

**INTERNATIONAL ONLINE
JOURNAL OF
EDUCATIONAL SCIENCES**

ISSN:1309-2707

Volume 15 Issue 5 November 2023

Founding Editor

Dr. Hasan Basri Gündüz

Editors

Dr. İbrahim Kocabaş
Dr. Tuncay Yavuz Özdemir



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

Volume 15, Issue 5, Year November - 2023

Editors

Dr. İbrahim Kocabaş (Fatih Sultan Mehmet Vakıf University, Türkiye)

Dr. Tuncay Yavuz Özdemir (Fırat University, Türkiye)

Editorial Board

Dr. Ali Balcı (Ankara University, Türkiye)
Dr. Anne Conway (University of Michigan, USA)
Dr. Catana Luminia (Institute of Educational Sciences, Romania)
Dr. Christoph Randler (University of Education Heidelberg, Germany)
Dr. Christopher A. Lubienski (University of Illinois, USA)
Dr. Craig Berg (The University of Iowa, USA)
Dr. David Bills (University of Iowa, USA)
Dr. Estela Costa (University of Lisbon, Portugal)
Dr. Fatih Kocabaş (Yeditepe University, Türkiye)
Dr. François Victor Tochon (University of Wisconsin-Madison, USA)
Dr. H. Gülru Yüksel (Yıldız Technical University, Türkiye)
Dr. İsmail Önder (Sakarya University, Türkiye)
Dr. Joanna Madalinska-Michalak (University of Warsaw, Poland)
Dr. Lim Lee Hean (National Institute of Education, Singapore)
Dr. Luis Miguel Carvalho (University of Lisbon, Portugal)
Dr. Maria Tsouroufli (University of York, England)
Dr. Mehmet Şahin (Necmettin Erbakan University, Türkiye)
Dr. Metin Başarır (Sakarya University, Türkiye)
Dr. Mitsuharu Mizuyama (Aoyama Gakuin University, Japan)
Dr. Mustafa Özbilgin (University of East Anglia, England)
Dr. Mustafa Özcan (Rhode Island College, USA)
Dr. Olcay Kiremitçi (Ege University, Türkiye)
Dr. Ömer Geban (Middle East Technical University, Türkiye)
Dr. Semire Dikli (Georgia Gwinnett College, USA)
Dr. Şerife Gonca Zeren (Yıldız Technical University, Türkiye)
Dr. Yavuz Erişen (Yıldız Technical University, Türkiye)
Dr. Zekeriya Nartgün (Abant İzzet Baysal University, Türkiye)

Contact Info.

Address : Fatih Sultan Mehmet Vakıf University, Faculty of Education,
Department of Educational Sciences Istanbul - Türkiye
Telephone : + 90 542 325 1923
E-Mail : info@iojes.net
Web Site : www.iojes.net

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

Indexing

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

Language editing

Language redactions of the papers are made by professional licensed institutions.

Volume 15, Issue 5, November - 2023 Executive Peer-Reviewers

Ahu Taneri (Niğde Ömer Halisdemir University, Türkiye)
Alper Kaşkaya (Erzincan Binali Yıldırım University, Türkiye)
Ayça Kaya (Haliç University, Türkiye)
Canan Avcı (Çanakkale Onsekiz Mart University, Türkiye)
Ebru Bozpolat (Cumhuriyet University, Türkiye)
Eray Alaca (Giresun University, Türkiye)
Esen Turan Özpolat (Adıyaman University, Türkiye)
Eyüp Bozkurt (Fırat University, Türkiye)
Fikret Gülaçtı (Erzincan Binali Yıldırım University, Türkiye)
Filiz Elmalı (Fırat University, Türkiye)
Hasan Hakan Okay (Balıkesir University, Türkiye)
Hasan Hüseyin Kılınç (Nevşehir Hacı Bektaş Veli University, Türkiye)
Satı Doğanıyğit (Ahi Evran University, Türkiye)
Seda Baysal (Kahramanmaraş Sütçü İmam University, Türkiye)
Serdal Poçan (Bingöl University, Türkiye)
Sevda Yılmaz (Bayburt University, Türkiye)
Ümit Dilekçi (Batman University, Türkiye)

© All rights reserved

INDEX

1. 7th Grade Students' Experiences on Rational Numbers Identifying Misconceptions
(Research Article)
Doi Number: <https://doi.org/10.15345/iojes.2023.05.001>
Bilal Baldemir - Tayfun Tutak - Büşra Nayıroğlu - Ahmet Burak Süzen 900-910
2. Studies Conducted Using MBTI (Myers-Briggs Type Indicator) Inventory in Music Education
(Research Article)
Doi Number: <https://doi.org/10.15345/iojes.2023.05.002>
Demet Güven - Önder Mustul 911-925
3. Effect of Socioscientific Issue and Argumentation-Based Inquiry Approach on Pre-Service Science Teachers' Understanding of The Nature of Science
(Research Article)
Doi Number: <https://doi.org/10.15345/iojes.2023.05.003>
Sümeyra Zeynep Et - Mehmet Nuri Gömleksiz 926-943
4. Examining the Relationships Between Instagram and Snapchat Usage Frequency, Fear of Missing Out, Self-Esteem and Internet Addiction
(Research Article)
Doi Number: <https://doi.org/10.15345/iojes.2023.05.004>
Abdullah Manap - Yasin Demir - İsmail Yelpeze - Cemal Karadaş 944-956
5. Attitude of Parents Who Have Primary School Children Towards Private Tutoring
(Research Article)
Doi Number: <https://doi.org/10.15345/iojes.2023.05.005>
Oğuzhan Kuru - Burcu Başpınar 957-968
6. An Overview of Innovative Approaches in Early Childhood Education with Field Practices: Naturalistic Teaching in Inclusive Classrooms
(Research Article)
Doi Number: <https://doi.org/10.15345/iojes.2023.05.006>
Sinem İpek , Ayperi Dikici Şığırtmaç 969-986
7. The Effect of Augmented Reality Applications on Students' Mathematics Achievement: A Meta-Analysis Study
(Research Article)
Doi Number: <https://doi.org/10.15345/iojes.2023.05.007>
Filiz Elmalı - Oğuzhan Özdemir - Hatice Çitak 987-995
8. Commercialized History and Media in Türkiye: Prediction of University Students' Popular History Proneness
(Research Article)
Doi Number: <https://doi.org/10.15345/iojes.2023.05.008>
Mehmet Elban 996-1017
9. Analyzing the Effects of Mobile Devices on Student Achievement: A Wide-ranging Meta-analysis
(Research Article)
Doi Number: <https://doi.org/10.15345/iojes.2023.05.009>
Ceyla Odabaş - Recep Kahramanoğlu 1018-1034

