of society have shaped the educational opportunities for women in Russia. These improvements can be regarded as practical and beneficial when these changes are political, socio-economic, related to the value system or the historical process of women's education in Russia.

In conclusion, it is incredibly crucial for the development of a country that the equality of opportunity be ensured for women in all areas of society as well as that women are properly represented throughout the social-economic system. For this reason, a conscious and qualified educational process afforded to all women regardless of socio-economic status is necessary.

4. Declaration of Conflicting Interests

The author declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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6. Statements of publication ethics

I hereby declare that the study has not unethical issues and that research and publication ethics have been observed carefully.

7. Ethics Committee Approval Information

Ethics Committee Approval is not required for this this research because it is a compilation study.

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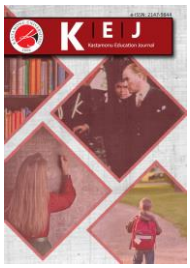

| Research Article / Araştırma Makalesi |

Pre-Service Social Studies Teachers' Perceptions of Social Problems

Sosyal Bilgiler Öğretmen Adaylarının Sosyal Problem Algısı[1]

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Keywords
1.Social problem
2.Social studies
3.Pre-service teacher

Anahtar Kelimeler
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Abstract

Purpose: The main purpose of this research is to understand pre-service social studies teachers' perceptions of social problems.

Design/Methodology/Approach: The phenomenological design was employed in order to investigate pre-service social studies teachers' perceptions of social problems. Participants are consisted of eight pre-service social studies teachers. Data was obtained in the fall semester in 2016-2017 academic year. Semi-structured interviews were used as data collection tool. The inductive analysis approach was adopted to analysis data.

Findings: As a result of the research, it was revealed that there are similarities between the pre-service social studies teachers' perceptions of social problems and functionalist (structuralist), confrontational, symbolic interactionist and social constructivist theories.

Highlights: It was concluded that pre-service social studies teachers' perceptions of social problem are shaped by different resources such as family, culture, political groups, and mass media. Besides, it was found that pre-service social studies teachers did not feel that they have enough skills and experiences about how to teach social problems in the courses.

Öz

Çalışmanın amacı: Bu araştırmanın temel amacı sosyal bilgiler öğretmen adaylarının sosyal problem algısının belirlenmesidir.

Materyal ve Yöntem: Araştırmada nitel araştırma yöntemlerinden biri olan fenomenoloji kullanılmıştır. Araştırmanın çalışma grubunu sekiz sosyal bilgiler öğretmen adayı oluşturmaktadır. Araştırmada veri toplama aracı olarak yarı yapılandırılmış görüşme kullanılmıştır. Araştırmanın verileri 2016- 2017 eğitim öğretim yılı güz döneminde toplanmıştır. Araştırma kapsamında elde edilen verilerin analizinde tümevarımsal analiz yaklaşımı benimsenmiştir.

Bulgular: Araştırmada sosyal bilgiler öğretmen adaylarının sosyal problem algısı ile yapısalcı, sosyal yapılandırmacı, sembolik etkileşimci ve çatışmacı kuramlar arasında benzerlikler olduğu belirlenmiştir.

Önemli Vurgular: Araştırmada sosyal bilgiler öğretmen adaylarının sosyal problem algısının aile, kültür ve kitle iletişim araçları gibi çeşitli kaynakların şekillendirdiği görülmüştür. Ayrıca sosyal bilgiler öğretmen adaylarının sosyal problemlerin öğretimine ilişkin yeterli becerilere sahip olmadıklarını düşündüğü sonucuna ulaşılmıştır.

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INTRODUCTION

Over the years, many theories have been asserted trying to explain and make sense of the human mind and behavior. Cognitive theories defending the importance of cognitive structures in the human mind and behavior are at the top of these theories. On the other hand, many theories arguing that cognitive theories are insufficient have also been conducted. Social learning theory, suggested by Albert Bandura and attracting a lot of attention by many people, is one of these theories.

Social learning theory states that environmental factors are ignored in understanding human mind and behavior and that these factors are at least as important as cognitive structures of people (Bandura, 1985).Bandura argues that individuals learn by modeling the behaviors and thoughts of people they consider valuable in their environment, and that today's ideas, values, beliefs, perceptions, and perspectives on life are socially transmitted (Bandura, 1997; Bandura, 2011).Teachers are the leading individuals that individuals take as models (Bahn, 2001; Bandura, 2019).Therefore, on the basis of social learning theory, it can be said that the knowledge, skills, values, attitudes, and behaviors of teachers influence on the knowledge, skills, values, attitudes, and behaviours that students acquire. Teachers' knowledge, skills, values, attitudes, and behaviors are strongly related to their perception of the environment as everyone else does. Because people act according to their perceptions and their personal characteristics, which are shaped based on their perceptions (Efron, 1969; Takvam, 2010).

In Turkey, in primary school 4th grade and middle school 5th, 6th, and 7th grades social studies is taught, includes some issues based on the social sciences such as sociology and psychology, and it is a course that aims to raise active citizens by presenting these topics in accordance with the level of the target audience (Özturk, 2012). Hence, one of the most important aims of the social studies course is to educate students as citizens who are aware of and sensitive to social problems in their social environment. As a matter of fact, the statement "believing in the importance of participation and suggesting distinctive opinions to find solutions to personal and common problems," which is among the specific aims of the social studies curriculum, shows this position more clearly. In addition, the explanation as "They realize how to preserve individual rights and social order in regimes that the main source of sovereignty depends on the nation by understanding how to solve and how to maintain order," which is one of the learning fields in the curriculum, (for example, the social studies curriculum includes in "Active Citizenship" learning field) is clearly suggests that social studies has an important role in solving social problems (MoNE, 2018).

Social Problem

In literature, there is no consensus on the definition of nature of social problems. However, researchers tried to make definitions with different approaches, based on the main features of social problems. Macionis (2015) define social problem as generally disputable structured situation that damage the welfare of a part of or the whole society, while Alessio (2011) defines it as a situation that damages the one or more individual, or social institution; and has at least one social cause or social effect and has one or more social solution. On the other hand, Leon-Guerro (2005) defines the social problem as objective or subjective situations that affect the individuals, the social life, and the physical world negatively.

Although how social problems emerge is unknown, the researchers tried to understand and define the reasons for social problems with the various theories. For example; while the functionalists assert that the social problems emerge from the structure of the society that inflicted by the changing norms and values of the society (Scarpitti, et al,, 1997); Conflict Theory claims that social problems emerge from the desire of the social groups to create oppression and exploitation over each other. (Coleman, 1998). Apart from these, there are approaches as class theory, boundary theory, critical theory, feminist theory, minority group theory, moral panic theory, social control theory, social exchange theory, socialization theory, and just war theory to explain the reasons of the social problems (Burcu et al., 2014).

Importance of the Study

There are different definitions and different approaches to social problems in the literature. These definitions and approaches lead to the emergence of perceptual differences regarding social problems. Accordingly, it can be said that social problems are perceived and interpreted in different ways from society to society, from time to time, and even from person to person. Social studies teachers, like other individuals, can perceive social problems differently from each other. Since how social studies teachers perceive social problems will have an affect on their way of including and teaching social problems, it is extremely important to know teachers' perceptions of social problems.

In order for teachers to guide their students in a subject that concerns the whole world, such as social problems, and to provide students with the necessary knowledge, skills, values, attitudes, and behaviors, they must first have acquired these knowledge, skills, values, attitudes, and behaviors before becoming a teacher. The acquisition of these skills can be achieved through teacher training in higher education. Therefore, it is important to understand how pre-service teachers' perceive social problems in order to provide the necessary training before they become teachers.

In the field of education, it is seen that there are studies trying to explain the social problem perception of professionals working in various branches in primary schools, pre-service teachers, high school, and university students. (Erwin, 2002; Voormann, 2005; Mora & Trujillo, 2007, Erdem, 2010; Pashkevich, 2011; Bautista Urrego & Parra Toro, 2016; Kurt, 2016). Also, it is seen that there are pre-service social studies teachers among the participants and researches aiming to determine the social problems and their opinions about the solution of these problems. (Koç & Palabıyık, 2012; İbret, Karasu Avcı & Recepoğlu, 2016).

However, when the related literature is examined, it is seen that there is no research that tries to understand and explain the social problem perception of pre-service social studies teachers by obtaining in-depth data. It is thought that this research will contribute to the literature in this sense and it is considered important. This research aims to understand and explain how pre-service social studies teachers perceive social problems. For this purpose, the following questions will be searched in this research:

1. What is the perception of social problem of pre-service social studies teachers?
2. How do pre-service social studies teachers explain the relationship between social studies education and social problems?

METHOD

This research, which aims to understand and explain the perceptions of pre-service social studies teachers on social problems, is designed by phenomenology from qualitative research methods. Researchers, in the phenomenological research design, try to explain how the phenomenon subject to research is structured and interpreted by individuals. (Bogdan & Biklen, 2007). In this study, the phenomenology design was found appropriate for the nature of this research because of the attempt to explain how participants perceive, understand and experience social problems.

Participants of the Research

Depending upon the purpose of the research, the pre-service social studies teachers who took “Global World Problems” course as a compulsory course and “Global Education” course as an elective course in the social studies teacher education programs; are determined as the intentional participants in the research, during the study period. Because one of the focal points of Global World Problems and Global Education courses is social problems and debates on social problems; pre-service social studies teachers who took these courses were included in the study on a voluntary basis. Therefore, the participants of the research consists of eight volunteers as pre-service social studies teachers in the social studies teacher education program at a state university in Turkey who took "Global World Problems" and "Global Education" courses. The information of the participants is presented in Table 1.

Table 1. Information of Participants

Participants	Age	Sex	Hometown	Mother’s Education Status	Father’s Education Status	High School Type	Non Governmentl Organization Membership
Ömer	22	Male	Ağrı	Literate	University	Common High School	No
Ebru	22	Female	Eskişehir	Secondary School	Secondary School	Common High School	No
Ayhan	24	Male	Eskişehir	High School	Primary School	Common High School	No
Merve	22	Female	Ağrı, İstanbul	Illiterate	Primary School	Common High School	No
Kadir	24	Male	Kahramanmaraş, Aydın	Primary School	Primary School	Anatolian Vocational High School	Yes
Sena	22	Female	Mardin	Primary School	College	Anatolian High School	No
Arif	23	Male	Diyarbakır, İstanbul	Illiterate	Primary School	Common High School	No
Damla	25	Female	Artvin	Primary School	Primary School	Open Education High School	No

Data Collection and Analysis

In this study, individual semi-structured interviews were conducted two times with the participants to obtain in-depth data on how participants perceived social problems in the fall semester in 2016-2017 academic year. Because the interviews allow the researcher to understand the whole complexity of a phenomenon by providing the opportunity to understand and explain what the participants think or feel about something and to capture that is not seen, it will not be seen or has to be seen (Glesne, 2014). Semi-structured interview questions were prepared considering the aim of the study and related literature. The draft interview questions were examined by two experts in the field of social studies education and necessary corrections and arrangements were made in line with the opinions of the experts. Thereafter the researchers conducted a pilot interview with a pre-service social studies teacher on the subject of global education and global world problems. This pre-service teacher was not included in the study. After the pilot interview, the questions were rearranged. For instance, some questions were combined in one question and some term preferences were changed according to feedbacks which were obtained from the pilot interview. Consequently, the semi-structured interview questions were finalized.

In pilot interviews, it was seen that using the concept of "common problem" rather than "social problem" was more understandable and the concept of "common problem" was used in the interviews. The semi-structured interviews with the participants were performed in the interview rooms where the sound insulation was made and recorded through two voice recorders. In addition to semi-structured interviews, the research logger was kept by the researcher both during the data collection process and in the data analysis process and these data were included in the analysis process.

In the study, participants were given information on how research data were stored and analysed, and what rights they had in the research process and verbal and written approvals of the participants were obtained. Table 2 shows the duration of the semistructured interviews with the participants.

Table 2. The Duration of The Semi-Structured Interviews

Participants	1. Duration of Interview (min: sec)	2.Duration of Interview (min: sec)
Ayhan	25:27	20:21
Neslihan	21:36	16:33
Damla	35:40	31:17
Kadir	33:43	25:32
Arif	30:48	34:36
Ebru	31:32	17:57
Ömer	32:52	10:16
Merve	31:37	18:46

Before the data is analysed, the semi-structured interviews were transcribed; after that, these texts were then transferred to the NVIVO 11 package program. The transferred data was first coded line by line before using the inductive analysis approach; from the codes to the themes and then the themes to the findings were found. In order to ensure trustworthiness of the study, peer-debriefing strategy was employed. In scope of the peer-debriefing sessions, a part of the data was given to independent field expert and re-analyzed by him. Analysis were compared and researchers and independent researcher discussed about analysis according to their codes and themes until a consensus was reached.

FINDINGS

In this section, the findings obtained from the research data are presented under two headings: "Social Problem Perception" and "Social Problems and Social Studies Relationship". The themes obtained from the analysis of the research data are shown in Figure 1.

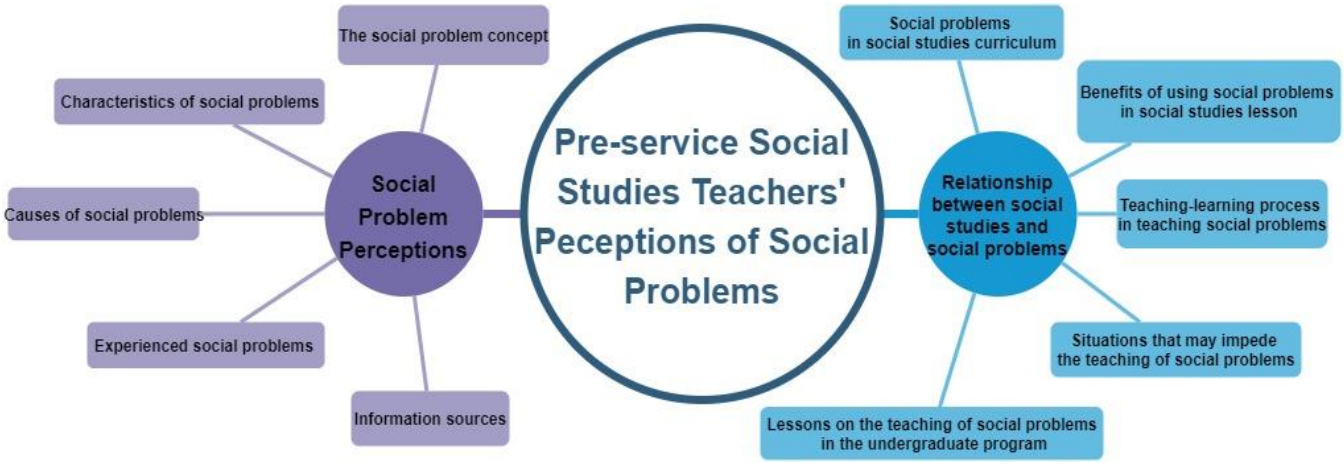

Figure 1. Pre-Service Social Studies Teachers' Perceptions of Social Problems

It is seen that the data obtained about the social problem perception of the pre-service teachers consist of five themes such as “the social problem concept”, “the characteristics of social problems”, “the reasons of social problems”, “the experienced social problems” and “information sources”. Findings on how these participants perceive social problems are also taken from these themes.

Concept of Social Problem

In the study, it was seen that the participants defined social problems as “the problems that disturb the general public”, “common problem of a group” and “problems that violate personal rights and freedoms”. It is understood that some of the pre-service teachers were looking at the effect of the problem and some of them were looking at the focus of the subject when they were trying to make a definition.