Contact Info.

Address : Fatih Sultan Mehmet Vakıf University, Faculty of Education, Department of Educational Sciences Istanbul - Turkey
E-Mail : info@iojes.net
Web Site : www.iojes.net

10. Development of the Early Childhood Cognitive Perspective Taking Test (EBAT): A Validity and Reliability Study
(Research Article)
Doi Number: <https://doi.org/10.15345/iojes.2023.05.010>
Murat Tuncer - Durmuş Aslan 1035-1054

Contact Info.

Address : Fatih Sultan Mehmet Vakif University, Faculty of Education, Department of Educational Sciences Istanbul - Turkey
E-Mail : info@iojes.net
Web Site : www.iojes.net

7th Grade Students' Experiences on Rational Numbers Identifying Misconceptions

Research Article

Bilal BALDEMİR¹, Tayfun TUTAK², Busra NAYIROĞLU³, Ahmet Burak SUZEN⁴

¹Erzincan Binali Yıldırım University, Faculty of Education, Department of Math Education, Erzincan, Türkiye  0000-0002-5695-4394

²Firat University, Faculty of Education, Department of Math Education, Elazığ, Türkiye  0000-0002-0277-6377

³Firat University, Faculty of Education, Department of Math Education, Elazığ, Türkiye  0000-0003-2440-2445

⁴Firat University, Faculty of Education, Department of Math Education, Elazığ, Türkiye  0000-0002-8996-1769

To cite this article: Baldemir, B., Tutak, T., Nayiroglu, B., & Suzen, A. B. (2023). 7th grade students' experiences on rational numbers identifying misconceptions, *International Online Journal of Educational Sciences*, 15(5), 900-910.

ARTICLE INFO

Article History:

Received: 30.12.2022

Available online:
21.08.2023

ABSTRACT

The cornerstone of the educational process includes conceptual learning, and in this context, misconceptions are of great importance. At the secondary school level, one of the subjects that students frequently encounter and have difficulty with is rational numbers. Effectively explaining rational numbers and associating them with daily life is possible with the teaching methods teachers can choose. This study aims to determine the misconceptions of 7th-grade students about rational numbers. Within the scope of the research, a sample was formed with 69 seventh-grade students studying in a central secondary school affiliated with the Ministry of National Education in the province of Şanlıurfa in the second half of the 2021-2022 academic year. Common mistakes and conceptual misconceptions of students about rational numbers were determined, and content analysis was conducted in line with these misconceptions. The findings revealed that students still have conceptual difficulties and errors in rational numbers from the primary school level. Therefore, students' misconceptions and incomplete information should be focused on in teaching rational numbers, and students should be encouraged to develop a conceptual understanding to comprehend rational numbers better.

© 2023 IOJES. All rights reserved

Keywords:

Rational Numbers, Misconception, Teaching Mathematics

¹Corresponding author's address: Firat University
Telephone: +905323724790
e-mail: tayfuntutak@hotmail.com
DOI: <https://doi.org/10.15345/iojes.2023.05.001>

Introduction

The Turkish Language Institution Dictionaries (2011) defines the concept as "the abstract and general design of an object or thought in mind." Mathematics is one of the disciplines in which students have difficulty learning and often struggle with conceptual misconceptions. For this reason, mathematics educators in our country and in different parts of the world have conducted various studies on this subject. These studies show that starting from the preschool period up to the university level, they examine what difficulties students encounter in mathematics and the nature of mathematical misconceptions (Kutluca, 2012). As a result of the fact that the concept is a cumulative discipline in mathematics, it is necessary to transfer mathematical concepts to students completely. Since there is a link between previous knowledge and concepts and later knowledge and concepts, solutions should be sought to provide students with complete conceptual information, identify missing information and misconceptions, and eliminate them (Küçük & Demir, 2009).

Although misconceptions replace a concept in the human mind, they refer to situations different from their scientific definition. Students can argue that this is true even though they are wrong, and if they state that they have this misconception, it can be considered a misconception. In this context, it is understood that not all mistakes are misconceptions, but all misconceptions are mistakes (Yenilmez & Yaşa, 2008).

Misconceptions are errors based on misunderstandings and interpretations. These misconceptions arise from "pure theories" that hinder students' rational thinking abilities (Ojose, 2015). Misconceptions are different from accidental errors because a person can realize and correct their mistake. However, a person with a specific misconception may be inclined to defend his mistake and not abandon the wrong concept he has learned unless he can convince others (Tutak, Gün, & Emül, 2010).

Misconceptions cause problems for two main reasons. First, students also tend to use these misconceptions in their new experiences. Second, students are emotionally and mentally attached to their misconceptions. Because they actively created these misconceptions. For this reason, students cannot easily give up on such misconceptions, which may negatively affect learning (Mestre, 1989).

Concepts formed during primary school form a solid foundation for further education levels. However, this period is also a stage where students are prone to misconceptions, and if these misconceptions are not noticed, they can continue up to the secondary school level. New concepts, the foundations of which were laid incorrectly in primary school, may lead to confusion in the future. These misconceptions, which are detected early, can be easily corrected, and students' mathematical understanding can be reconstructed (Bala, 2013).

One of the most common misconceptions and learning difficulties in mathematics is rational numbers. Although rational numbers are similar to natural and integers, they stand out as a number system with different and complex features. This difference and complexity can cause difficulty in teaching rational numbers (Durmuş, 2005).

There are many studies on rational numbers in the literature (Alacacı, 2012; Biber, Tuna, & Aktaş, 2013; Pesen, 2007; Yetim & Alkan, 2010; Yılmaz & Yenilmez, 2007). Although many of these studies have focused on different misconceptions, there is a lack of comprehensive studies that contribute to this field in general. This study aims to determine which misconceptions are more common by addressing all those found or absent in the literature. It aims to deal with the current literature's misconceptions or detect them holistically for the first time. In this direction, it is aimed to reveal the most common misconceptions between the existing and newly detected misconceptions of secondary school 7th-grade students about rational numbers.

Problem

The problem of this study is, what are the misconceptions of secondary school 7th-grade students about rational numbers? It forms a question sentence. For this purpose, the sub-problems of the research are as follows:

1. What are the misconceptions about the representation of rational numbers on the number line?
2. What are the misconceptions about ordering rational numbers?
3. What are the misconceptions about converting integer fractions to compound fractions?
4. What are the misconceptions about addition and subtraction with integer fractions?
5. What are the misconceptions about adding and subtracting rational numbers?
6. What are the misconceptions about multiplying and dividing rational numbers?
7. What are the misconceptions about zero coming to the numerator and denominator?

These sub-problems aim to reveal the misconceptions of secondary school 7th-grade students by addressing different aspects of rational numbers. This research aims to determine which subjects students have more common misconceptions by addressing each sub-problem separately. The data obtained in this way will provide an essential roadmap for designing teaching processes more effectively and improving students' mathematical understanding.

Method

This study revealed the misconceptions of secondary school 7th-grade students about rational numbers. In this context, the case study method, one of the interactive patterns of the qualitative approach, was used in the research. The case study method is a qualitative research approach in which the researcher examines one or more limited cases over time with data collection tools (observations, interviews, audio-visuals, documents, reports) that include multiple sources and define cases and themes related to the situation (Creswell, 2007).

Studying group

The study group consists of 69 seventh-grade students studying in the second semester of the 2021-2022 academic year in a central secondary school among the secondary schools affiliated with the Ministry of National Education in the province of Şanlıurfa. A non-random sample was used to determine the study group. The non-random sampling method is defined as the determination of the units to be sampled without depending on the principle of randomness (Büyüköztürk, Kılıç Çakmak, Akgün, Karadeniz, & Demirel, 2012).

Data Collection Tools

As a data collection tool, the existing misconceptions in the literature on Rational Numbers were examined. The opinions of 7 mathematics teachers working at the school where the study was conducted were taken, and seven misconceptions were determined. The developed knowledge test was shown to three mathematics educators who are experts in the field, and necessary corrections were made in line with the feedback received. Later, in line with the opinions of a Turkish teacher, the knowledge test took its final form. After the knowledge test was applied, interviews were conducted with each student. The following sub-topics are given in Table 1.

Table 1. Identified Subtopics

Subtopics
Representing rational numbers on the number line
Ordering rational numbers
Converting integer fractions to compound fractions
Adding and subtracting integer fractions

Adding and subtracting rational numbers
Multiplication and division with rational numbers
The case of zero coming to the numerator and denominator

Analysis of Data

The content analysis method was used for the analysis of the research data. The content analysis aims to examine oral or written content objectively and systematically (Tavşancıl & Aslan, 2001). This method divides document contents such as books, articles, correspondence, and historical documents into categories and codes according to specific rules. Then, these documents are systematically analyzed and evaluated (Sert, Kurtoğlu, Akıncı, & Seferoğlu, 2012).

Process time

Two questions prepared for each sub-topic were used to detect misconceptions. It was examined that the students gave wrong answers and why they gave such an answer in the student interviews. The data were analyzed by categorizing the misconceptions related to the seven sub-topics as true, empty, false and misconception. Similar to the two questions prepared for each misconception, the misconceptions identified due to the interviews made by the students and researchers who gave wrong answers were determined as misconceptions. If the student did not explain the question, their answers were in the incorrect category. For example, the first and second questions in the sub-topic "Showing rational numbers on the number line" were used to identify the related misconception. First, the correct and blank answers to the 1st question were determined, and their frequencies were calculated. At the same time, considering whether the students gave the same wrong answer in the first and second questions, this situation was considered a misconception. It was recorded under the code "KY1". For the research, misconceptions belonging to each sub-topic were defined. For example, the misconception determined under "Representation of rational numbers on the number line" is divided into two categories as KY1, KY1a, "Division between two integers in the numerator as many regions," and KY1b, "Division between two integers as much as the number in the whole number." This approach resulted in a similar analysis of seven subtopics.

Findings

For each sub-topic of rational numbers, misconceptions were determined and shown in tables with frequencies and percentages. For example, according to the sub-topic, the misconceptions determined as "Representation of rational numbers on the number line" are divided into four misconceptions as KY1 and KY1a, KY1b, KY1c and KY1d.