As one of the participants who define social problems as problems that disturb the general public, Damla explained as “I can say things that cause anxiety and problem in everyone”.And she indicated that she sees; construction of hydroelectric power plants (HEPP), terrorist activities, violence against women and minorities, discrimination, refugees, skewed urbanization, environmental pollution, oppression of LGBT individuals and rape as social problems. Similarly, Ayhan who was born and raised in Eskisehir and never lived apart from her family for a long time; and defined social problem as ”If there is something in society that many people don't want, I think this should be" and he gave, child abuse, gender inequality, and discrimination as examples of social problems. But Ayhan's examples of social problems were found to be quite low compared to the other participants. Ayhan’s statements as “I can say...I don't see too much for living in Eskisehir. At least I don't encounter in my daily life. I read a lot in the news, but they are not the things I've seen around me (…) As I said, we learn more from news or people around us, from their lives” show that he has no social problems that affect him or he is aware of in his environment, but he has learned the existence of some social problems and heard some of them when he comes to university. As a matter of fact, from Ayhan’s statement :

> For example, the concept of mores (moral laws). It's something we've heard so much, but something I've never seen, not in my life. This is something about where I live in and it's a social situation. There are no mores in Eskisehir. Because there are no family ties, or I should rather say the kinship ties are not very strong there aren't this type of things

It is understood that Ayhan, have become aware of the many social problems when he encounters and interacts with people from many different regions of Turkey.

Some of the participants stated that it was not necessary for an event or phenomenon to affect everyone to accept it as a social problem; they stated that the problems that affect certain segments of society may also be a social problem. For example, Neslihan was born and raised in Mardin in the Southeastern Anatolia Region, stated that the problems that are affected by a certain group of society can be accepted as a social problem by saying " a part of society must be disturbed by this thing". In addition, Neslihan stated that discrimination, environmental problems, terrorism, weakness of local administrations and compulsory religious education in schools are social problems. Similarly, Damla who was born and raised in Artvin in the Eastern Black Sea region explained that situations that affect a small group in a society can be called a social problem by saying "There are pathless villages and this is a common problem for them. There is no need to affect the whole region."

Some of the participants explained social problems as violations of personal rights and freedoms. During his undergraduate studies, Arif who took a part in critical theater plays explained the social problem by saying that “Social problem; If the rest of the country is disturbed by the practices of a certain segment, it is a social problem if it violates personal rights and freedoms". He gave discrimination, distorted urbanization, refugee problem, animal rights problem, unemployment, oppression on LGBT people, Cyprus problem, Israel-Palestine problem, foreign relations, gender inequality, education and freedom of belief as examples of social problems. Considering the examples given by Arif in parallel with the definition of social problems, it is understood that the governmental administration perceives the practices related to the policies implemented in both domestic and foreign relations as social problems. Apart from these definitions, one of the participants, Damla tried to make a certain definition, but she had difficulty in making a definition. And she explained that she did not think about what the social problem was before, but she encountered in her daily life. Based on all these discourses; the participants faced many social problems directly or indirectly in their daily lives; however, it can be said that they have problems in defining the social problem. On the other hand, it is among the findings of the study that the participants have an idea about social problems and explain these ideas with examples.

Characteristics of Social Problems Through the Eyes of the Participants

Another finding of the study is that the participants describe the characteristics of the social problem as is being relative, includes violence, affects people negatively, creates a restless environment and causes another social problem. Indicating that the social problems are relative, the pre-service teachers stated that the social problems vary from culture to culture, from society to society, and from time to time. And they explained that an event or phenomenon considered as a social problem in a certain time or society may not be seen as a social problem at another time or in another society. Merve, one of the participants, stated that violence against women is not accepted as a problem in ancient times because it was different from the conditions of today; as saying “ For example, when we look at ancient times, there were matriarchal societies. Then it changed to the patriarchal society. That's why the woman has just started to make a little bit of voice. Violence has begun to be used because of that.” Similarly, Merve stated that a problem as a social problem could change from one society to another by saying “ Social problems may vary according to me (…) Something that is not a problem for me could be a problem for another society. I think this is a very subjective

situation.” Damla who also thinks social problems may vary in different cultures, tried to explain this changing situation by saying "We are growing from childhood to youth, so we face the social problems that way. We encounter the experience of living and can be the views of the family on the basis. It can be culture, traditions, customs. In other words, they may affect our perspective on social problems".

Finally, the participants stated that social problems can cause other social problems and they are among the features of social problems. Saying that "Robbery, I don't know, rape or other things. It's a social problem, I mean (…) these things cause other problems",Merve stated that the policies carried out for the refugees under the protection of the state in Turkey, caused a number of social problems (theft, rape, etc.) and that she believed these problems would lead to other social problems in the future.

For social problems, a pre-service social studies teacher stated that, unlike her friends, another characteristic of social problems is that they contain violence. One of the participants Damla stated that physical and emotional violence situations can be considered as social problems by saying "I think it's a problem when a situation turns into violence. Violence is not necessarily to be physical violence. It can be language, insult or exclusion from the society". Based on all these discourses; It can be said that pre-service social studies teachers interpret the characteristics of social problems in terms of the affected party more and think and evaluate them more at the national level.

Causes of Social Problems in the Eyes of the Participants

The pre-service teachers stated that the state practices made for the benefit of society can be misunderstood by people sometimes, due to the social change, social structure, and the perception created by the media and also miscommunication and misunderstanding could cause social problems.

Some of the participants pointed to issues such as social justice, law, protection of personal rights and freedoms, and stated that experienced practices that they thought had a negative impact on these elements could cause a social problem. Ayhan, one of the participants :

> When you open the news, you see that a woman was killed. The judge has sentenced him to 10 years. His prison time got shorter and shorter because of good conduct abatement. The sentence has dropped to very disparaging figures. I think it doesn't really affect people. Even in the simplest case, someone can commit a crime by thinking that the punishment is small. I think there's a bit of trouble in the law.

He emphasized the application of the rules of law to ensure social justice and explained that the sense of injustice not only causes social problems but also increases them.

Some of the participants stated that social problems are caused by people's insensitivity, lack of empathy and inability to tolerate. Some of the pre-service teachers stated that people do not make a sound if the problem does not affect them and that if they do, they accept it and make it logical for them as unilateral and cannot have empathy on this issue and this leads to social problems. Neslihan stated that she believed that not having empathy triggered social problems by saying; “Violence against women. Killings of women. Racism. There's no empathy. That's why these things happen.”

Similarly, Damla explained that the constraints caused by the effects of gender roles and the lack of empathy caused social problems:

> The thought of the educated or the uneducated person is the same. In fact, it gets ugly. People are trying, to make sense of it. For example, at 3:00 a.m., what was she doing on the street? , they say. Does this require him to rape? What kind of perspective is this? Or rape is the event there, but the problem is that the woman has gone out at night.

In her statements, Damla also stated that she believed that realization was made more by women, and that this was due to the women feeling weak because of the lack of economic freedom in society. One of the participants, Ömer, from another perspective, emphasized the conflicts between ethnic groups and explained that such problems stem from the fact that people do not tolerate each other:

> We live in Turkey. There are different groups. Of course, this is normal. The fact that being different makes society more beautiful. Tolerance is needed for this society to live together. Without tolerance, these people cannot live together. The common points are tolerance and patience. Intolerant groups do not agree with each other.

Participants stated that behaviors such as lack of empathy, insensitivity, and inability to tolerate were caused by the lack of cultivation and reading habits. One of the participants Arif believed that empathy and respect for different cultures were not achieved because of the family education or the inadequacy of education on this subject:

> I think that is something comes from the family. Let's consider a high school student. The child sees that from the family until that time. For example, when we look at the past we see the oppression on different cultures. In Turkey, the mainstream is emphasizing the culture and cultural glorification. And that actually prevents respect for different cultures. From an early age, the child learns that and behaves like that.

Damla stated that the reason behind the lack of empathy is that people do not have reading habits, as saying “We can also learn a lot from the books. There is only one right for a person who doesn't read a book, and this one believes in that one truth. This person learns what serves her/his purpose”

In addition, the participants stated that the lack of communication among the people caused social problems. One of the participants Ayhan stated that people do not interact with each other, make comments without knowing them and try not to

understand each other because they are different from oneself cause social problems. Ayhan also added that “I think the media is effective in this. Because when you open the news, there's a lot of things that can disturb people all the time”. And he stated that the media is effective on the occurrence of social problems. Similarly, Merve stated that social problems arise “because people do not listen to each other”. Also, Merve added “We are not open to development. We can't keep up with the age. As we know, we have blinkers on. We're not looking around. People who perceive the Westernization as language only." and she emphasized that the emergence of social problems in societies which are not open to change is also natural.

Kadir, being the only participant who is an active member of an NGO, stated that the only reason behind the social problems is the conflicts in society, and he explained that by saying; "Social problems actually arise from people's conflicts within society. We see this in many civilizations, in many countries, whether in the past or not. Cultural, ethnic, linguistic and religious conflicts are in fact social problems. There are conflicts on the basis. Everything actually stems from here". Also, he emphasized that the struggle for power that people tried to establish on each other caused conflicts by saying: “Why do people clash? From the power struggle. I'm not tying it to politics. There may also be a power struggle within a small institution (…) Even a rebellion against a mother or a father is a social problem. Because we live in a patriarchal society. [Rebellion against the father] is a social uprising". One of the participants, Damla explained that it is inevitable to have social problems in societies where different cultures live together, by saying: "It can be natural. Because people have very different opinions. Lifestyles, geographies, the language they speak, the society in which they live, and the culture are different. I think they affect"

Most of the participants stated that social problems stemmed from the social structure and they indicated that patriarchal structures that maintain its presence in Turkey as in many societies created pressure on people and this situation creates a number of problems. Neslihan gave an example to the problem of violence against women "We are coming from a patriarchal society. This is reflected in everything because we are a society founded on this basis" and explained that the most problems, especially violence against women, stem from this structure. On the other hand, she added "We are not a very democratic society either. We have no tradition as democracy. For example, people, states, peoples have achieved something by fighting; but In Turkey, we had [many things] without fighting for them [with the law] so we were unable to internalize them well”. And Neslihan emphasized that the inability to fully achieve the democratic structure leads up to different social problems.

Among the participants of the study, there is a pre-service social studies teacher who thinks that social change causes social problems. Merve tried to explain that the emergence of social problems in the societies in which people are closed to change is natural by saying "We are not open to development. We can't keep up with the age. As we know, we have blinkers on. We're not looking around. People who perceive the Westernization as language only."

Based on all these discourses; the reasons underlying the social problems of the participants are insensitivity, lack of communication, interpersonal conflict, social polarization and cultural differences, the perception created by the media, social change, social structure and democracy problem. And it is seen that these participants generally explained these problems thinking Turkey and its borders in particular. Although interpersonal conflict, social change, etc. are seen among social problems, not only in Turkey but also in other countries; descriptions of the participants have been involved in their environment or borders of Turkey. On the other hand, although the participants tried to explain the reasons for the social problems from different points, they mentioned violence against women as a serious social problem and they mentioned in their examples. This situation shows that violence against women is a social problem regardless of the perspective.

Social Problems Experienced by Participants

Findings related to social problems experienced by pre-service teachers were also found among the findings of the study. Participants also stated that they personally experienced social problems such as discrimination, identity problem, unemployment, bureaucracy, gender inequality, and traffic. However, it was observed that there were quantitative differences between the social problems that the participants experienced or affected and the social problems they exemplified. In addition, it was understood that the participants did not see the problems experienced in the society such as environmental pollution, migration, economy as direct or indirect problems in daily life, but did not see them as experienced problems. The social problems experienced by the pre-service teachers are given in Table 3.

Table 3. Examples of Participants Related to Social Problems and Social Problems They Experienced

Participant	Social Problem Examples		Experienced Social Problems
Merve	• Unemployment, • Environmental pollution, • Gender inequality • Rape • Mores • Slavery	• Violence against women • Communication • Immigration • Using internet unconsciously • Discrimination • Thievery	• Unemployment, • Gender inequality • Discrimination

Arif	• Gender inequality • Cyprus issue • Israel-Palestine issue • Foreign affairs • The Arab Spring • Economical Problems • LGBT	• Unemployment, • Violation of Animal Rights • Education • Violation of freedom of religion and belief • Unplanned urbanization • Discrimination	• Unemployment • Discrimination
Neslihan	• The weakness of local administrations • Terrorism • LGBT • Violence against women • HEPP	• Economical Problems • Compulsory Religion Lesson • Environmental pollution • Discrimination	• Violence against women
Kadir	• Domestic problems, • Democracy • Gender inequality, • Rape • LGBT • Violence against women • Unemployment	• Worker Deaths • The first Turkish States • Everything • Discrimination • The Rights of Academicians • Bureaucratic barrier • Suicide bombers	• Democracy • Discrimination • Bureaucratic barrier
Damla	• The weakness of local administrations • Rape • Zika virus • Ebola • LGBT • Vendetta • Violence against women • HEPP	• Immigration • Economical Problems • Environmental pollution, • Unplanned urbanization • Violence against minorities • Discrimination • Public security • Suicide bombers	• Discrimination • HEPP • Violence against women • Transportation
Ebru	• Presidential system • Abuse • People don't line up • Abortion Law • Fear • Violation of animal rights	• Immigration • Tension • Compulsory Religion Lesson • Environmental pollution, • Discrimination	• Fear • Tension • Immigration
Ayhan	• Gender inequality • Terrorism • Mores	• Violence against women • Child abuse • Discrimination	• Gender inequality
Ömer	• Fascism • Drugs • Gender inequality • LGBT • Vendetta • Violence against women	• Unemployment • Intolerance • Immigration • Compulsory Religion Lesson • Coup • Discrimination	• Discrimination • Identity • Gender inequality

Information Sources of the Participants

The participants stated that they learned the information about social problems from the circle of friends, the lessons taken in undergraduate education, written sources such as magazines, newspapers and books, visual media such as social media, internet sites, and television programs and they experienced some social problems by experiencing them personally. Neslihan stated that her sources of information were books, television programs and friends; "I'm trying to read books. I have friends, some of them are more knowledgeable than me. I sometimes try to follow discussion programs to learn what's going on and what do they think". Kadir, who thinks that there are conflicts and violence on the basis of social problems, explains that he has learned by experiencing

them as saying “I live. So no need to learn. In Suruc, 33 people died. I know them all. We were together a week before we died. I was drinking tea at the same table as I am now and I lost 33 of them”. Among these courses, prospective teachers mostly stated that they had acquired information about global education, current world problems, special teaching methods and social problems in the teaching of controversial and contemporary subjects.

Participants indicated that they learned in-depth information on social problems, mostly from their undergraduate courses such as social psychology, philosophy, sociology, fundamentals of social studies, special teaching methods, introduction to political science, contemporary world problems in mandatory courses as History of Republic of Turkey and global education, discussion of controversial and current issues as elective courses. The participants stated that the presentations, the films they followed and the discussions were effective in these courses.

Relationship Between Social Studies and Social Problems in the Eyes of the Participants

Based on the data on the social problems and social problems obtained from pre-service teachers, five themes were reached ; “social studies in social studies teaching curriculum”, “teaching-learning process in teaching social problems”, “benefits of including social problems in social studies” and “lectures on teaching social problems in the undergraduate program”. From these themes, it was found that how pre-service teachers perceive and explain the relationship between social studies and social problems.

Social Problems in Social Studies Curriculum

Pre-service teachers indicate that there are gains or information on social problems in the social studies, but they also stated that social problems subjects such as gender inequality and violence against women are not included in the program. In addition, pre-service teachers explained that many social problems, although not directly related, could be explained by associating them with an appropriate acquisition of the social studies course. Neslihan has tried to explain that the social studies course includes current issues and that social problems are among the current issues and therefore the social studies course also includes social problems by saying "The Social studies course is already a lesson on this basis. It includes topics such as history, geography, and citizenship. All of them are current, issues related to society (...)" and "of course we have social events in what we live”. Also, Neslihan added that "As far as we have examined in the lessons, there is not much about women's rights. Even in very few ways, the woman's name goes by. But this issue is an important issue in our society" and she emphasized that the current position of women and women's rights in Turkey is quite an important social problem; however, this subject was not included in the social studies curriculum. Similarly, Ayhan also stated that there are no learning outcomes directly related to gender inequality in the Social studies Curriculum; In fact, he explained that there are few learning outcomes that might be indirectly related:

> In many of our lessons, we examined all the learning outcomes. Well, at least we haven't studied it all. We're talking about sexism, and we're already talking about it as a lesson. In the global education course, we examined the learning outcomes of all 4 years as the title of sexism. There is not a direct line, even the outcomes didn't exceed 10. Maybe it was less.