"What are the misconceptions about representing rational numbers on the number line?" Findings related to the sub-problem are given in Table 2 and Table 3.

Table 2. Frequency and percentages of S1 and S2 related misconceptions (KY1)

Questions	Correct		Blank		Wrong		KY1	
	(f)	(%)	(f)	(%)	(f)	(%)	(f)	(%)
S1	6	17,14	3	8,57	22	62,85	4	11,42
S2	5	14,28	7	20	19	54,28	4	11,42

As seen in Table 2, it is seen that 4 (=11.42%) people each had misconceptions in the 1st and 2nd questions.

Table 3. Frequencies and percentages of KY1

Subtopics	Misconceptions	(f)	(%)
Representation of rational numbers on the number line (KY1)	KY1a= The numerator between two integers is divided into as many regions as the number.	5	62,5
	KY1b= It is divided into as many regions between two integers as the number in the whole part.	2	25
	KY1c= Rational numbers are between the number in the denominator and the number written in the denominator.	1	12,5
	KY1d: On the number line, positive numbers are on the left and negative numbers are on the right.	0	0

As seen in Table 3, the distribution of misconceptions is KY1a (f=5, %=62.5), KY1b (f=2, %=25%) and KY1c (f=1, %=12.5).

“What are the misconceptions about ordering rational numbers?” Findings related to the sub-problem in the form of are given in Table 4 and Table 5.

Table 4. Frequency and percentages of S3 and S4 related misconceptions (KY2)

Questions	Correct		Blank		Wrong		KY2	
	(f)	(%)	(f)	(%)	(f)	(%)	(f)	(%)
S3	18	51,42	0	0	10	28,57	7	20
S4	12	34,28	6	17,14	6	17,14	11	31,42

As seen in Table 4, 7 (=20%) people in the 3rd question and 11 (=31.42%) people in the 4th question have misconceptions.

Table 5. Frequencies and percentages of KY2

Subtopics	Misconcepts	(f)	(%)
Ordering rational numbers (KY2)	KY2a: The numbers are bigger.	8	44,44
	KY2b: While the numerators are different, the one with the smaller denominator is larger.	2	11,11
	KY2c: The smaller the denominator is the smaller.	3	16,66
	KY2d: The smaller the numbers, the larger.	0	0
	KY2e: Negative rational numbers have no effect on ordering.	5	27,77
	KY2f: The smaller one is the larger.	0	0

As seen in Table 5, the distribution of misconceptions is as follows: KY2a (f=8, %=44.44), KY2b (f=2, =11.11%), KY2c (f=3, %=16.66) and KY2e (f=5, %, =27.77).

“What are the misconceptions about converting integer fractions to compound fractions?” Findings related to the sub-problem in the form of are given in Table 6 and Table 7.

Table 6. Frequencies and percentages of S5 and S6 related misconceptions (KY3)

Questions	Correct		Blank		Wrong		KY3	
	(f)	(%)	(f)	(%)	(f)	(%)	(f)	(%)
S5	15	42,85	8	22,85	9	25,71	3	8,57
S6	12	34,28	8	22,85	10	28,57	5	14,28

As seen in Table 6, it is seen that 3 (=8.57) people in the 5th question and 5 (=17.64%) people in the 6th question have misconceptions.

Table 7. Frequencies and percentages of KY3

Subtopics	Misconceptions	(f)	(%)
Converting integer fractions to compound fractions (KY3)	KY3a: The denominator is multiplied by the whole part and written in the denominator.	4	50
	KY3b: In negative rational numbers, the minus belongs only to the integer.	2	25
	KY3c: The denominator, the whole part and the numerator are added together and written into the numerator.	2	25

As can be seen in Table 7, the distribution of misconceptions is as KY3a (f=4, %=50.00), KY3b (f=2, %=25) and KY3c (f=2, %=25). In 8th grade students, it is seen that 5 (=%14.70) people in the 5th question and 6 (=%17.64%) people in the 6th question have misconceptions. In sub-misconceptions, the distribution is as KY3a (f=8, %=72.72), and KY3b (f=3, %=27.27).

“What are the misconceptions about addition and subtraction with integer fractions?” Findings related to the sub-problem in the form of are given in Table '8 and Table 9.

Table 8. Frequency and percentages of misconceptions about S7 and S8 (KY4)

Questions	Correct		Blank		Wrong		KY4	
	(f)	(%)	(f)	(%)	(f)	(%)	(f)	(%)
S7	9	25,71	4	11,42	15	42,85	7	20
S8	11	31,42	7	20	9	25,71	8	22,85

As seen in Table 8, 7 (=20%) people in the 7th question and 8 (=22.85%) in the 8th question have misconceptions.

Table 9. Frequencies and percentages of KY4

Subtopics	Misconceptions	(f)	(%)
Addition and subtraction with integer fractions (KY4)	KY4a: Without equalizing the denominator, whole parts, numerators and denominators are added together and subtracted.	13	86,66
	KY4b: When equalizing the denominators, the numerator remains constant.	0	0
	KY4c: The integer is the power of the rational number.	2	13,33

As seen in Table 9, the distribution of misconceptions is KY4a (f=13, %=86.66) and KY4c (f=2, %=13.33).

Secondary school 7th and 8th grade students' "What are the misconceptions about addition and subtraction with rational numbers?" Findings related to the sub-problem in the form of are given in Table 10 and Table 11.

Table 10. Frequency and percentages of misconceptions about S9 and S10 (KY5)

Questions	Correct		Blank		Wrong		KY5	
	(f)	(%)	(f)	(%)	(f)	(%)	(f)	(%)
S9	2	5,71	3	8,57	10	28,57	20	57,14
S10	14	40	2	5,71	7	20	12	34,28

As seen in Table 10, it is seen that 20 (=%57.14%) people in the 9th question and 12 (=%34.28) people in the 10th question have misconceptions.

Table 11. Frequencies and percentages of KY5

Subtopics	Misconceptions	(f)	(%)
Addition and subtraction with rational numbers (KY5)	KY5a: The numerators and denominators are added together without equalizing the denominators.	23	71,87
	KY5b: It keeps the numerator constant and adds and subtracts the denominators.	0	0
	KY5c: It leaves the numerator constant while equating the denominators.	9	28,12

As seen in Table 11, the distribution of misconceptions is KY5a (f=23, %=71.87) and KY5c (f=9, %=28.12).

Secondary school 7th and 8th grade students' "What are the misconceptions about multiplying and dividing rational numbers?" Findings related to the sub-problem in the form of are given in Table 12 and Table 13.

Table 12. Frequency and percentages of misconceptions about S11 and S12 (KY6)

Questions	Correct		Blank		Wrong		KY6	
	(f)	(%)	(f)	(%)	(f)	(%)	(f)	(%)
S11	21	60	3	8,57	7	20	4	11,42
S12	10	28,57	4	11,42	14	40	5	14,28

As seen in Table 12, it is seen that 4 (=11.42%) people in the 11th question and 5 (=14.28%) people in the 12th question have misconceptions.

Table 13. Frequencies and percentages of KY6

Subtopics	Misconceptions	(f)	(%)
Multiplication and division with rational numbers (KY6)	KY6a: Denominator equalization.	6	66,66
	KY6b: Multiplication is multiplied by inverting the second.	1	11,11
	KY6c: In division, the first rational number is inverted.	0	0
	KY6d: In division, the second is directly divided without inversion.	2	22,22
	KY6e: In division, both are reversed and divided.	0	0

As seen in Table 13, the distribution of misconceptions is KY6a (f=6, %=66.66), KY6b (f=1, =11.11) and KY6d (f=2, %=22.22).

"What are the misconceptions about zero coming into the numerator and denominator?" Findings related to the sub-problem in the form of a sub-problem are given in Table 14 and Table 15.

Table 14. Frequency and percentages of S13 and S14 related misconceptions (KY7)

Questions	Correct		Blank		Wrong		KY7	
	(f)	(%)	(f)	(%)	(f)	(%)	(f)	(%)
S13	19	54,28	7	20	0	0	9	25,71
S14	8	22,85	7	20	0	0	20	57,14

As seen in Table 14, 9 (=%=25.71%) people in the 13th question and 20 (=57.14) people in the 14th question have misconceptions.

Table 15. Frequencies and percentages of KY7

Subtopics	Misconcepts	(f)	(%)
The case of zero coming to the numerator and denominator (KY7)	KY7a: $\frac{0}{3} = 0$	3	10,34
	KY7b: $\frac{0}{3} = \text{Undefined}$	3	10,34
	KY7c: $\frac{0}{3} = 0,3$	3	10,34
	KY7d: $\frac{7}{0} = 0$	10	34,48
	KY7e: $\frac{7}{0} = 7$	9	31,03
	KY7f: $\frac{7}{0} = 0,7$	1	3,44

As seen in Table 15, the distribution of misconceptions is as follows: KY7a ($f=3$, $\%=10.34$), KY7b ($f=3$, $\%=10.34$), KY7c ($f=3$, $\%=10.34$), KY7d ($f=10$, $\%=34.48$), KY7e ($f=9$, $\%=31.03$) and KY7f ($f=1$, $\%=3.44$).

Conclusion and Discussion

This study aims to reveal the misconceptions of the 7th secondary school students about rational numbers and the misconceptions about the seven sub-problems within the scope of the research are mentioned below, respectively.

"What are the misconceptions about representing rational numbers on the number line?" 4 misconceptions related to the sub-problem were identified. These misconceptions are divided into as many regions as the number in the numerator between two integers (KY1a), between two integers are divided into as many regions as the number in the integer part (KY1b), between the number written in the denominator of rational numbers and the number written in the denominator (KY1c), and on the number line. Positive numbers are on the left, and negative ones are on the right (KY1d). The percentage of students with misconceptions in the two questions asked to identify misconceptions was 11.42% in the 1st and 2nd questions. In two questions, the percentages of 8 students' answers to misconceptions were 63.5% of KY1a misconceptions, 25% of KY1b misconceptions; KY1c misconception was found to be 12.5%. Özaltun, Danacı, and Orbay (2020) reached similar results in their study and concluded that students had problems showing and explaining fractions on the number line; they also ignored the concept of equal spacing and could not determine between which two integers a fraction lies. Pesen (2008) stated in his study that students had problems perceiving a/b as a single number in the representation of a/b on the number line, had the idea that the numerator and denominator in the fraction were different numbers, and while showing the fraction on the number line, it was 0 in dividing the whole into equal parts. Considering the points with and 1, he determined that they divide the whole into equal parts, one less than it should be, due to two points minus the number in the denominator between 0 and 1. In addition, he concluded that some students had misconceptions about dividing the whole into more parts than it should be by placing as many points as the number in the denominator between the points 0 and 1.

"What are the misconceptions about ordering rational numbers?" Six misconceptions related to the sub-problem were identified. These misconceptions are more significant than their number. (KY2a), While the numerators differ, the one with the smaller denominator is more considerable. (KY2b), The one with the smaller denominator is smaller (KY1c), and The one with the smaller numbers is more considerable. (KY2d), Negative rational numbers do not affect the ordering (KY2e), and the smaller numerator is larger (KY2f). In the two questions asked to determine the misconceptions, the percentage of students who had misconceptions in the 7th grade was 20% in the 1st question and 31.42% in the 2nd question. The percentages of 18 students' answers to misconceptions in a total of two questions 44.44% of KY2a misconceptions; 11.11% of KY2b misconceptions; 16.66% of KY2c misconceptions; KY2e misconceptions was found to be 27.77%. Özaltun et al. (2020) reached similar results, albeit partially, in the study of students. The fact that the numbers in the numerator or denominator of a fraction are prominent causes the fraction to be significant. It is concluded that the given fraction has misconceptions, such as removing the part it expresses in a whole and comparing the remaining parts. They have reached.