Benefits of Including Social Problems in Social Studies Course

Pre-service teachers stated that it is important to give social problems in social studies lessons to gain some skills and values such as empathy, respect for differences and sensitivity in students. Ebru stated that when social problems are included in a social studies lesson, students may become sensitive to social problems as saying "It seems to be better for them to articulate such problems in classes where children may be sensitive to social problems such as social studies lessons". In addition to that, she emphasized that social problems can be utilized in creating active citizenship. Ebru "In a social studies lesson, social problems and current problems can be discussed. The subjects of citizenship, especially social studies lessons, are one of the courses where children can learn their rights and responsibilities, at the same time they can protect them, internalize them and take the decision-making process." and stated that social problems in a social studies lesson would be useful for students to gain active citizenship awareness. While explaining the importance of social problems in social studies, participants mentioned only critical thinking and empathy skills from the skills to be gained in the curriculum, and values of respect and equality for differences.

Teaching-Learning Process in Teaching Social Problems

The pre-service teachers focused on the role of teachers in the teaching-learning process of teaching social problems. They also stated that social studies teachers must objective about their roles in this process. Omer, one of these pre-service teachers:

> I don't know teachers must leave their thoughts. If there are 30 people in the class, they must be equal, fair, respectful to 30 people. They must show this affection to everyone at the same rate. A teacher has no right to give her/his student a high score for having a similar view or label the student if he/she thinks different or for being naughty. You know, a teacher must be equal to everyone.

With this statement, he stated that teachers should behave fairly, respectfully and be respectful both in this process and against students. In addition, pre-service social studies teachers stated that social studies teachers should be sensitive to social problems because the personality traits of the teachers will be reflected in the teaching-learning process. Damla, for this subject:

> Our attitude towards social problems, whether we are sensitive or not, will affect their past perspective or thought structure. Because the teacher wants to be as objective as he /she wants, subjective emotions will affect the students and will try to direct them. Somehow you try to give them a sense of sensitivity, you try to win, or you make them very insensitive.

With these statements, she explained that if the social studies teacher is sensitive to social problems, students will also be sensitive. In this process, pre-service teachers stated that social studies teachers should give importance to critical thinking, prepare for class, be role model, create a free environment and if necessary they should step out of the social studies lesson and they also said that a number of teaching principles such as actuality and vitality should be in the teaching of social problems. Neslihan stated that the teacher should give importance to the principles of timeliness and vitality in teaching social problems by saying " Here you can go through more current events. Because s/he sees it, s/he watches it on the news. S/he can hear it from around. It can be more effective. It can be told that way". Similarly, Kadir supported Neslihan with the words "S/he should bind life, the current". In addition, it was seen that pre-service teachers emphasized the principles of learning in education, abstract to the concrete, close to far and by doing and experiencing, however, it was found that they did not establish a connection with the principles of integrity, knownness to the unknown and clarity and economy. In addition, the participants stated that social studies teachers may benefit from some methods and techniques such as discussion and case study in the process of teaching social problems. Neslihan stated that the case could be used to emphasize social problems by saying " I don't know, something about racism. For example, we can give an example case. A case from the country, then we can try to make the student find the right thing". Participants also advocated that family involvement, theater practices and, in particular, encouraging boys and girls to play more often together may be useful in the teaching-learning process.

Situations that may Impede the Teaching of Social Problems

Although the participants stated that social problems should be addressed in a social studies lesson and out-of-class teaching, they think that the attitudes of the school administration and the parents of the students can be an obstacle in teaching social problems. Pre-service teachers explained these thoughts considering the observations in the schools where they do their internship and their own educational experiences. Ayhan, one of the participants, explained that the attitudes and different expectations of parents can be an obstacle in teaching social problems with telling one of the events that happened when he was an intern teacher:

> A representative from MHP, not a well-known person, had a beautiful word. And the teacher had added that word to his slides. One of the kids got up. And said, "Isn't that a representative's word?". "Well done, you are interested in politics at this age. Well, do you know which party it is?" said the teacher. "I know MHP.," said the student. [Teacher] "Well done, sit down". That is the whole of the dialogue. The next day, at the school there were three parents asking teacher questions like "Do you do the advocacy of the MHP? Are you making propaganda?" I was in the scene, it was really nothing. Even the simplest things can be a problem at school.

Arif explained that there are a number of question marks in the conversion of theoretical knowledge into practice in teaching social problems ; "In fact, it is easy to say, for example, when I talk about the concept of sexism or a religion, do I encounter things like parents saying 'you are washing this child's brain' or his/her family making a complaint about me." Ebru stated that the support of parents and the school principal in favor of education within the framework of their wishes and goals could cause problems in teaching social problems by saying "Parents can ask for lessons that they see more important(…) Social problems may be a bit off by them (…) The fact that the manager can be in the same way, s/he can think the successes in the exams as more important". In addition, the participants think that the cultural structure of the region, the school administration, colleagues, administrative officers or fear of being blacklisted, the sensitive structure of social problems, the reaction of students and society, and also the indifference of the teacher may be impeded in teaching social problems.

Lessons on the Teaching of Social Problems in the Undergraduate Program

In the undergraduate program of social studies teacher education program, pre-service teachers have obtained information from social psychology, philosophy, sociology, fundamentals of social studies, special teaching methods, introduction to political science, contemporary world problems in mandatory courses as History of Republic of Turkey and global education, discussion of controversial and current issues as elective courses. However, pre-service teachers were informed about the teaching of social problems only in the special education methods as a compulsory course and global education and the teaching of controversial and contemporary subjects as elective courses. In addition, it has seen that information is given about social problems and teaching of social problems in global education and teaching of controversial and current subjects, but it is seen that pre-service teachers cannot adapt their knowledge acquired in these courses to the teaching of social problems. For example, Neslihan stated that social problems were included in the global education course, but how these topics should be explained in the lessons and the points about how they should be transferred to the students were not sufficiently addressed ; "In Global Education lesson empathy was told a little, but we didn't discuss what would we do in this subject or how it is told there was no such thing as that. Similarly, Damla stated that these courses were not sufficient for teaching social problems and she said: "It's not exactly enough, but it's better than nothing".

Considering the findings related to the sources of pre-service teachers' learning and teaching of social problems in the undergraduate program, it was seen that the pre-service teachers had high command and motivation for teaching, but on the other hand, their pedagogical knowledge about teaching social problems was quite shallow.

CONCLUSION, DISCUSSION AND RECOMMENDATIONS

Based on the findings of the study, it was concluded that pre-service social studies teachers could not provide an inclusive and in-depth explanation of the concept of social problems, and some of the participants stated that they talked about social problems many times every day, but that they never thought about what social problems meant, and that they felt a bit strange. However, when the data were analyzed and interpreted in more depth, it was concluded that the perceptions of the social problems varied according to the pre-service teachers, although they could not make a clear definition. For example, some of the participants

stated that the causes of social problems were conflicts in different contexts, while others stated that there were social changes in society. In addition, some participants stated that the meanings attributed to concepts, events, phenomena and some symbols were different, and thus, the failure of disagreement and non-communication gave rise to social problems. In addition, some of the pre-service teachers stated that in order to accept a problem as a social problem, a section of society should accept the problem as a social problem and the other sections of the society must accept that the problem is a social problem. From the results of the study, it is seen that there are similarities between the perceptions of prospective teachers on the functionalist (structuralist), confrontational, symbolic interactionist and social constructivist theories about social problems in the literature. In other words, although the pre-service teachers are not knowledgeable about these theories, it is seen that their perceptions are gathered and resembled around these four theories in the literature. Moskalewicz and Swiatkiewicz (1998) concluded that the social problem perceptions of individuals aged 18-55 living in Gdansk in Poland were more related to (social) constructivist and functionalist theories. Hunter and horse-Twaijir (1996) in their research the social perceptions of American citizens of Saudi Arabian citizens related to the social problems have reached the conclusion that accommodates three elements. These; ashamed by society, incidence and common perception. These results are mostly related to social constructivism theory. Kusayanagi (2013) also tried to explain with the evidence from newspaper news, how an event that occurred in Japan was not seen as a social problem and how social perceptions of individuals change with Social Constructivism theory. Research shows that similar results with the results of other relevant studies.

Another result of the research is that the social groups the pre-service social studies teachers participate in pre-university and pre-university education and the activities they participate in shape the social problem perceptions. For example, It is concluded that the participant who plays theater plays on social criticism has similarities with the symbolic Interactionist theory, while a participant who has a political understanding that is a member of a more minority ethnic group and who is actively participating in activities in this direction is closer to the concept of social problem than to the conflict theory. In addition, it was concluded that the diversity of the cities where the participants live has shaped their perceptions of social problems. It is seen that the concept of social problems, the examples they give about the social problems, the explanation about the characteristics of social problems and the social problems they experienced of the pre-service teachers who are born and raised in different cities and who are studying in a different cities are very different and they are also aware of these. For example, one of the participants living in an area where water resources and forests are dense stated that HEPPs is a social problem. On the other hand, It was observed that the participant's examples, who was born and raised in the city where s/he was studying, were not as diverse as the other participants. Koc and Palabiyik (2012) concluded that the pre-service teachers' political identities and the regions where they live played a decisive role in evaluating social problems. In his study, Wilson (1981) concluded that students with disabilities and non-disabled faced the same social problems, but the social problem perceptions of the students in the school in the rural area and in the school in the city center differed. In the study conducted by Kurtdede Fidan (2016), it was concluded that fourth-grade students had an impact on their sensitivity to social problems, and that family members' occupational backgrounds and educational backgrounds were effective on their sensitivity to social problems. The results of this study and the results of other researches are similar to each other. In addition, Voorman (2005) concluded that gender was an important factor in shaping the perceptions of individuals about social problems. In contrast to the results of this study, Parmee (1966) concluded that the inclusion of ethnic groups with different cultures had no effect on students 'social problem perception but the mainstream culture shaped students' perception of social problems. Another finding of the research is that the pre-service teachers think about the reasons of social problems in the context of the practices of the people and the structure of the society and the policies implemented in the country. Driedger (1974) in his study with the US preachers, he concluded preachers of the power of the country to control the society applied to control the censorship, interventions and personal freedoms were factors triggering social problems. The results of other studies with similar results show that social environment is very important in pre-service social studies teachers' knowledge and perceptions about social problem, so this situation can be explained by Bandura's social learning theory.

In addition, it was seen that the pre-service teachers' explanations about the causes of social problems were in the axis of human-human and human-state interaction, but they did not make a statement about state-state interaction. In addition to these, there were participants who stated that the causes of social problems were not one-dimensional, one of the social problems was the result of another social problem, and even this social problem was the result of another social problem. Kızılçelik (1991) also found that social problems such as squattering, unemployment, rapid population growth, cultural decay, alienation, anomy and deviation caused by industrialization and urbanization increase crime events. In addition, in the study conducted by Komurcu and Avşar Negiz (2016), it was concluded that the causes of child labor, which is a social problem, were migration, education, and financial income. The results of the research conducted by Kızılçelik (1991) and Kömürcü and Avşar (2016) are similar to the results of a social problem.

When we look at the examples of pre-service teachers about social problems, the meanings they give to the concept of social problems, their thoughts on the characteristics of social problems, based upon the examples they give to social problems are in national sense, they make an assessment in terms of international or global, and therefore social problems occurring on a global scale were shown overlooked. Günel (2016) concluded in his study that social studies have limited global views of prospective teachers. Günel's (2016) research with the conclusions of these results appears to be similar. Similarly, Özturk and Günel (2016) concluded that social studies teachers have an ambiguous perception of global systems. In addition, in the study where Günel and Pehlivan (2016) investigated the perceptions of pre-service social studies teachers about global citizenship education, it was seen that the participants had a very limited definition of global citizenship and had many misconceptions.

Another important finding of the research is that the pre-service teachers are not aware that they are experiencing some social problems encountered in their social lives. For example, environmental pollution, seen in almost every region and even more felt in cities in Turkey, no participant has identified it among the social problems they experienced. Even the participants, who thought that environmental pollution was a social problem, did not show environmental pollution among the social problems they experienced. Besides, they did not specify the distorted urbanization in which they live, the failure of drivers and pedestrians not obeying the traffic rules, among the social problems they experience. Therefore, it was observed that the participants were aware of some social problems but their awareness of the social problems they experienced was quite limited. In the research, it was found that the pre-service teachers got information about the social problems in many ways from the discussions they had with their friends to the books they read, from undergraduate courses to social media, from discussion programs to newspapers. Based on this finding, it has been concluded that the sources of information that shape the social problem perception of pre-service teachers are quite diverse but not profound. However, it was observed that pre-service teachers did not specify the experience which is the most effective and permanent source of information among the sources of social problems. Yan and Liu (2016) concluded in their study that the media has an impact on the social problem perception of individuals. Kaufman, Huss, and Segal-Engelchin (2011) concluded in their study that undergraduate students interacted with society for a year to change and shape their social problem perceptions. This result of the study and the results of other related researches are similar to each other.

In the study, it was determined that pre-service social studies teachers thought that including social problems in social studies lesson contributed to the development of many skills and values in the curriculum. Similarly, many studies reveal that dealing with current issues and social problems in social studies course contributes to the development of values and skills in the curriculum. (Baloğlu Uğurlu and Doğan, 2016; Copur and Demirel, 2016; Kruger, 2012; Kuş, 2015; Kuş and Öztürk, 2019; Linowes, Misco, Ho and Sthalsmith, 2019; Misco, 2014; Misco, Kuwabara, Ogawa and Lyons, 2018). Hence, it can be said that including social problems in social studies lessons and discussing them in-class can be one of the effective ways to reach the goals of the course.

As a result of the study, it was seen that the pre-service social studies teachers received a lot of information about the social problems in the courses they took in the training, but their knowledge, skills and experience related to the teaching of social problems were quite limited. In other words, pre-service social studies teachers feel that they have sufficient knowledge and motivation about social problems but do not have an understanding of how to teach these subjects. This lack of skills and knowledge how to teach social problems and current and controversial issues were concluded in the many studies (Busey and Mooney, 2014; Camicia; 2008; Clabough et al., 2010; Demircioğlu, 2016; Hessi 2001; Hung, 2018; Journell, 2011; İbret, Karasu Avcı and Recepoğlu, 2016; Segall and Gaudelli, 2007; Yılmaz, 2012). Based on these results of the studies, it can be said that courses in the undergraduate program related to the teaching of social problems are quite inadequate or that the lecturers of the course do not function effectively and efficiently in the teaching of social problems. As a matter of fact, studies have indicated that the inadequacy in teaching social problems and controversial issues is due to the limited training provided in pre-service training (Holden and Hicks, 2007; Kuş and Öztürk, 2019; Misco and Patterson, 2007; Oulton et al., 2004).

At the end of the research, the following suggestions can be taken:

- In order to contribute positively to the perception of pre-service social studies teacher candiates regarding social problems, sources with different views on social problems can be used in lessons and discussions can be made around these views. Thus, faculty members should try to present as many different perspectives on social problems as possible during the lessons. They can apply different approaches, methods, and techniques that can improve the critical thinking skills of pre-service social studies teachers.In order to deepen the perceptions of pre-service teachers on social problems, discussions should be conducted with the guidance of experienced faculty members. Beside this, faculty members should provide opportunites to pre-service social studies teachers to talk about social problems in the lectures. There are several lectures in the undergraduate program where this kind of problems can easily and possibly evaluated.
- Issues related to social problems in pre-service education should be addressed not only on a national context, but also on a global context, and the awareness of pre-service teachers about the social problems that may or may be experienced on a national and global scale should be increased. Teacher education should be reviewed and updated on this issue. If deemed necessary, a different course in this sense should be added to undergraduate programs.
- In order to increase the awareness of the pre-service teachers about the social problems they are experiencing, the pre-service teachers should be compared with the social problems seen in the region they live in in the context of compulsory and elective courses and the effects of these problems should be felt more. It is thought that service learning will be an effective way to improve understanding of social problems by social studies teachers. Pre-service social studies teachers can both better understand social problems and learn by experiencing them with the service learning approach. Therefore, faculty members should use this kind of teaching methods as much as possible. In addition, pre-service social studies teachers could directed to NGOs working on social problems to increase their awareness of the social problems they experience, or they should cooperate with NGOs in pre-service training.

- Pre-service social studies teachers should be given more effective pedagogical knowledge about teaching social problems and related methods and techniques should be taught. In addition, pre-service teachers' skills for teaching social problems can be improved by making micro-teaching and internship practices in pre-service education.
- Pre-service teachers should be directed to NGOs working on social problems to increase their awareness of the social problems they experience, or they should cooperate with NGOs in pre-service training.

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Statements of publication ethics

We hereby declare that the study has not unethical issues and that research and publication ethics have been observed carefully.

Researchers' contrubution rate

All authors contributed to the concept and design of the study. Önder Eryılmaz and Ayşegül Pehlivan Yılmaz collaborated on the conceptual framework, literature review and method of the study. Önder Eryılmaz analyzed the data and reported findings. Elvan Günel supervised other authors mainly in auditing findings and results of the study. Besides, Elvan Günel dealed with the translation and proofreading of the manuscript. Results, conclusion and recommendations section discussed and reported by collaboration of all authors.

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Ethical approval was obtained from the Research and Publication Committee on Ethics at Anadolu University (Protocol Number: 26558, Date: 25.03.2016).

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| Research Article / Araştırma Makalesi |

The Relationship Between Preschool Teachers' Computer and Internet Use and Online Learning Motivation

Okul Öncesi Öğretmenlerinin Bilgisayar ve İnternet Kullanımı ile Çevrimiçi Öğrenme Motivasyonları Arasındaki İlişki

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Keywords

1. Preschool education
2. Preschool teacher
3. İnternet
4. Online learning
5. Motivation

Anahtar Kelimeler

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5. Motivasyon

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Abstract

Purpose: The increasing use of technology in the world and the search for new education methods have made learning processes independent of time and space such as distance education and online learning. Moreover, health concerns have made online learning environments more popular during the pandemic process.

Design/Methodology/Approach: In this study, the relationship between pre-school teachers' computer and internet use and online learning motivation was examined. For this purpose, the relational scanning model, one of the quantitative research methods, was used in the study. The sample of the study consists of 160 preschool teachers. Computer and Internet Usage Scale and Online Learning Motivation Scales were used to collect data in the study. t- test, one-way variance (ANOVA), Pearson correlation and, simple linear regression analysis was used for data analysis.

Findings: It has been revealed that the online learning motivations of preschool teachers do not differ significantly according to gender, time spent on the internet and, the number of media tools used to access the internet. Besides, it has been observed that the online learning motivation of pre-school teachers who have just started the profession is higher than experienced teachers.

Highlights: It was revealed that as the self-efficacy of pre-school teachers using computers and the internet increased, their online learning motivation also increased.

Öz

Çalışmanın amacı: Dünyada artan teknoloji kullanımı ve yeni eğitim yöntemleri arayışı, öğrenme süreçlerini uzaktan eğitim ve çevrimiçi öğrenme gibi zamandan ve mekândan bağımsız hale getirmiştir. Dahası, sağlık sorunları, pandemi sürecinde çevrimiçi öğrenme ortamlarını daha popüler hale getirdi. Bu nedenle bu araştırmada okul öncesi öğretmenlerinin bilgisayar ve internet kullanımı ile çevrimiçi öğrenme motivasyonu arasındaki ilişki incelenmiştir.

Materyal ve Yöntem: Araştırmada nicel araştırma yöntemlerinden ilişkisel tarama modeli kullanılmıştır. Araştırmanın örneklemi 160 okul öncesi öğretmeninden oluşmaktadır. Araştırmada veri toplamak için Bilgisayar ve İnternet Kullanım Ölçeği ve Çevrimiçi Öğrenme Motivasyon Ölçekleri kullanılmıştır. Veri analizinde ttesti, tek yönlü varyans (ANOVA), Pearson korelasyon ve basit doğrusal regresyon analizi kullanılmıştır.

Bulgular: Okul öncesi öğretmenlerinin çevrimiçi öğrenme motivasyonlarının cinsiyete, internette geçirilen süreye ve internete erişim için kullanılan medya araçlarının sayısına göre anlamlı bir farklılık göstermediği ortaya çıkmıştır. Ayrıca mesleğe yeni başlayan okul öncesi öğretmenlerinin çevrimiçi öğrenme motivasyonlarının deneyimli öğretmenlere göre daha yüksek olduğu görülmüştür.

Önemli Vurgular: Bilgisayar ve internet kullanan okul öncesi öğretmenlerinin öz yeterlikleri arttıkça çevrimiçi öğrenme motivasyonlarının da arttığı ortaya çıkmıştır.

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INTRODUCTION

In the research conducted on the increasing prevalence of the internet and computer use in the world, it was concluded that nearly 4,8 billion people use the internet among the world population. It is also seen that widely used internet and computer technologies are used for a more qualified and innovative education (Santiago, Navaridas & Andía, 2016). Therefore, digital learning replaces traditional education on a daily basis (Szymkowiak, Melović, Dabić, Jeganathan & Kundi, 2021). When we look at internet and computer statistics in Turkey, According to the Turkish Statistical Institute (TSI), 79% of the Turkish population aged 16-74 are Internet users. Considering the availability of information technology products in households, it was stated that 16.7% households had a desktop computer, 36.1% had a portable computer (laptop, netbook), and 22.0% had a tablet computer.

Web 1.0 was the first generation of the World Wide Web that allowed us only to access information, in the early times (Lawrence & Giles, 2000). The Internet has been developed over time and with Web 2.0, which is defined as the second generation, it has become possible for users to interact, shop, and share their thoughts by opening a blog (Cormode & Krishnamurthy, 2008). It was also an alternative online education platform as it allowed users to interact and share content (Rollett, Lux, Strohmaier, Dosinger & Tochtermann, 2007). People use computers and the Internet to access information (Naci & Tatli, 2020), communicate (Kisanga & Ireson 2016), plan and shop (Majid & Firend, 2017), and study and make education engaging, easy, and fun (Constantinides & Fountain, 2008). Moreover, digital devices and the Internet motivate people to learn (Mumtaz, 2000). The increasing number of Internet users with various purposes has brought many issues, such as equality, access to information, technical support, benefits in education, and possible risks (Christensen & Knezek, 2009; Greenhow, Robelia & Hughes, 2009; Kisanga & Ireson, 2016; Tareen & Haand, 2020).

Considering the researches, it is seen that internet-based technologies are developing rapidly and are widely used in the education process (DeGennaro, 2008; Vaala & Bleakley, 2015; Sandholtz, 1997). For example, teachers use the Internet as a resource of professional development (Agyei & Voogt 2010; Ibieta, Hinostroza, Labbé & Claro, 2017). Therefore, technology use for teacher training is becoming increasingly important (Lawless & Pellegrino, 2007). Computer and Internet use in the classroom increases students' academic performance (Hinostroza, Labbé, Brun & Matamala, 2011) and promotes visual and deep (Fullan, 2014) and social learning (McKnight, O'Malley, Ruzic, Horsley, Franey & Bassett, 2016; Scardamalia & Bereiter, 2006). The Internet also provides great convenience for information access and content sharing (Appana, 2008, Correa, Pavez & Contreras, 2020; Saraçoğlu, Uça & Candar, 2012). Thus, it provides teachers with alternative educational techniques and allows them to modify curricula and prepare materials (Hinostroza, Ibieta, Claro & Labbé, 2015; UNESCO, 2011). Since they must be the pioneers of change and innovation in the education process (Hargreaves & Fullan, 2012), teachers are expected to use computers and the internet to enrich their teaching activities as well as to use computers and the internet effectively (Meneses, Fàbregues, Rodríguez-Gómez & Ion, 2012; Strawhacker, Lee & Bers, 2018). Teachers cannot make use of computers and the Internet as much as they are supposed to because of poor access to technology, insufficient infrastructure, inadequate training in technology usage, and lack of technological skills (Bingimlas, 2009; Hew & Brush, 2007; Dong, 2018; Njiku, Maniraho & Mutarutinya, 2019; Mumtaz, 2000; Otterborn, Schönborn & Hultén, 2019). In some cases, even if sufficient technological infrastructure is provided, it is seen that technology is not used effectively in education due to teachers' negative attitudes towards technology (Bozkurt & Johnston-Wilder, 2011). However, teacher's online learning practices have shown positive effects on children's academic performance (Mou & Kao, 2020).

The integration of technology into education has also affected preschoolers' learning environment (Edwards, 2016). Today, the use of technology has become a necessity to offer new learning opportunities to children (Bingimlas, 2009). It is known that preschool children use digital tools extensively in their daily life (Couse & Chen, 2010; Mertala, 2017; Neuman, 2015; Ofcom, 2019). Therefore, we should consider the characteristics of early childhood and integrate technology into preschool education (Bajovic, 2018). The use of information and communication technologies in early childhood education and programs contributes to children's learning processes (Masoumi, 2015). Game-based learning might be a more useful approach to teaching for preschoolers (Beck & Wade, 2006). Nacher, Garcia-Sanjuan, and Jaen (2016) revealing that game technologies are appropriate tools for the development of children's capacities, However, there are also concerns about technology posing risks to preschoolers' interaction and socioemotional development (Mertala, 2017; Genç, 2014). In addition, it has been revealed that preschool teachers support the use of technology in children's education (Aubrey & Dahl, 2014). we should integrate technological tools and computer-aided education into preschool education (Donohue & Schomburg, 2017). Therefore, recently, various programs have been implemented for teachers and students to develop their digital skills and use digital materials in the education process (Del Carmen Ramírez-Rueda, Cózar-Gutiérrez, Colmenero & González-Calero, 2021).

Online learning, which is one of the greatest innovations of computer and Internet use (Masoumi, 2020), refers to a process in which Internet technology and digital devices (TV, smartphone, tablet, etc.) promote learning (Clark & Mayer, 2016). Online learning platforms move away from the traditional learning structure and diversify education with games, simulations, and instructional videos and animations (Mayer, 2017). They provide students with the opportunity to learn and interact simultaneously or at different times (Jolliffe, Ritter & Stevens, 2012; Wang, 2008). Many educational institutions capitalize on

them because they are cost-effective platforms that facilitate the transmission of information and allow teachers to provide educational services anywhere and anytime (Gilbert, 2015) and students to learn at their own pace through online materials (Panigrahi, Srivastava & Sharma, 2018). School closures and suspension of face-to-face education due to the COVID-19 pandemic have made online learning platforms and distance education more popular (Sandars et al., 2020). Therefore, there has been a growing body of research on online learning and computer and Internet use.

Motivation is essential for high-quality education (Szymkowiak, Melović, Dabić, Jeganathan & Kundi, 2021). Motivation plays a vital role in learning and in the effective management of the learning process. Also, motivation deeply affects us where, what and when we learn (Schunk & Usher, 2012). And one of the biggest problems in online learning is motivational difficulties that students and teachers will experience with regard to online learning (Ryan & Deci, 2020). The desire to be involved in online learning, the development of technological skills, technological infrastructure, attitude and awareness towards technology will also affect online learning motivation. For all online motivational problems, educators should take precautions and positive attitudes towards online learning (Karataş ve Arpacı, 2021; Kim, 2020).

Literature Review on Online Learning Motivation

Research on online learning addresses preservice teachers' readiness levels (Alsancak Sırıkkaya & Yurdagül, 2016; Lei, 2009), academics' views on distance education (Gürer, Tekinarslan & Yavuzalp, 2016), and teacher qualification in online learning platforms (Kim, Xie & Cheng, 2017). Research on computer and Internet use focuses on using technology in early childhood and media habits of preschool teachers (Meneses, Fàbregues, Rodríguez-Gómez & Ion, 2012; Öner, 2020; Tekin & Işıkoğlu Erdoğan, 2020), teachers' beliefs in technology use in the classroom (Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur & Sendurur, 2012; Kim, Kim, Lee, Spector & DeMeester, 2013), factors affecting the use of digital technology in early childhood (Blackwell, Lauricella & Wartella, 2014), the effect of social media on children, adolescents, and families (O'Keeffe & Clarke-Pearson, 2011), teachers' attitudes towards computer and Internet use (Hernández- Ramos, Martínez-Abad, Peñalvo, García-Herrera & Rodríguez-Conde, 2014; Prestridge, 2012), and primary school teachers' attitudes towards computers and the Internet (Bahar, Uludağ & Kaplan, 2009). However, there is no published research on the relationship between preschool teachers' computer and Internet use and online learning motivation. Therefore, we aimed to determine the factors affecting (1) preschool teachers' competence in using computers and the Internet and (2) their motivation to participate in online learning. We also investigated whether there was a correlation between computer and Internet use and online learning motivation. To that end, we sought answers to the following questions:

- Do gender, the type of digital device, and the time spend online each day affect preschool teachers' online learningmotivation?
- Does preschool teachers' self-efficacy in computer and Internet use significantly predict their online learning motivation?
- Is there a correlation between preschool teachers' computer and Internet use and online learning motivation?

METHOD

Research Design

This descriptive study adopted a quantitative correlational survey model to determine the degree of the relationship between variables (Fraenkel & Wallen, 2006). Quantitative research yields results based on deductive measurements and analysis (Watson 2015). A correlational survey model is used to determine the existence and the level of the relationship between two or more variables (Karasar, 2014). This study aimed to describe a situation as it is, with no intervention.

Participants

The study was approved by the Chair of the Social and Humanities Ethics Committee of Van Yüzüncü Yıl University (date: 17.02.2021, issue: 2021/02-01). The number of teachers in preschool education institutions of Turkey is 98.825 (Ministry of National Education, 2020). Preschool teachers take technology courses in undergraduate education but there is not any education about information technologies and technology labs in preschool education institutions.

Due to the pandemic, data were collected online from the teachers. The participants were also selected based on purposeful sampling. The criteria used were willingness to participate and at the time of the study employment in public preschools. After the invitation to participate in the study, the sample consisted of 160 preschool teachers (145 women and 15 men). 85 participants were 20-30 years of age, 61 were 31-40 years of age, and 14 were ≥ 41 years of age. Fifty-nine participants had 1-5 years of work

experience, 51 had 6-10 years of work experience, 33 had 11-15 years of work experience, and 17 had 16 ≥ years of work experience. 11 participants spent one hour or less online, 83 spent 1-3 hours online, and 66 spent three hours or more online. 40 participants had only one digital device, 57 had two digital devices, and 63 had three or more digital devices. Table 1 shows the participants' demographic characteristics.

Table 1. Distribution of demographic characteristics

Demographic Characteristics	Variable	f	%
Gender	Woman	145	90.6
	Man	15	9.4
	Total	160	100
Age (years)	20-30	85	53.1
	31-40	61	38.1
	≥41	14	8.8
	Total	160	100
Work experience (year)	1-5	59	36.9
	6-10	51	31.9
	11-15	33	20.6
	≥ 16	17	10.6
	Total	160	100
Time spent online per day(hour)	≤ 1	11	6.9
	1-3	83	51.9
	≥ 3	66	41.3
	Total	160	100
Number of digital devices	1	40	25.0
	2	57	35.6
	≥ 3	63	39.4
	Total	160	100

Instruments

The personal information form was developed by the researchers to determine the participants' demographic characteristics, which were the independent variables. The form elicited information on gender, age, work experience, the number of digital devices, and the average time spent online each day.

The Scale of Online Learning Motivation (SOLM) This scale developed by Chen and Jang (2010) in English was adapted to Turkish by Özbaşı, Cevahir, and Muzaffer (2018). The SOLM consists of 28 items scored on a seven-point Likert-type scale. First, the SOLM was translated from English into Turkish and then checked by five experts for compatibility in both languages. Second, two pilot tests were conducted on undergraduate English teaching students (n=70) and undergraduate students with online learning backgrounds (n=437). A Pearson product-moment correlation was used to determine the relationship between the original scale and the Turkish version. The results yielded correlation coefficients of 0.43 to 0.68, suggesting that the two scales measured the same construct and focused participants on similar situations. Reliability was determined using Cronbach's alpha correlation coefficient for the total scale and its subscales. The results pointed to a Cronbach's alpha of 0.60 to 0.94. In this study, the scale had a Cronbach's alpha of 0.88.