"What are the misconceptions about converting integer fractions to compound fractions?" Three misconceptions regarding the sub-problem were identified. These misconceptions are written in the denominator multiplied by the denominator by the integer (KY3a); negative rational numbers minus belong only to the integer. (KY3b), denominator, whole part and numerator are added to the numerator (KY3c). The percentage of students with misconceptions was 8.57% in the 1st question and 14.28% in the 2nd question; it

turned out to be. In two questions, the percentages of 8 students' answers to misconceptions were 50% of KY3a misconception, 25% of KY3b misconception, and KY3c misconception was found to be 25%.

“What are the misconceptions about addition and subtraction with integer fractions?” Three misconceptions regarding the sub-problem were identified. These misconceptions are integer parts, numerators and denominators are added and subtracted from equating the denominator (KY4a), The numerator remains constant when equating the denominators (KY4b), and The integer is the power of the rational number (KY3c). The percentage of students who had misconceptions in the two questions asked to determine their misconceptions was 20% in the first question and 22.85% in the second question. In two questions, the percentages of 15 students' answers to misconceptions were found to be 86.66% for KY4a and 13.33% for KY4c.

“What are the misconceptions about addition and subtraction with rational numbers?” Three misconceptions regarding the sub-problem were identified. These misconceptions include adding the numerators and denominators among themselves without equalizing the denominators (KY5a), adding and subtracting the denominators while keeping the numerator fixed (KY5b), and keeping the numerator constant while equating the denominators, (KY5c) form. The percentage of students who had misconceptions in the two questions asked to determine their misconceptions was 57.14% in the 1st question, 34.28% in the 2nd question; it turned out to be. In two questions, the percentages of 32 students' answers regarding sub-concept were 71.87% of KY5a misconceptions; KY5c misconception was 28.12%. Özaltun et al. (2020) reached similar results, albeit partially, in their study and concluded that the students had misconceptions about adding the numerators and denominators among themselves and adding the numerator and denominator of the fraction and continuing the process with the number they found.

“What are the misconceptions about multiplying and dividing rational numbers?” Five misconceptions related to the sub-problem were identified. These sub-misconceptions are equating to the denominator. (KY6a), in multiplication, the second is inverted and multiplied (KY6b); in the division, the first rational number is inverted (KY6c); in division, the second inversion is divided directly (KY6d), and in division, both are inverted and divided (KY6e). The percentage of students who had misconceptions in the two questions asked to determine their misconceptions was 11.42% in the first question and 14.28% in the second question. In a total of two questions, the percentages of 9 students' answers to misconceptions were 66.66% of KY6a misconceptions; 11.11% of KY6b misconceptions, KY6d misconception was found to be 22.22%. Özaltun et al. (2020) reached similar results, albeit partially, in the study of students applying the rules of addition in fractions to multiplication, multiplying both the numerator and denominator when multiplying fractions by natural numbers, performing operations without converting integer fractions to compound fractions, fractions using their fractions. They concluded that there are misconceptions in the form of incorrectly applying the rule of cross-multiplication and division between.

“What are the misconceptions about zero coming into the numerator and denominator?” 6 misconceptions related to the sub-problem were identified. These misconceptions, $0/3 = 0$ (KY7a); $0/3 = \text{Undefined}$ (KY7b); $0/3 = 0.3$ (KY7c), $7/0 = 0$ (KY7d); $7/0 = 7$ (KY7e); $7/0 = 0.7$ (KY7f) The percentage of students who had misconceptions in the two questions asked to identify misconceptions was 25.71% in the first question; In the second question, it was found to be 57.14%. In a total of two questions, the percentages of 29 students' answers regarding misconceptions were 10,34% of KY7a misconceptions; 10.34% of KY7b misconceptions; 10.34% of KY7c misconceptions; 34.18% of KY7d misconceptions; 31.03% of KY7e misconception; KY7f misconception was found to be 3.44%.

According to the results of the research, some suggestions are listed as follows:

- More emphasis should be placed on meaningful learning in teaching rational numbers. Students' cognitive readiness should be taken into account.
- Digital technology should be used in teaching rational numbers, and games that can explain models such as number lines more interestingly should be developed.
- Rather than teaching the operations of rational numbers as a set of rules by heart, students should be provided with a conceptual understanding of this subject. Therefore, the conceptual understanding of rational numbers should be emphasized in education and training.
- Active participation of students in the activities in the lessons should be ensured.
- Activities enabling students to comprehend the place and importance of rational numbers in daily life should be included frequently.