The Computer and Internet Self-Efficacy Scale (CISES) This scale developed by Şad and Demir (2015) has two subscales: computer use self-efficacy (eight items) and Internet use self-efficacy (eight items). The items are scored on an 11-point Likert-type scale ("0= I am absolutely sure that I cannot do it" to "10= I am absolutely sure that I can do it"), with the total score ranging from 0 to 160. Şad and Demir (2015) conducted exploratory and confirmatory factor analyses. The former revealed that a two-factor (subscale) structure accounted for 74.02% of the total variance, while the latter confirmed that the two-factor structure had acceptable goodness of fit indices. The "computer use self-efficacy" and "Internet use self-efficacy" subscales had an AVE (average variance extracted) of 69% and 67%, respectively. The researchers reported that the "computer use self-efficacy" and "Internet use self-efficacy" subscales had a Cronbach's alpha of 0.943 and 0.9333, respectively. In this study, CISES had a Cronbach's alpha of 0.89.

Data Collection and Analysis

The study was approved by the Chair of the Social and Humanities Ethics Committee of Van Yüzüncü Yıl University. Afterward, data were collected online using a Google Form. Before data collection, all participants were informed about the research purpose and procedure and told that the participation was voluntary and that data would only be used for scientific purposes and would in no way be shared with third parties. The data were analyzed using the Statistical Package for Social Sciences (SPSS). Number and percentage were used for descriptive analysis. Independent-samples t-test, two-way ANOVA, Pearson correlation, and simple

linear regression analysis were used for statistical analysis.

RESULTS

The findings obtained in the research are presented in this section. In the research, The descriptive data were used for normality testing (Table 2).

Table 2. Normality assumption test

Scales	Kurtosis	Skewness
SOLM	1.151	-.795
CISES	-.308	-.431

The acceptable range of skewness and kurtosis for a normal distribution is +2 to -2, suggesting that parametric tests should be used for analysis (Tabachnick & Fidell, 2013; George % Mallery, 2010). Participants' SOLM scores had a kurtosis and skewness of 1.151 and -.795, respectively. Their CISES scores had a kurtosis and skewness of -.308 and -.431, respectively. The results indicated that the data were normally distributed. Therefore, an independent samples t-test was used to determine the effect of gender on online learning motivation, while one-way analysis of variance (ANOVA) was used to determine the effect of work experience, age, time spent online each day, and the number of digital devices on online learning motivation. A Scheffe's test was used to make posthoc comparisons to determine the source of significant differences. Pearson correlation analysis was used to determine the relationship between online learning motivation and Internet use self-efficacy. Simple linear regression analysis was used to determine whether Internet use self-efficacy predicted online learning motivation.

Table 3. Descriptive statistics for online learning motivation and computer and internet use self-efficacy

Scale	N	Max.	Min.	X	ss
SOLM	160	193	52	146.26	23.04
CISES	160	160	65	121.24	21.77

Participants had a mean SOLM and CISES score of 146.26 and 121.24, respectively (Table 3).

Table 4. Effect of gender on online learning motivation

Scale	Gender	N	X	df	t	p
SOLM	Woman	145	147.36	23.102		
	Man	15	135.60	20.181	1.897	0.06

*p<0.5

An independent samples t-test was used to determine whether gender affected participants' online learning motivation. Male and female participants had a mean SOLM score of 135.60 and 147.36, respectively, showing no significant difference. The result indicated that gender did not affect online learning motivation (t_{158}=1.897, p>.05).

Table 5. Effect of work experience, number of digital devices, and time spent online on online learning motivation

Independent variables	Source of Variance	Sum of squares	Sd	Mean square	F	p
Work experience	Between-group	5306.274	3	1768.758	3.487	.017
	Within-group	79128.219	156	507.232		
	Total	84434.494	159			
Number of digital devices	Between-group	563.891	2	281.945	.528	.591
	Within-group	83870.603	157	534.208		
	Total	84434.494	159			
Time spent online	Between-group	325.163	2	162.581	.303	.739
	Within-group	84109.331	157	535.728		
	Total	84434.494	159			

*p<0.5

A one-way analysis of variance (ANOVA) was performed to look into the effect of work experience, number of digital devices, and time spent online on online learning motivation. The results showed significant differences. A Scheffe's test was used to make posthoc comparisons to determine the source of the differences. The results showed

that participants with five years or less work experience (x=152.39) had a significantly higher mean SOLM score than those with 16 years or more work experience (x=133.53).

According to the results, the number of digital devices *(F=.529; p>.05)* and the time spent online each day *(F=.739; p>.05)* had no effect on participants' online learning motivation.

Table 6. Correlation between online learning motivation and internet use self-efficacy

	SOLM	CISES
SOLM	1	
CISES	.196*	1

*p<0.5 SOLM: Online learning motivation, CISES: Computer and Internet use self-efficacy

Pearson correlation analysis was used to determine the relationship between online learning motivation and computer and Internet use self-efficacy. The results showed that participants' SOLM and CISES scores were positively correlated (r=.196, p<0.5), suggesting that the higher the computer and Internet use self-efficacy, the higher the online learning motivation.

Simple linear regression analysis was used to determine whether computer and Internet use self-efficacy predicted online learning motivation.

Table 7. Model of online learning motivation and computer and internet use self-efficacy

		R	R^2	F	p
SOLM	CISES	.196	.038	6.283	.013

*p<0.05 SOLM: Online learning motivation, CISES: Computer and Internet use self-efficacy

The model showed that CISES accounted for 3% of the total variance of SOLM, suggesting that the model was significant (F= 6.283, p=.013).

Table 8. Simple linear regression analysis for online learning motivation and computer and internet use self-efficacy

Variable	B	Standard error	β	t	p
Constant	121.157	10.172		11.911	.000
CISES	.207	.083	.196	2.507	.013

*p<0.05

The results showed a significant relationship between computer and Internet use self-efficacy and online learning motivation (R=.19, R^2=.03, p=.01), with computer and Internet use self-efficacy explaining 3% of the total variance of online learning motivation.

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

In the study, it was revealed that the online learning motivations of preschool teachers did not differ significantly according to gender. Yukselturk and Bulut (2009) also reported that gender did not affect students' online learning motivation. Similarly, Hinojo-Lucena, et al., (2019) didn't find gender as an influencing factor in digital competence. On the other hand, Young and McSporra (2001) argued that gender affected students' motivation to use online materials. Although there are studies stating thatwomen are disadvantaged in male-dominated society in the online learning process, there are also studies showing that women have a better learning experience (Gunn, McSporran, Macleod & French, 2003; Price, 2006; Rovai & Baker, 2005). In addition, it has been observed that the online learning motivation of the pre-school teachers who have just started the profession is higher than the experienced teachers. Ibieta, Hinostroza, Labbé, and Claro (2017) also found that teachers who were new to the profession were better at using technological tools than experienced ones. The inadequacy of experienced teachers in ICT may be due to the fact that they did not receive ICT training during their undergraduate education. Unlike this research, Hinojo-Lucena etal. (2019) found that more years of teaching experience leads to achieving a higher digital competence level. Moreover, young teachers are more successful in using technology in professional development, communication with students and providing pedagogical support. However, in the last years, many researchers are alerting about the risks arising from excessive and disproportionate use of ICT by the young (Dishkova & Papancheva, 2019). The number of digital devices and the average time spent online each day

had no effect on preschool teachers' online learning motivation. However, Teachers' spending time on theInternet, especially for their professional development, is expected to affect the use of technology in classroom practices (Sandholtz, 2001).

It was revealed that as the self-efficacy of pre-school teachers using computer and internet increased, their online learning motivation also increased. Teachers who are motivated to use technology are more likely to integrate it into their lectures (Blackwell, Lauricella & Wartella, 2014). In addition, a relationship was found between teachers' experiences of using computers and their beliefs about using technology in the classroom (Chiu, Liang & Tsai, 2016). As Wake and Whittingham (2013) puts it, teachers who can use technology and integrate it into the teaching process contribute to their students' learning. Technology provides teachers with teaching materials (McKnight, O'Malley, Ruzic, Horsley, Franey & Bassett, 2016) In addition, the use of digital tools provides alternative ways to achieve learning goals (Otterborn, Schönborn & Hultén, 2019). Also, integrating technology into education brings teachers closer to a student-centered constructivist perspective (Tondeur, Van Braak, Ertmer & Ottenbreit-Leftwich, (2017). Further, traditional methods of education are not suitable for educating the new generation who prefer to use modern technology to support and direct their learning (Szymkowiak, Melović, Dabić, Jeganathan & Kundi, 2021). Therefore, it should be ensured that teachers develop a positive attitude towards increasing their knowledge about digital devices, supporting their skills in using digital devices and adapting digital technology to the learning process (Hernández-Ramos et al., 2014; Spiteri, Chang Rundgren, 2020). Casillas Martín, Cabezas González, and García Peñalvo (2020) argue that preschool teachers are ill-competent to use digital devices for academic and professional development. However, they are keen to integrate digital devices into education (McKnight, O'Malley, Ruzic, Horsley, Franey & Bassett, 2016; Otterborn, Schönborn & Hultén, 2019). Therefore, teachers should have a scope for creativity and innovation rather than just downloading and using ready-made plans, presentations, and resources (Ibieta, Hinostroza, Labbé & Claro, 2017; Miranda & Russell, 2012). To that end, schools should provide technology-based programs and curricula for technologically incompetent teachers (Afshari, Bakar, Luan, Samah & Fooi, 2009; Hyndman, 2018). Because in technology-oriented online learning environments, preschool teachers have important role in supporting children's development and skills (Mou & Kao, 2020).

In conclusion, the higher the computer and Internet use self-efficacy, the higher the online learning motivation among preschool teachers. Therefore, preschool teachers should be provided with technology-based training programs and activities to make sure that they translate their online learning motivation into their lectures. Schools should offer technology-supported education to students to improve their academic performance and help them enjoy the experience of learning. Moreover, the pandemic has shown us that technology plays a crucial role in classroom, learning environments outside the classroom and distance education.

As a suggestion, training on computer and internet use for preschool teachers can be increased. Well-organised courses can increase teachers' motivation and develop their technology skills. Conferences and seminars on computer and internet use can be given to preschool teachers.

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Statements of publication ethics

We hereby declare that the study has no unethical issues and that research and publication ethics have been observed carefully.

Researchers' contribution rate

The study was conducted and reported with equal collaboration of the researchers.

Ethics Committee Approval Information

It was decided that this study complied with the ethical rules of Education and Humanities due to the meeting dated 17.02.2021 by Van Yüzüncü Yıl University Ethics Committee from the Social and Humanities

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| Research Article / Araştırma Makalesi |

A Latent Native Speakerism in ELT in the Private Sector in Turkey: A small scale content analysis

Türkiye'de Özel Sektörde İngilizce Öğretiminde Gizil Bir Anadil Konuşuru Yönelimi: Küçük ölçekli bir içerik analizi

Züleyha Ünlü[1]

Keywords

1. Latent native speakerism
2. Traditional native speakerism
3. English language teachers
4. Neoliberal educational policies

Anahtar Kelimeler

1. Gizil anadil konuşuru yönelimi
2. Geleneksel anadil konuşuru yönelimi
3. İngiliz dili öğretmenleri
4. Neoliberal eğitim politikaları

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Abstract

Purpose: The doubling share of private education institutions in the education sector between 2010 and 2017 reveals that these institutions also have a determining effect in the field of teacher training. This study aimed at examining the English language teacher employment approaches of private education institutions through job postings and understanding the approaches to the identities of the English language teachers to be employed in these institutions.

Design/Methodology/Approach: This qualitative study examining 141 online job postings by private educational institutions in Turkey utilized the principles of content analysis. The job postings reviewed are to employ the English language teachers.

Findings: The study showed that the native speaker orientation in the employment of the English language teachers in the private sector persists at different layers as traditional native speakerism (first layer) and latent native speakerism (second layer). In light of the findings, this study showed that the English language teachers whose native language is not English are perceived in a secondary position despite the pluralism and diversity in the field.

Highlights: Native speakerism in the Turkish private sector existed in two layers. At Layer 1, latent native speakerism, a new form of native speakerism, was found. Although latent native speakerism foregrounded traditional native-speakerism, it disguised this orientation in the so-called expertise-oriented requirements. This layer is directly visible and a hidden version of the traditional native speakerism. At Layer 2, which is the source and the sub-layer of Layer 1, the presence of traditional native speakerism was found to persist. The findings are important in showing that with the rise of neoliberal educational policies, thus the increasing share of the private educational sectors, further studies are needed to reveal how the dichotomy can be overcome via a potential collaboration between teacher training programs, policymakers, and stakeholders.

Öz

Çalışmanın amacı: Özel eğitim kurumlarının, 2010-2017 yılları arasında eğitim sektöründeki payını ikiye katlaması, öğretmen yetiştirme alanında bu kurumların da yön verici bir etkiye sahip olduğunu ortaya koymaktadır. Bu çalışmada, özel eğitim kurumlarının İngilizce Öğretmeni istihdamı yaklaşımlarının iş ilanları aracılığıyla incelenmesi ve bu kurumlarda istihdam edilecek İngilizce öğretmenlerinin kimliklerine yönelik yaklaşımlarının anlaşılması amaçlanmıştır.

Materyal ve Yöntem: Nitel desenli bu çalışmada, Türkiye'de iş ilanı sitelerinde yayınlanan 141 iş ilanı üzerinde içerik analizi yapılmıştır. İncelenen iş ilanları, çeşitli özel kurumlarda istihdam edilecek İngilizce öğretmenlerine yönelik ilanlardır. İncelenen iş ilanları, çeşitli çevrim içi platformlardan elde edilmiştir.

Bulgular: Çalışma, İngilizce öğretmenlerinin özel sektörde istihdamında anadil konuşuru yöneliminin, gizil anadil konuşuru (birinci katman) ve geleneksel anadil konuşuru (ikinci katman) olarak farklı katmanlarda hala sürdüğünü göstermiştir. Bulgular ışığında, bu çalışma anadili İngilizce olmayan İngilizce öğretmenlerinin alandaki çoğulculuk ve çeşitliliğe rağmen ikincil konumda algılandığını göstermiştir.

Önemli Vurgular: Türkiye'de özel eğitim sektöründe anadil konuşuru yönelimi iki katmanda ortaya çıkmıştır. 1. Katmanda, Geleneksel anadil konuşuru yöneliminin yeni bir biçimi olan gizil anadil konuşuru yönelimi gözlemlenmiştir. Gizil anadil konuşuru yönelimi, geleneksel anadil konuşurunu öne çıkarsa da sözde uzmanlık odaklı gereksinimlerle bu yönelimi kamufle etmektedir. Bu katman, doğrudan gözlemlenebilen katmandır ve geleneksel anadil konuşuru yöneliminin örtülü bir halidir. 1. Katmanın besleyicisi ve alt katmanı olan 2. Katmanda ise geleneksel anadil konuşuru yönelimi varlığı tespit edilmiştir. Bulgular, neoliberal eğitim politikalarının ivme kazanması ve dolayısıyla özel eğitim sektörünün büyümesiyle birlikte, öğretmen yetiştirme programları, politika yapıcılar ve paydaşlar arasında potansiyel bir iş birliği yoluyla ikilemin nasıl aşılabileceğini ortaya çıkarmak için daha fazla çalışmaya ihtiyaç olduğunu göstermesi açısından önemlidir.

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INTRODUCTION

Native speakerism/culturism was first coined by Holliday (2005) to define the ideology that prioritizes 'so-called native speakers' and their cultures as the ultimate model to teach the English language. Later, the concept of native versus non-native speaker has frequently been examined by various studies in the literature in the English language teaching field. However, few studies examined the relationship between neoliberal economic policies and their reflections on native speakerism in Turkey. Therefore, this paper reveals the lines of debate about the issue and presents the current understanding while also revealing findings from small-scale data to indicate that the dichotomy has been changing towards a 'latent native speakerism', a new form of traditional native speakerism, as a result of neoliberal educational practices.

LITERATURE REVIEW

Neoliberalism is defined in various ways; however, the majority of the scholars stated that 'neoliberals strive to extend market principles to all social spheres' (Perisic, 2021, p. 3). Additionally, the logic behind neoliberalism is the government resemblance to a corporation, which necessitates that 'its priorities should also be those of a corporation: efficiency, productivity, and growth' (Perisic, 2021, p. 4). This economy-oriented principle of neoliberalism has re-defined 'human beings and their environments' as 'mere capital' (Clymer, Alghazo, Naimi, & Zidan, 2020, p. 211). More specifically, ''homo oeconomicus'' has emerged with an orientation towards participating in the market competition via its continuously developing portfolio (Brown, 2015; as cited in Clymer, Alghazo, Naimi, & Zidan, 2020, p. 211).

In addition to its impact on the perceptions of humans in society, neoliberalism has shaped how education is conducted across the world via the marketisation of education. The reflections of neoliberalism on education have been observed in three major ways: a) selling services to schools, b) selling services within schools, and c) selling the schools (Bayram, 2017; Hirrt, 2007). It is obvious that the marketing of education has consequently re-defined the roles of all participants of education. Students have been set as ''consumers rather than learners'' (Desierto & De Maio, 2020, p. 148). Similarly, ''teachers are considered as economic units who can be dispensed with at short notice to maintain profit margins'' (Barnes & Kniest, 2019; as cited in Desierto & De Maio, 2020, p. 148). This situation, as a result, has led teachers to ''work towards particular types of professional practice based on trends and standards generated by global and domestic institutions'' without reflecting on global inequalities (Çiftçi & Karaman, 2021, p. 18). In terms of the native speaker versus non-native speaker debates, neoliberalism has presented itself via language ideologies that label languages as 'foreign language' in different contexts (Bacon & Kim, 2018). These labels assume that the recruitment of 'native speaker' teachers is a necessity as the underlying agenda is marketable education (Bacon & Kim, 2018).

In the field of English language teaching, the use of such labels, however, sparked long-term arguments that problematised these labels. One major argument against native speakerism has been about who to be defined as a native speaker. For example, finding the criteria unclear, Liu (1999), Rampton (1990), and Jin (2005) defined this labelling as inadequate and misleading. Rampton (1990) also explained that these labels are more focused on the biological origins of a person rather than the sociological aspect and make the mistake of reducing the language to a criterion for social identification, forgetting its communicative role. Similar concerns were raised by Singh (1998) who claimed the label was based on nationality, and by Kubota and Lin (2006) who claimed that the label was based on the ethnic background rather than linguistic proficiency. Lowe and Lawrence (2018, p. 163) underlined that the label is 'a socially constructed category that is applied to a wide range of political, social and cultural traits.'. Davies (2003, p. 8) also highlighted that the term itself contains racist assumptions that could lead to the exclusion of 'speakers of certain varieties of a language or highly proficient non-native speakers.'. Likewise, Holliday (2018) defined native speakerism/culturism as racist for two reasons: First, native speakerism assigns certain ways of behaving to people, which is accepted racist in critical sociology. Second, the marketing of native speakerism leads to an implicit association of native-speaker teachers with 'whiteness', categorising 'non-white teachers who have spoken English from birth either implicitly or explicitly as non-white' (p. 2). Likewise, Çelik (2006) suggested that identifying a person as a native speaker of a language does not necessarily create the natural ability to use that language. Parallel to these statements, Menard-Warwick (2008) argued that these labels overlook the cultural, intercultural, national and international identities of teachers of English.

Other studies highlighted that native speaker-oriented attitudes may lead to problems in practice (Mackenzie, 2020). From the perspectives of teachers, for example, Liu (1999) claimed that being a native speaker of a language did not necessarily show whether a teacher could meet the linguistic and cultural demands of her/his learners. Similarly, by creating the illusion that the most efficient language teacher is a native speaker of English, this dichotomy downgrades the non-native English speakers to a secondary position, which might negatively influence their performance (Çelik, 2006), and lead to the ''internalization of the superiority of the native counterparts'' by some non-native speaker language teachers, and an 'imposter syndrome' according to other scholars (Bernat, 2009, p. 1; Mackenzie, 2020, p. 5). Holliday (2018, p. 1) also stated that ''The Othering of teachers who are labelled 'non-native speakers' result in a cultural disbelief, not believing in their ability to teach English''. Parallel to these arguments, others claimed that the labelling may lead to 'self-discrimination' (Reves & Medyges, 1994), described as ''being overly self-conscious towards language usage errors'' (Lowe & Pinner, 2016, p. 42).

Several suggestions have also been made to leave the native/ non-native labelling. For example, TESOL International Association[2] and BAAL[3] have banned the use of 'native speaker' label (Holliday, 2018). Likewise, Blair (2015, p. 99) recommended removing the ''nativeness, ownership, and idealised pedagogical standards.''. Others highlighted modelling bilingual or multilingual speakers as the target instead of 'native speakers' (Pakir, 2009). Finally, several scholars recommended ''native speaker English should no longer inform educational materials and learning strategies, and should instead promote global and local cultures in ELT content'' (Baker, 2012; McKay, 2002; as cited in Boonsuk & Ambele, 2019). Clymer, Alghazo, Naimi and Zidan (2020) also suggested that more attention be paid to raising learners' awareness about the issue.

However, with the rise of neoliberalism, despite this long-term problematisation of native speakerism/culturism, studies show that the dichotomy continues to exist. Examining the issue from students' perspectives on CALL, for example, Clymer, Alghazo, Naimi and Zidan (2020, p. 209) found that the majority of the student participants ''deeply internalised the logic of neoliberalism'' and carried ''native-speakerist/culturist perceptions.'' More specifically, their findings indicated that students displayed ideas representing an 'Anglophone neoliberal order' where US or British cultures are the norm to be learnt. Others examined the issue from the perspective of recruiters. Rivers (2016) indicated that various terms including 'native speaker, near-native, or native level' are still persistent to indicate the expected level of language across the job advertisements. The study conducted by Kiczkowiak (2020) on the attitudes of recruiters also highlighted how the recruiters still regarded being a native speaker as an important criterion. Mackenzie (2020) also examined the job ads in Colombia and found that nearly half of the 95 job ads contained discrimination. Others (Mahboob & Golden, 2013; Ruecker & Ives, 2015; Selvi, 2010) also showed that the term native speaker appeared among the recruitment criteria in the job advertisements they examined. Regarding the tendency to prefer native speaker English language teachers over non-native English language teachers, Floris and Renandya (2020, p. 5) argued that ''discriminatory attitudes and practices continue to exist to please parents and students and to secure businesses.''

In the context of Turkey, neoliberalisation of education meant more privatisation across educational institutions. In the review study conducted by Bayram (2017), for example, it was found that the number of private schools in Turkey almost doubled between 2010 and 2017, which was one of the consequences of neoliberal educational policies. The increase in the privatisation of educational institutions also has implications for the debates on native versus non-native speaker language teachers' dichotomy. Focusing on the issue in Turkey, Tezgiden-Çakçak (2019, p. 1) coined the concept of 'pseudo-native speakerism' and indicated that private schools in Turkey ''present local non-native English-speaking teachers with high linguistic capital as native English-speaking teachers.'' Furthermore, Tezgidan-Çakçak (2019, p. 1) found that local English language teachers were asked to ''lie about their personal and linguistic backgrounds and to behave as if they are monolingual'' English language speakers. Other studies focusing on native speakerism across job advertisements in the Turkish educational context also exist. For example, Selvi (2010) examined job announcements from various sources around the world including Turkey, and found that 60.5% of job announcements required native speakers and displayed multifaceted discriminatory hiring practices. Similarly, Yaman and Şahin (2019, p. 5) analyzed 173 job advertisements in Turkey to reveal the ''details concerning the employment of English language teachers by the private sector in Turkey''. The results indicated that only 34 of the job advertisements required native speaker English language teachers. The same study found that the examined job advertisements had requirements about having a degree or certificate as well as other special requirements (e.g., holding a Master's degree). Notwithstanding being important in terms of revealing the tendency towards native speakerism, the study by Yaman and Şahin (2019) did not prioritize understanding how native speakerism emerged in job advertisements. Likewise, although the studies by Selvi (2010), Tezgiden-Çakçak (2019), and Yaman and Şahin (2019) enabled a closer look at the issue of native speakerism in Turkey, and job advertisements, they did not evaluate the findings in the light of neoliberalism. Additionally, as has been stated by Selvi (2021, p. 63), the research on native speakerism in Turkey ''is still in its infancy in many ways''. This is because the majority of the existing studies ''are conceptualized within a relatively outdated view on the teachers' professional identity, lacking theoretical depth and methodological rigor, adopting a rather fixated approach in instrumentation, and investigating the same stakeholders (i.e., teachers and students)'' (Selvi, 2021, p. 63). Thus, in an attempt to present a fresh conceptual perspective towards the issue, this study is the first to examine how native speakerism across job announcements in Turkey relates to neoliberalism. To this end, focusing the issue from the perspective of the English language teacher recruitment practices in Turkey, with the increased privatisation of education, the study collected data from major job ads websites in Turkey to answer the following research question via content analysis:

a) What requirements are presented for the English language teachers in job announcements published between February 2021 and May 2021 in Turkey?

METHOD/MATERIALS

This qualitative study was conducted on job advertisements in Turkey. The job advertisements were collected from the major job-hunting websites in two phases: February 2021 Phase and May 2021 Phase.

These job advertisements were for native speaker English language teachers to work in Turkey. In February, 64 advertisements for native speaker language teachers from various websites were collected to be analysed. The websites were Yenibiriş, Kariyer.net, Indeed, Linkedin, Sahibinden.com, Superproof.com, and CareerJet. These websites were selected since they were the

2 Teaching English to the Speakers of Other Languages International Association
3 British Association for Applied Linguistics

only ones with published job announcements for native speaker English language teachers. Other major job-hunting websites were also examined; however, they did not contain any announcements for native speaker English language teachers to work in Turkey at the time of the study. In May, the second round of data collection was conducted across the same major job-hunting websites. 77 advertisements for native speaker language teachers were gathered for analysis.

Qualitative content analysis (Bowen, 2004) was conducted on the job announcements. The content analysis was completed through the stages of ''skimming (superficial examination), reading (thorough examination) and interpretation'' (Bowen, 2004, p. 32). Once the analysis was completed, themes across the job ads were established. These themes were later ''edited, re-organised, and grouped together'' to better show the relationship between them (Boonsuk & Ambele, 2019, p. 3).

Also, Taguette, a computer-assisted qualitative data analysis software, was utilised to conduct the data analysis, which facilitated the whole procedure.

In terms of the credibility and dependability of the themes that emerged via the analysis, the study followed the strategies recommended by Lincoln and Guba (1985). Two of these strategies are prolonged engagement and peer debriefing. Prolonged engagement is defined as ''spending sufficient time in the field to learn the culture, test for misinformation provided the distortions'' (Lincoln & Guba, 1985, p. 301). In this study, prolonged engagement was achieved through the fact that the study was conducted in two phases: Phase I being in February, and Phase II being in May. Prolonged engagement helped the researcher increase the range and number of the data, which led to the establishment of logical links between the data and the codings (Ünlü, 2015).

The second strategy to ensure credibility and dependability was peer debriefing. Peer debriefing is defined as ''the process of exposing oneself to a disinterested peer in a manner paralleling an analytic session and for the purpose of exploring aspects of the inquiry that might otherwise remain only implicit within the inquirer's mind'' (Lincoln & Guba, 1985, p. 308). In this study, sharing the analysis and the codes with colleagues, experts in qualitative research, ''provided a check against biases within the analysis'' (Barber & Walczak, 2009, p. 6).

FINDINGS

Stage 1: Skimming, Reading and Creating Themes

The analysis of job advertisements presented findings to understand the current status of native speakerism. Accordingly, the content analysis showed that the job advertisements published in Turkey consisted of two major parts: a) Prioritization of native speaker English language teachers, b) Balancing the call with professional and personal qualities.

In the part, Prioritization of native speaker English language teachers, job advertisements described their needs for language teachers while also attempting to define who would be a native speaker (e.g., Job Ad#1). However, these sections displayed an ambiguous view of native speakers. Likewise, a Westernized perception of native speakers was observed in the advertisements, which indicated a discriminating perception (Job Ads#1, 2, 3, 4). Examples of these are presented below:

Table 1. Descriptions of Native Speaker English Language Teachers in Job Advertisements

Job Advertisements	Descriptions
1	United States of America to be citizen, Canada to be citizen and European countries citizen
2	''European / Native English-Speaking Countries, or the ones speak with a clear and distinct accent.''
3	''Native English speakers from English-speaking countries'' ''Uk/Usa/Australian/ Canadian citizenship''
4	''For native instructor, British or American accent is required''
5	''We are seeking for native speaker English teachers who would like to work part time at our schools''
6	''A native speaker of English''
7	''Native speaker of English''
8	''We urgently need native speakers.
9	''Native English Teachers will be recruited.''
10	''Native Level English A MUST''
11	''Native speaker teachers''
12	''Native English Speaker; American, Canadian, British, Australian or New Zealander''

In the second part, Balancing attempts with professional and personal qualities, the job advertisements presented other requirements from the candidates, mostly highlighting the level of expected expertise from the candidates. The table below details how job advertisements balanced their prioritisation of native speakers with additional requirements about level of educations, having additional certificates, and so forth. Each theme is further explicated after the Table 2.

Table 2. Balancing Attempts with Professional and Personal Qualities

Professional Qualities	Personal Qualities
Level of education (n=82)	
Having certificates (n=64)	Interpersonal Relations (n=10)
Knowledge about technological tools (n=14)	Result oriented (n=32)
Pedagogical Training (n=16)	Having ease with adapting to different cultures (n=31)
Teaching Experience(n=24)	

Expected professional qualities were found to be level of education, having certificates, knowledge about technological tools, pedagogical training, and teaching experience. Regarding the level of education, a university degree in a foreign language teaching area, or at least having BA in an English-related area was requested. It was found that MA, MS or PhD degrees were also stated as acceptable degrees. In several advertisements, candidates who are students, or graduates of BA, MA, MS, or PhD degrees were also invited. The job advertisements also necessitated having a certificate in CELTA, DELTA, TEFL, or TESOL[4]. The third quality was knowledge about technological tools. Although the advertisements did not specify what these skills were, candidates with a strong background in utilizing technology for academic, and administrative purposes, or with knowledge about educational technologies were preferred. Another professional quality was pedagogical training. The advertisements usually stated that candidates should have either pedagogical training or a certificate in CELTA, DELTA, TEFL, or TESOL. Finally, having at least 2 years of experience was listed among professional qualities. Depending on the type of the advertising institute, an experience with exam preparation (e.g., TOEFL or IELTS), or a specific learner group (e.g., preschooler, adults) was also specified.

As for personal qualities, these included interpersonal relations, being result oriented, and adaptation to different cultures. Interpersonal relations included good communication and teamwork skills. The qualities of being result-oriented or having ease with adapting to different cultures were frequently listed on the job advertisements; however, no details on these qualities were presented.

Stage 2: Relating and Interpretation of the Themes

As this stage, the researcher attempted to relate the emerging themes with each other to better display the relationship among them. In the end, two layers, Layer 1 and Layer 2, were established to describe the current attitudes towards native speakerism. Layer 1, also defined as traditional native-speakerism, showed native speakers as the ideal for language learners. It is traditional in the sense that the 'native speakerism' at Layer 1 protected its features that existed for a long time without any change. For example, that job ads listed specific countries reflected traditional native speakerism, which attributed the ownership of the English language to specific countries.