REFERENCES


- Alacacı, C. (2012). Students' misconceptions about fractions. E. Bingolbali and M.F. In Özmantar (Ed.), *Mathematical difficulties and suggestions for solutions* (pp. 63-95). Ankara: Pegem a Publishing.
- Bala, R. (2013). A study of errors and misconceptions in mathematics at elementary school stage. *Sage Journals*.
- Biber, A. Ç., Tuna, A. & Aktaş, O. (2013). Students' misconceptions about fractions and the effects of these misconceptions on the solution of fraction problems. *Trakya University Journal of Education Faculty*, 3(2), 152-162.
- Büyüköztürk, S., Kılıç Çakmak, E., Akgün, Ö. E., Karadeniz, S. & Demirel, F. (2012). *Sampling methods*. Ankara: Pegem a Publishing.
- Creswell, J. W. (2007). *Qualitative inquiry & research design: choosing among five approaches* (2. Edit). USA: SAGE Publications.
- Durmuş, S. (2005). Primary school students' perceptions of division of rational numbers. *Sakarya University Faculty of Education Journal*, 9, 97-109.
- Kutluca, T. (2012). Mathematical misconceptions and solution suggestions. *Journal of Dicle University Ziya Gökalp Faculty of Education*, 18 (2012) 287-291.
- Küçük, A. & Demir, B. (2009). Elementary 6-8. a study on some misconceptions encountered in teaching mathematics in classrooms. *Journal of Dicle University Ziya Gökalp Faculty of Education*, (13), 97-112.
- Mestre, J. (1989). Hispanic and anglo students' misconceptions in mathematics. ERIC Digest. Page 1 of 7.
- Ojose, B. (2015). Students' misconceptions in mathematics: analysis of remedies and what research says. *Ohio Journal of School Mathematics*, Fall 2015, Vol. 72
- Özaltun, S., Danacı, D. & Orbay, K. (2020). Test for identifying sixth grade students' misconceptions about fractions and an application. *International Journal of Field Education*, 6(1), 175-200.
- Pesen, C. (2007). Students' misconceptions about fractions. *Education and Science*, 32(143), 79-88.
- Pesen, C. (2008). Learning difficulties and misconceptions of students in representation of fractions on number lines. *Journal of İnönü University Faculty of Education*, 9(15), 157-168.
- Sert, G., Kurtoğlu, M., Akıncı, A. & Seferoğlu, S. S. (2012). An overview of research examining teachers' technology use: a content analysis study. *Academic Informatics*, 1-3 February 2012, Uşak University.
- Tavşancıl, E. & Aslan, E. (2001). *Content analysis and application examples*. Istanbul: Epsilon Publishing.
- Turkish Language Association., (2011). *Turkish dictionary*. Ankara: TDK Publications.
- Tutak, T., Emul, N. & Gün, Z. (2010). An evaluation of studies on misconceptions at primary education level in mathematics education. *Education Sciences*, 5 (3), 940-953.
- Yenilmez, K. & Yaşa, E., (2008). Elementary school students' misconceptions in geometry. *Uludağ University Journal of Education Faculty*, 21(2), 461-483.
- Yetim, S. & Alkan, R. (2010). Common mistakes and misconceptions of 7th grade students about the rational numbers and placement of the rational numbers on the number line. *Manas Journal of Natural Sciences*, 2(11), 87-109.
- Yılmaz, Z. & Yenilmez, K. (2007). Primary school 7th and 8th grade students' misconceptions about decimal numbers. *Afyon Kocatepe University Journal of Science*, 8(1), 269-290.

Studies Conducted Using MBTI (Myers-Briggs Type Indicator) Inventory in Music Education

Research Article

Demet GUVEN¹, Onder MUSTUL²

¹Necmettin Erbakan University, Faculty of Education, Department of Music Education, Konya, Türkiye  0000-0001-5721-7903

²Necmettin Erbakan University, Faculty of Education, Department of Music Education, Konya, Türkiye  0000-0002-7045-5145

To cite this article: Guven, D., & Mustul, O. (2023). Studies conducted using MBTI (myers-briggs type indicator) inventory in music education. *International Online Journal of Educational Sciences*, 15(5), 911-925.

ARTICLE INFO

ABSTRACT

Article History:

Received: 01.06.2023

Available online:
26.12.2023

The principle of student-centered education, which has become increasingly important in recent years, is called the "principle of student suitability". In the education process, which will be determined according to the student, the teacher's inferences about how and in what way the student acquired and comprehended the information may have positive results in the learning-teaching processes. Especially in instrument training lessons, which is an important sub-dimension of music education, one-to-one communication between the teacher and the student makes the principle of suitability for the student inevitable. In this study based on the scanning model, the document analysis method was used. In the study, firstly, what the MBTI (Myers-Briggs Type Indicator) inventory is explained. Then, different studies aiming to determine the personality types of students and teachers in the field of music education are included. Research on the subject was grouped under five themes (author of the research, year of the research, type of research, name of the research, place where the research was conducted) and analyzed by content analysis and shown in the table. It was found that the research conducted was mostly doctoral and master's theses. Additionally, when the relevant research results are examined; it is seen that in an education process planned according to the MBTI inventory, success in instrument lessons increases, students with extrovert (E) preference tend to focus on voice training, and introvert (I) students focus on instrument performance.

© 2023 IOJES. All rights reserved

Keywords:

Myers-Briggs Type Indicator, Student Appropriateness Principle, Student-Centred Education, Turkey

¹Corresponding author's address: Necmettin Erbakan Üniversitesi
Telephone: +905052749626
e-mail: ondermustul@hotmail.com
DOI: <https://doi.org/10.15345/iojes.2023.05.002>

Introduction

As a part of the culture in which a person lives, he/she needs education in order to maintain his/her life, to communicate and even to make sense of his/her existence. Along with the beginning of life, all of the teachings coming from our family and all our social environment are formed, developed and matured within the education process. This process continues from birth to death. According to Demirel (2006, p. 6), the concept of education is the process of creating a behavioural change in the individual. It is expected that there will be a change in the behaviour of an individual who goes through the education process. "Education is the process of bringing about the desired behavioural change in the individual through his/her own life and intentional enculturation." The education given by an instructor outside the school, which lasts from birth to death, is called informal education. Unlike this education, the planned and programmed education given in schools is formal education and includes the concept of teaching. Teaching is the planned and programmed activities organized by teachers working in schools. According to Varış (1998), teaching is all of the processes applied for the realization of learning and the development of desired behaviours in the individual, and it is a planned and programmed activity in schools (Orhaner and Hussein 2007, p. 3, 5). Like teaching, the concept of learning is also included in the educational process. According to Çalışkan et al. (2010 p. 17), the concept of learning is to be able to conduct a behaviour that we did not know how to do before and to perform the learned behaviour by remembering when we need it. Learning is the ability of an individual to permanently gain knowledge acquired through his/her life and a change in his/her behaviour. As Çelikkaya (1991 p. 76) stated, learning refers to the student aspect of education and teaching refers to the teacher aspect of it.