As for Layer 2, also described as latent native speakerism, a cautious approach towards the dichotomy was displayed while creating a new discourse about native speakerism. At this point, knowing what latent means would ease understanding the latent native speakerism as well. In Collins Dictionary, latent is described as ''something which is hidden and not obvious at the moment, but which may develop further in the future.'' (Collins Dictionary, 2021). In the context of this study, the argument for latent is that the long-term native versus non-native dichotomy is creating a new form. The label kept some of its original functions (e.g., dividing language teachers as native versus non-native language teachers) while also losing, gaining or exchanging some of its traditional features (e.g., highlighting expertise together with native speakerism). More importantly, however, the label is still there but is disguised behind the expertise. Both layers and the relationship among them is shown below (Figure-1):

Figure 1. Layers of Native Speakerism in the Context of Recruitment

DISCUSSION

[4]Celta: Certificate in Teaching English to Speakers of Other Languages
Delta: Diploma in Teaching English to Speakers of Other Languages)
TEFL: Teaching English as a Foreign Language
TESOL: Teaching English to Speakers of Other Languages

This study was conducted to explore what requirements were presented for the English language teachers in job announcements in Turkey. Content analysis on the 141 job announcements for English language teachers was conducted. The findings indicated that native speakerism existed at two levels in job announcements. At Layer 1, traditional native speakerism persisted with the prioritization of 'native' speaker English language teachers. At Layer 2, latent native speakerism, a new form of native speakerism, emerged with the so-called expertise-oriented requirements with the disguised native-speakerism. The existence of these levels supports the literature by showing labels 'native speaker, near-native, or native level' are still persistent to indicate the expected level of the language across the job advertisements (Rivers, 2016). Similarly, the findings support Kiczkowiak (2020), Mackenzie (2020), Mahboob and Golden (2013), Ruecker and Ives (2015), and Selvi (2010) who found that recruiters regarded native speakerism as an important criterion to be recruited.

The findings on the traditional native speakerism are in line with the arguments indicating that the distinctions between native and non-native speakers were made according to nationality, biological origins, or ethnic background (Kubota & Lin, 2006; Rampton, 1990; Singh, 1998). For example, when prioritizing native speakers, it was frequently observed that job advertisements specified the countries of preferences as New Zealand, Australia, UK or USA. In that regard, the job advertisements left out speakers of certain varieties of the English language as well as highly proficient non-native speakers (Davies, 2003). Similarly, the findings show that racism lingers across job announcements, thereby in educational settings, by assigning certain roles to the people from the specific countries while also building an underlying connection between whiteness and native speaker teachers (Holliday, 2005).

The existence of latent native speakerism expands the literature by showing that employing parties indeed took the cultural, intercultural, national and international identities of teachers of English into consideration as has suggested earlier by Menard-Warwick (2008). However, displaying a latent character via 'balancing attempts with professional and personal qualities', this orientation presents so-called native speaker language teachers as homo oeconomicus who need to present a developing portfolio towards expertise. For example, job advertisements show that private educational institutions created an illusion that their focus was on expertise (e.g., the level of education, having certificates, knowledge about technological tools and so forth). This superficial attempt towards expertise presents a market competition to the so-called native speakers as well (Brown, 2015; as cited in Clymer, Alghazo, Naimi, & Zidan, 2020, p. 211; Perisic, 2021) while also leaving out other highly proficient 'non-native speakers of English'. The emphasis on 'being native speaker' in the job advertisements also supports the literature in that students are regarded as consumers (Desierto & De Maio, 2020), whose demands, instead of learning needs, must be satisfied. Likewise, the existence of latent native speakerism has supporting implications for the arguments on teachers' ''working towards particular types of professional practice based on trends and standards generated by global and domestic institutions'' without reflecting on global inequalities (Çiftçi & Karaman, 2021, p. 18). Therefore, it could be argued that latent native speakerism would unavoidably radicate the existing inequalities. All in all, as Clymer, Alghazo, Naimi and Zidan (2020) indicated earlier, latent native speakerism carries the logic of a deeply internalised neoliberalism in an attempt to please the customers of the private sectors (Floris & Renandya, 2020).

In the context of Turkey, the existence of latent native speakerism supports the earlier findings highlighting the tendency towards native speakerism (Selvi, 2010; Yaman & Şahin, 2019). More importantly, presenting a fresh conceptual perspective on the issue, the existence of latent native speakerism could be interpreted as a consequence of neoliberal educational policies that have led to more privatization across educational institutions. The doubling of private educational institutions in Turkey (Bayram, 2017), and the resulting latent native speakerism, could multiply the instances of practices similar to 'pseudo-native speakerism' across private educational institutions in the future (Tezgiden-Çakçak, 2019).

The findings of this study are important in reminding that native/non-native labelling be dropped across all professional contexts as has already been suggested by various organisations like TESOL and BAAL as well as by several scholars (Blair, 2015; Holliday, 2018). Additionally, these findings show that a longitudinal and comprehensive study in different contexts is needed to reveal the dynamics of the latent native speakerism to better inform the field against the potential impact of this new form of native speakerism. This is because the increasing trend in the privatisation of education in Turkey, as Bayram indicated (2017), also suggests that latent native speakerism will continue changing into new forms.

CONCLUSION AND RECOMMENDATIONS

Native speakerism has a long-debated phenomenon in the field of English language teaching. This article presented that several attempts have been made to prevent any dichotomy from persisting in the field among language teachers. However, as has been shown in the literature review, the rise of neoliberalism across the educational fields influenced the emergence of native speakerism in different forms. The content analysis of the job advertisements gathered from online job-hunting platforms also supported the literature by presenting the existence of a disguised version of traditional native speakerism in the job advertisements of private education institutions. The latent native speakerism is a form of traditional native speakerism disguised in professional requirements. The concept has been explored within this small-scale study, which indicates that latent native speakerism has an unexplored potential for the field. Therefore, further studies are needed to be conducted from various perspectives (e.g. students, teachers, parents, the administrations of private sectors, and so forth) to better understand the dynamics of the concept. Also, further studies would certainly reveal how the dichotomy can be overcome via a potential collaboration between teacher training programs, policymakers and stakeholders.

LIMITATIONS

This study is the first step to explore latent native speakerism in relation to neoliberalism in education. Different methods of data collection including interviews with employers in private educational institutions could also contribute to the understanding of the concept of latent native speakerism. Future studies, therefore, could be conducted over an extended period to present other features of latent native speakerism and show how/whether the employment practices of recruiters display certain characteristics over time.

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Statements of publication ethics

I/We hereby declare that the study has not unethical issues and that research and publication ethics have been observed carefully.

Examples of author contribution statements

Dr. Züleyha Ünlü conceived of the presented idea. Dr. Züleyha Ünlü developed the theory and performed the analysis. Dr. Züleyha Ünlü verified the analytical methods.

Researchers' contribution rate

The study was conducted and reported with equal collaboration of the researchers.

Ethics Committee Approval Information

No data has been collected from any human participants in this study. Thus, no ethical permission has been sought.

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|Research Article/ Araştırma Makalesi|

The Effect of Jigsaw II Technique on Students' Skill to Solve Real Life Problems in Fourth Grade Science Lesson in Primary School

İlkokul Dördüncü Sınıf Fen Bilimleri Dersinde Jigsaw II Tekniğinin Öğrencilerin Gerçek Hayat Problemlerini Çözme Becerisi Üzerine Etkisi

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Keywords
1.Real life problem
2. Non-routine problem
3.Primary school

Anahtar Kelimeler
1. Gerçek yaşam problemi
2. Rutin olmayan problem
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Abstract

Purpose: The purpose of this research is to determine the effect of jigsaw II technique on fourth grade students' real-life problem (non-routine problem) solving skills in science lessons in primary schools.

Methodology: This research was carried out with 53 students attending the fourth grade of a primary school in Bandırma, Balıkesir both in experimental and control groups. Appropriate sampling method was preferred in the study. This research was designed according to quasi-experimental design, which is one of the quantitative research methods. The research data was collected by applying 5 real life problems (non-routine problems) within the experimental and control groups as pre-test and post-test. Mann Whitney U Test was used to analyze the obtained data.

Findings: As a result of this research, the success of solving real life problems of the experimental group in which the jigsaw II technique was applied in the 4th graders in science lesson; was found higher than that of the control group undergoing the education and training process prepared compatible with the curriculum prepared by the Ministry of National Education.

Recommendations: In line with these results, primary school teachers can be provided with in service training on creating and solving real life problems.

Öz

Çalışmanın amacı: Bu araştırmanın amacı, ilkokul dördüncü sınıf fen bilimleri dersinde jigsaw II tekniğinin öğrencilerin gerçek hayat problemleri çözme becerisi üzerine etkisini belirlemektir.

Yöntem: Bu araştırma, Balıkesir'in Bandırma ilçesinde ilkokul dördüncü sınıfta öğrenimine devam eden 53 öğrenci ile gerçekleştirilmiştir. Örneklemin belirlenmesinde seçkisiz olmayan örnekleme yöntemlerinden biri olan uygun örneklem yöntemi kullanılmıştır. Bu araştırma nicel araştırma yöntemlerinden biri olan yarı deneysel desene göre tasarlanmıştır. Araştırma verileri 5 adet gerçek yaşam probleminin deney grubu ve kontrol grubunda yer alan öğrencilere ön test ve son test olarak uygulanması sonucu elde edilmiştir. Elde edilen verilerin analiz edilmesinde Mann Whitney U Testi kullanılmıştır.

Bulgular: Bu araştırmanın sonucunda dördüncü sınıf fen bilimleri dersinde jigsaw II tekniğinin uygulandığı deney grubunun gerçek yaşam problemi çözme başarısı; Milli Eğitim Bakanlığı tarafından hazırlanan müfredata göre eğitim ve öğretim sürecinin uygulandığı kontrol grubunun gerçek yaşam problemi çözme başarısından daha yüksek olduğu belirlenmiştir.

Öneriler: Ulaşılan bu sonuçlar doğrultusunda, sınıf öğretmenlerine gerçek yaşam problemi oluşturma ve çözme konusunda hizmetiçi eğitim verilebilir.

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INTRODUCTION

When the current science curriculum of the Ministry of National Education is examined, it is seen that cooperative working and problem solving skills are among the important competencies that individuals should gain (MEB, 2018).The main purpose of making individuals gain these skills can be strongly related to the developments in science and technology affecting the life of the society, the structure of the society, the education of the society and all development areas of individuals. For this reason, it is important to make individuals who can adapt themselves to changes, have critical thinking, be creative, find effective solutions to their problems and contribute to the society they live in. Acquisition of those skills may be possible by the children who could gain problem solving skills at an early age. Within the relevant contexts; the ability of individuals to maintain their social lives in harmony with every stage of life, from childhood to adulthood, necessitates problem-solving skills (Sungur & Bal, 2016). Although mathematics lesson is one of the first concepts that come to mind when problem is mentioned, the concept of problem is not just a concept that belongs to mathematics lesson (Apaydın & Kandemir, 2018). There are many definitions regarding the concept of the problem in the literature. According to this;

1. "Problems are called as situations that the organism cannot solve with known ready reactions." (Acıkgoz, 2014, p. 141).

2. "Problems are the obstacles we face in shifting from one environment to another or from one state to another." (Steven, 1998, p. 11).

3. "The problems are the obstacles against the existing forces one has gathered to achieve the desired goal." (Bingham, 2004, p. 18).

Naming an issue as problem depends on certain conditions. In this context, the problem should contain features that confuse the individual, create a need for a solution, and are perceived for the first time and include preparations for a solution. If an individual is not aware of the problem or has encountered that problem before, this may not be a problem for that person (Altun, 2008; Gelbal, 1991; Yenilmez, 2010). Based on these expressions, problem can be defined as a situation that causes distress to the individual and where the individual wants to get rid of and relax immediately. In the literature, problems are classified with different approaches. One of the important classifications made is the classification of problems as ordinary (routine) and extraordinary (non-routine) problems (Gok & Sılay, 2008; Kar & Isık, 2011).Routine problems are problems that require four processing skills (addition, subtraction, multiplication and division) and contribute to the development of problem solving skills. Non-routine problems, unlike routine problems, are the complex ones that are similar to real life events that are not easily solved and require creative mental strategies to solve. Therefore, comprehending the solution of non-routine problems requires understanding the solution of real-life problems (Artut & Tarım, 2009; Elia et al., 2009; Gok & Sılay, 2008; Murdiyani, 2018). Hence, non-routine problems can contribute to the development of senior thinking skills such as critical and creative thinking among students. Non-routine problems enable individuals to use different solutions and approaches in solving the problem (Mabilangan et al., 2011). Individuals use the cognitive steps high above the standard of implementation and practice in solving non-routine problems (Apostol, 2017).In this context, it can be stated that the effect of non-routine problems on the development of individuals' problem solving skills is higher than the routine problems (Polya, 1997).

There are also many definitions for the concept of problem solving in the literature. Some of them are as follows: "Problem solving is the process of overcoming difficulties encountered in reaching a goal" (Bingham, 2004, p.23). Problem solving deals with a situation seen as a problem by the solver (Rohmah & Sutiarso, 2018). Problem solving can be defined as trying to get rid of the difficulties faced by the individual or the uncertainty of the individual (Gelbal, 1991). Problem solving based on these definitions; It can be defined as the process of finding solutions to situations in which the individual wants to get rid of and relax immediately. In the process of problem solving, the individuals become aware of a problem, define it; develop solutions for this problem; they test the solution ways they find and reach a result (Hall et al., 2013). In addition, students do research in this process; share what they learn with each other; take responsibility for the learning process and find the opportunity to learn by solving the related problem (Acıkgoz, 2014). In addition to these, problem solving also offers the person the opportunity to learn how to benefit from internal and external resources; speeds up the development process of the individual and contributes to the development of abilities, self-confidence and self-esteem (Bingham, 2004). Individuals should realize that there may be more than one way to solve the problem in the problem-solving process. Studies in the literature show that problem solving process varies from time to time, from situation to situation, from problem to problem, from individual to individual (Bingham, 2004). When children usually encounter a problem, they look for a rule to solve the problem. However, problem solving has no rules, and has a systematic. The main task of the teacher is to provide the student with problem solving systematics. While using this systematic, the student should understand the strategies to be used in problem solving and gain skills related to problem solving (Altun, 2008). There are many general method suggestions followed in problem solving in the literature. According to Jewey's (1910) suggestion, the steps in problem solving are given below. These are:

1. Awareness of the problem,

2. Defining and limiting the problem,

3. Gathering information for the solution of the problem,

4. Formation of hypotheses for the solution of the problem,

5. Determining the most appropriate hypothesis that provides the solution of the problem,

6. Solving the problem and reaching the result.

In another study in the literature, Kandemir & Celik (2021) identified the steps most frequently used by primary school teachers in the process of providing students with problem-solving skills in science lessons. These steps are as follows, respectively: *Defining the problem, gathering information for the solution of the problem, formation of hypotheses for the solution of the problem, determining the most appropriate hypothesis that provides the solution of the problem*.

One of the techniques that the individual will cooperate with and contribute to the development of problem-solving skills is the Jigsaw II technique. This technique was developed by Aronson et al. in 1978 and some changes were made by Slavin in 1986. When the students finish their studies, the students who have taken the same subject come together; they discuss and specialize on the topic; they plan and rehearse how to teach the subject to their friends. When the work is done in the temporary group consisting of the same subjects, everyone returns to their original group and they teach each other the subjects in the groups. The student, who presents the subject as an expert, is questioned about the parts that are not fully understood by the other members of the group or guidance is provided by the teacher to ask questions. In addition, the student presenting his subject can also ask questions to the students who are listening. Students are taken to exam individually after the instructions. The team score is determined by taking the average of their individual scores, so each group has a team score. Groups that show progress according to their previous situation are rewarded. In this process, the teacher systematically provides guidance to the students and organizes the groups (Acıkgoz, 2014; Aronson, 2019; Maden, 2011; Saygılı, 2015). In this technique, students work for the success of the group, and it is known by the group members only if all individuals are successful as this success will belong to the whole group (Yıldız et al., 2017). This technique contributes to the development of students' cooperation competencies, internalization of acting together for a common goal, communication and academic skills. In addition, it becomes possible to gain high-level skills such as increasing the permanence of the acquired knowledge, sharing knowledge, development of social skills, increasing interest and motivation towards the course and critical thinking (Azmin, 2016; Dogan, Ucar & Simsek, 2015; Gambari & Yusuf, 2016; Kandemir, 2017; Khan, 2016; Kızılkaya & Seven, 2017; Koc, 2013; Sugianti, 2016; Yılar & Simsek, 2016; Yıldız et al., 2017).In this technique, especially since there are cognitively heterogeneous groups; when groups come together, they get the chance to interact with each other and can progress towards a common goal by improving each other's learning (Avcı & Aksu, 2019). One of the most important contributions of the technique is to give all students an opportunity to be a leader (Acıkgoz, 2014). As a result of the literature review, there wasn't any similar study on the effect of the jigsaw II technique on students' ability to solve real life problems in the fourth-grade science course. This study is important in terms of eliminating the scarcity in this subject and contributing to the development of problem-solving skills in cooperation (Apaydın & Kandemir, 2019; Kaya & Kablan, 2018), which is one of the features that should be present in the individuals according to our curriculum. In this study, it is aimed to determine the effect of jigsaw II technique on students' ability to solve real life problems in primary school fourth grade science lesson. Parallel to this purpose, the students in the experimental group in the fourth-grade science lesson had an education and training process in a classroom where the jigsaw II technique was applied. The students in the control group went through an education and training process in accordance with the curriculum prepared by the Ministry of National Education. The main research question was determined as "Is there a significant difference between the success scores of solving real life problems between experimental and control groups?" Within the scope of this research question, the following sub-research questions were formed.

1. Is there a significant difference between the scores of the students in the experimental group and the control group before the application of pre-test of questions related to real life problems?

2. Is there a significant difference between the scores of the students in the experimental group and the control group obtained from the questions related to real life problems after the application of post-test?

METHOD

Research Model

This research is designed according to quasi-experimental design, which is one of the quantitative research methods. The quasi-experimental pattern is often used in educational research and, when examined as scientific value, comes after the actual trial designs. Quasi-experimental designs are mostly used in educational research. The reason for this is that classes in schools are formed by the school administration and as a result, it is impossible to distribute the individuals to the groups in a neutral way (Özmen & Karamustafaoglu, 2019).

Participants

This study was carried out with the participation of 53 fourth grade students in Bandırma district of Balıkesir province. There are 26 students in the experimental group and 27 students in the control group. The appropriate sampling method, which is one of the systematic sampling methods, was preferred in determining the schools and classes in the study. In this sample determination method, the researcher collecting data from a close and accessible sample is quite fast and practical for the research. Two classes were determined according to the lottery method among six classes of a school with the appropriate sampling (Yıldırım & Simsek, 2016).

Practice of Teaching Method

In this study, while a teaching process was applied in the classroom of the experimental group where the jigsaw II technique was used, another teaching process based on the curriculum of the Ministry of Education was conducted in the classroom of the control group. The implementation duration was 12 lesson hours in both groups. The students in the experimental group were asked to solve real life problems developed by the researchers in this process. Before and after the implementation, 5 non-routine problems were applied to both groups.

Instruments

The data in the research was obtained from students by applying the 5 real life problems prepared according to the unit of force at the beginning of the research, a total of 24 real life problems were prepared by the researcher, with at least three questions for the acquisition of the unit of force effects. In the preparation of these questions, fourth grade science textbook, PISA 2015 questions, Altun (2008), Polye (1997), Bingham (2004) were used. These research questions were reduced to 15 depending on the opinions of 3 field experts, 1 assessment and evaluation specialist, 5 science teachers and 3 primary school teachers. These 15 question groups were read by 20 students in order to determine whether there is an incomprehensible part in the language of instructions. Having 200 respondents in the pilot application can provide an opportunity to obtain realistic results (Turgut & Baykul, 2010). In this direction, 15 real life problems were applied to 262 prepared fourth grade students. The responses of the students to the solution of real-life problems were dealt with in a four-level assessment as inadequate, need to be developed, good and very good, quantitative scaling was also used by giving the degrees 0, 10, 15, and 20 in order. The data obtained was uploaded to the SPSS 22.00 data analysis program and data analysis was started. The scores obtained by the students were ranked in descending order and analyzed by taking 27% of the highest group and the lowest group. The procedures for data analysis are given below:

1. Data analysis was started by calculating the item difficulty index (Pj). Item difficulty indicates the percentage of correct answers for the item. When calculating it in open-ended questions, it is obtained by dividing the arithmetic average of the scores of those answering that question by the highest score determined for that item. The real-life problems selected for this study have item difficulty indexes between 0.20 and 0.58. The total difficulty index of real-life problems was calculated as 0.502. This difficulty index is at an acceptable level in the literature (Atılgan, 2009; Özcelik, 1997; Turgut & Baykul, 2010). The item difficulty index for these items is given in Table 1.

Table 1. Difficulty indexes of selected items

Madde No	Item difficulty index (Pj)
Item 7	0.58
Item 8	0.58
Item 9	0.57
Item 10	0.58
Item 12	0.2

2. In the second process, item discrimination indices (rjx) were calculated. Items with and without the desired feature to be measured are distinguished by the help of item distinctiveness and correlation calculations are also made. Item discrimination index is the correlation between item scores and the total scores of the test (Atılgan, 2009; Özcelik, 1997). In calculating the correlation between the item scores and the total scores of the test, the item-total score correlation was calculated using the Spearman correlation coefficient because the item data did not have a normal distribution ($p < 0.05$). In general, items with an item-total correlation index of 0.30 and above are those which can distinguish students who know and the ones who do not know well (Buyukozturk, 2016). Taking into consideration that, real life problems with discrimination indices between 0.614 and 0.802 were chosen.

Table 2. Spearman rank differences correlation coefficient results

		Item Total Scores
Item 7	r	.806
	p	.000
	N	.262
Item 8	r	.803
	p	.000
	N	262
Item 9	r	.806
	p	.000
	N	262
Item 10	r	.757
	p	.000
	N	262

Tablo2. (continue)

Item 12	r	.614
	p	.000
	N	262

P<.05

If the correlation coefficient is between 1-0.70, it is high. If it is between n 0.69-0.30, it is medium and can be defined as a low level of correlation between 0.29-0.00 (Buyukozturk, 2016). When we examine Table 2, 7-8-9-10. It is observed that there is a positive highly significant relationship between the items and the total scores of the items (r = .806, p <0.05; r = .803, p <0.05; r = .806, p <0.05; r = .757, p < 0.05). In addition, it is seen that there is a moderately positive correlation between the 12th item and the total scores of the items (r = .614, p <0.05).

3. In the third process, the reliability of the items was calculated. Reliability is related to the fact that the gap between measurements yields the same results under similar conditions (Atılgan, 2009). In the literature, a reliability coefficient of 0.70 or higher is considered sufficient. In this study, the reliability coefficient (Cronbach's Alpha) was calculated as α = 0.86. Considering the difficulty, distinctiveness and content validity of the items, 5 real life (non-routine) problems were identified (Appendix-1). The item distinctiveness index (rjx) for these items is given in Table 2.

Data Analysis

In this study, SPSS 22.00 data analysis program was used to analyze the data obtained from real life problems. Answers to real life problems were scored as 0, 10, 15, 20 according to rubric. According to Jewey (1910), based on the steps followed in problem solving, problem solving steps were arranged parallel to the level of fourth grade students. These steps given below have been taken into account in the rubric's category arrangement.

1. Recognizing and defining the problem,

2. Gathering information about the problem,

3. Determining solutions and choosing the best solution,

4. Apply the solution way.

20 (Very good)	The problem was fully understood, a solution way was found. The correct result was reached by finding the solution adequate explanation about the problem solving process was provided.
15 (Good)	Although the problem was largely understood and a suitable solution was found, the problem could not be solved due to minor calculation errors. The problem was understood to a great extent, the appropriate solution was found, the solution of the problem was reached, but sufficient explanation couldn't be given about the problem solving process.
10 (Need to be developed)	The problem was partially understood. The start of the attitude towards solving the problem was right, but the problem could not be solved as it didn't reach to the solution. There were important errors in the procedures for the solution of the problem.
0 (inadequate)	The problem was not understood. Inappropriate strategies to solve the problem were used. There was not enough explanation about the problem solving process. Expressions such as "very difficult" or "I do not know" were expressed about the problem. The data given in the problem was repeated and tried to be answered in that way.

Figure 1. Rubric used in scoring real life problems (Ilhan, 2016)

In order to determine the method of analysis of the obtained data, the standard "normal" criteria of the data were examined first. As the data obtained from the analysis of the performance did not meet the p> .05 condition, it was determined that the data did not have a normal distribution (Table 3). For this reason, Mann Whitney U Test was preferred in order to determine whether there was a significant difference between the means of the two groups. All the date obtained from students' answers were scored by two raters according to the scoring key. The Kendall Tau Correlation Coefficient test was used because the scores of the two raters did not have a normal distribution and the number of repeated values was high. As a result of this test, it was determined that there was a positive and highly significant relationship between the two raters (τ = 0.990, p = 0.00 <0.05). The effect size is low if 0.1 <r; it is moderate if 0.3 <r; and it is found high level If 0.5 <r (Cohen, 2007).

Table 3. Normality test results of the data

		Kolmogorov-Smirnov	Shapiro-Wilk
Pre-test	Control group	.000	.002
	Experimental group	.034	.145
Post-test	Control group	.200	.051
	Experimental group	.000	.001

p>.05

FINDINGS

Our first research question is, "Is there a significant difference between the scores of real-life problems by the students in the experimental group and the control group before taking a pre-test?" When Table 4 is examined to answer this question, it is seen that there is no significant difference between the pre-test scores of the experimental and control groups (U = 340.000, Z =. -199, p> .0843).

Table 4. Mann Whitney U test results between pre-test scores

Groups	N	Mean Rank	Sum of Ranks	U	Z	P
Control group	27	27.41	740.00	340.000	-.199	.843
Experimental group	26	26.58	691.00			
Total	53					

p<.05

Our second research question is, "Is there a significant difference between the scores of real-life problems by the students in the experimental group and the control group after taking a post-test?". When Table 5 is examined to answer this question, it is seen that there is a significant difference between the groups after the application. (U = 229.500, Z = -2.213, p <.05, r = 0.304).

Table 5. Mann Whitney U test results between post-test scores

Groups	N	Mean Rank	Sum of Ranks	U	Z	P	r
Control group	27	22.50	607.50	229.500	-2.213	.027	0.304
Experimental group	26	31.67	823.50				
Total	53						

p<.05

When Table 6 is examined in order to determine which group is in favor of this difference, it is seen that the experimental group in which the Jigsaw II technique was applied (median = 70, n = 26) was more successful than the control group (median = 55, n = 27). It can be stated that the effect size of the calculated data is moderate (r = .304).

Table 6. Median values of post test scores

Groups	N	**Median**
Control group	27	55
Experimental group	26	70
Total	53	

DISCUSSION AND CONCLUSION

In this study, it was tried to determine whether there is a significant difference between the achievement scores of the students in the experimental and control groups that are obtained from solving real life problems.

To start with the first question of the study, the significance level value (p = .843) was found higher than .05 according to the results of the Mann Whitney U test applied between the pre-test scores of the groups. This result shows that there is no significant difference between the groups (U = 340.000, Z =. -199, p> .0843).

As to come to the second question of the research, the significance level value (p = .027) was found lower than .05 according to the results of the Mann Whitney U test applied between the post test scores of the groups. These results show that there is a significant difference between the post-test scores of the groups (U = 229.500, Z = -2.213, p <.05, r = 0.304). When we examined the median values in order to determine which group is in favor of this difference, it was observed that the median value of the experimental group was 70, while the median value of the control group was 55 (Table 6). Based on this finding, it can be stated that the success of the experimental group in which the jigsaw II technique was applied in the 4th grade science lesson has a higher success in solving real life problems compared to the control group conducted based on the curriculum by the Ministry of National Education. As a result, it can be stated that the Jigsaw II technique contributes to the development of students' problem-solving skills.

The result of the study reflects parallel outcomes to the results of the studies of Altınkok (2012); Dendup & Onthanee (2020); Genc (2007); Iuliana (2016); Johnson et al. (2007); Nopembri et al. (2019); Pelobillo (2018); Sahin (2010); Saturated et al. (2005); Senemoglu (2009); Wismath & Orr (2015) and Yılmaz's (2001) in the literature. It can be claimed that many factors can shape the contribution of the Jigsaw II technique to the development of students' problem-solving skills. Thus, individuals aim to use their own capacities and their friends' capacities in full potential in this technique (Acıkgoz, 2014).

Bingham (2004) states that the most important aspect of developing problem-solving skills is learning to work together effectively. This technique can also be considered as a technique that particularly contributes to the ability of students to work together. Individuals who make up the groups take responsibility of both their own learning and their friends' learning as they are aware that success belongs to the whole group (Doymus et al.2005). This behavior is so closely related to the awareness of each individual composing the group that their individual achievements will contribute to the success of the group. For this reason, the individuals belonging to the same group encourage, motivate, direct and help each other during problem solving. They share and discuss their ideas on the solution of the problem they encounter (Johnson & Johnson 1999; Turkmen, 2016). The individuals in

the group express one another about how the problem was solved and check whether their friends understood the solution. The individuals in the group contribute to the transfer of knowledge in problem solving process by using the information which was learned by other friends of them in the lessons in problem solving (Yılmaz, 2001).

Thanks to this technique, individuals also have the opportunity to combine or change their current learning with their past learning (Dendup & Onthanee, 2020). In addition, students can even have the opportunity to keep the information they have learned in mind for a long time, to think critically, and to use what they have learned in an interdisciplinary attitude thanks to the related technique. What's more, the students work with an intrinsic motivation to manage to solve the problem in the process of problem solving, and thus, working in groups has a very positive effect on the development of their self-esteem and psychological health (Gambari & Yusuf, 2016; Johnson et al.2007).

The learning process of Jigsaw II technique not only provides students opportunities , such as actively participating in the process, planning the teaching process, increasing academic success, self-evaluation, and covering their deficiencies up, but also contributes to the development of students' self-regulation skills (Koc, 2013; Donmez & Gundogdu, 2018). The studies referred above in the literature, support the findings of this study.

RECOMMENDATIONS

Based on these results, it can be suggested to provide teachers with in-service training to create and solve real life problems.

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Statements of publication ethics

We hereby declare that the study has no unethical issues and that research and publication ethics have been observed carefully.

Researchers' contribution rate

The study was conducted and reported with equal collaboration of the researchers.

Ethics Committee Approval Information

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Appendix-1

Rutin Olmayan (Gerçek Yaşam) Problem Örnekleri

1. Mahmut yaz mevsiminde yazlığa gider, orada çok eğlenirdi. Ama kardeşi Ahmet sürekli yazlıktaki evin bir bahçesine çıkar, bir eve girerdi; eve girip çıkar iken kapıyı açık bırakır içeriye sivrisineklerin girmesine sebep olurdu. Mahmut, kapının içeriden çıkınca hemen kapanması için bir çözüm arayışı içine girdi. Mahmut 'un yerine siz olsaydınız ne yapardınız?

2. Ali okuldan çıkıp eve doğru ilerliyordu. Komşuları olan yaşlı Ahmet amcanın bir şeylerle uğraştığını gördü. Hemen onun yanına geldi. Ali, Ahmet amcanın evinin anahtarını mazgalın içine düşürdüğünü ve buradan alamadığını gördü. Birden aklına bir fikir geldi ve eve doğru koşturmaya başladı. Siz Ali'nin yerine olsaydınız, Ahmet amca'ya nasıl yardım ederdiniz?

3. Ahmet okuduğu kitabı sınıfa anlatırken diğerlerin farklı bir şekilde anlatmak istemiştir. Ahmet'in aklına kitaptaki karakteri yapıp perde üzerinde hareket ettirip olayları canlandırarak arkadaşlarına kitabını anlatmak fikri gelmiştir. Fakat karakterleri nasıl hareket ettireceğini bir türlü bulamamıştır. Siz olsaydınız Ahmet'e nasıl yardımcı olurdunuz?

4. Ali ve arkadaşları bir gün lunaparka gezmeye gitti. Zeynep ve Mehmet lunaparkta çarpışan otolara binmeye karar verdiler. Çarpışan oto zilinin çalmasıyla birlikte araçlar birbirine doğru sürülmüştür ve araçlar çarpışmıştır. Bu çarpışmalarda Zeynep ve Mehmet çok sarsılmıştır. Sizce çarpışan otolarda sarsılmayı en aza indirmek için ne yapılabilir?

5. Yavuz komşuları olan Ayşe teyzenin evlerinin altında bulunan markete yaşlı olması ve binada asansör olmaması nedeniyle inip çıkarken zorlandığını görmüştür. Yavuz kafasında tasarladığı aracı yaparak bu sorunu çözmüştür. Yavuz sizce ne yapmıştır?