Teacher-Centred Education

Students and teachers, who are at the centre of education and training, have created an understanding of education shaped in two different ways. These are; teacher-centred education and student-centred education. In these two different types of education, the active and central party changes within the process. These methods adopt an understanding that is opposite to each other. Teacher-centred education positions the teacher as active and the student as passive. Every piece of information to be given is tried to be conveyed to the student exactly as the teacher explains. In this process, an evaluation is made on how much of the information conveyed by the teacher is learned by the student. According to Coşkun and Taneri (2021, p. 33), teacher-centred education, in a traditional sense, is based on idealist and realist philosophical understanding, perennialist and essentialist education theories, teacher-centred and authoritarian, and aims to transfer the existing knowledge, skills and rules to students within the framework of the social and political expectations and objectives. Therefore, these theories reflect a pedagogical understanding that sees the learner or student as an object to be formed intellectually and spiritually in a passive way, while positioning the teacher actively. According to Brown (2003, cited in Yağan 2022, p. 295), the primary goal in teacher-centred understanding is to transfer the determined content information to learners. For this reason, special attention is paid to lecturing and learners are assessed on how much they can repeat the content transferred to them.

Student-Centred Education

In student-centred education, on the other hand, the student is active. According to Darsih (2018, p. 34), student-centred approach is an approach in which students are more active than the teacher in the learning process and share the responsibility of learning with their teacher. In this approach, the teacher plays the role of facilitating and guiding learning. Teachers explain less and learners discover more. In this respect, student-centred teaching forces more passive learners to play an active role traditionally. While Coşkun and Taneri (2021, pp. 34-36) define the student-centred education approach as an approach based on the individual or the subject, they also identify the philosophies on which student-centred education approaches are based generally as progressivism and constructivism. The principle that best summarizes the student-centred education approach is the principle of appropriateness for the individual (student, child) in education. It

advocates an understanding of education that should be arranged according to the student's needs, motivation, and process of acquiring knowledge, interests and needs. This principle was introduced into the field of education in the early twentieth century by J. Dewey (1859-1952). According to Yeşilyurt (2020, p. 268), the characteristics that should be based on the principle of child appropriateness are the needs and differences of the individual.

The Importance of Student-Centred Education and the Principle of Student Appropriateness in Music Education

One of the important areas where the student-centred education approach should be applied is music education. Music education is a process that covers the individual's acquiring knowledge in the field of music and the development of his/her behaviours in the desired direction. According to Uçan (1997 p. 14), "music education is basically the process of gaining a musical behaviour, changing a musical behaviour or creating a musical behaviour change, developing a musical behaviour. In this process, the individual's own musical life is taken as the basis, a planned, regular and methodical path is followed in line with certain purposes, and certain goals are achieved in this way. Instrument training, which is one of the most important sub-dimensions of music education, is the whole of the methods applied in playing an instrument. Instrument training is a process in which the teacher and the student communicate one-to-one, individual characteristics come to the fore, and different teaching methods are employed according to each student's own characteristics. Therefore, the principle of student appropriateness has an undeniable importance in instrument training. According to Parasız (2009, pp. 19-24), in individual instrument training, studies aimed at playing the instrument with the correct technique, arranging the study time in a way to increase efficiency, getting the best understanding of musical cultures through the instrument and increasing students' musical skills are the main objectives of instrument training. Although instrument training is a long and difficult path, it is also a process that requires careful, patient and planned work. The two most important elements on this difficult path are the student and the teacher. In individual instrument training lessons, teacher-student communication and teaching method play an active role in the process of acquiring the targeted behaviours. According to Coşkuner (2016, pp. 83-104), in addition to the skills of making music together, the aesthetic understanding and social aspects of the students who receive instrument training also develop. Through instrument training, students can express themselves more easily and thus their psychological needs are met. Therefore, this situation will positively affect the future life of the student and will enable him/her to make right decisions in order to distinguish the good and the beautiful. In the process of individual instrument lessons, the teacher's teaching methods and attitudes towards the student may differ according to the personality traits of the student. The personal characteristics of the student and the teacher are very important in the individual instrument training course, where they can communicate directly and instantly. Each student's personality and way of working may be different, as well as the way of communication he/she expects from his/her teacher and the activities he/she does outside the class can directly affect the individual instrument lesson. According to Ercan and Yıldırım Orhan (2016, pp. 130-144), individual instrument training is regarded to be an educational process in which students' individual differences, intelligence, musical intelligence, perceptions, time to practice their instrument, abilities, and readiness are taken into account. In addition, in the statements about the definition of individual instrument lessons, common ideas such as each student is a class, the educator knows his/her student and designs teaching activities suitable for his/her individual learning characteristics, organizes the education program according to the student by considering his/her individual learning differences, creates the basis and learning environment that will respond to his/her enthusiasm and success are seen. Above, the principle of student-centred education and student appropriateness have been tried to be explained, and the importance of these concepts especially in instrument training lessons, which is an important sub-dimension of music education (and conducted one-to-one) is mentioned. In addition, in this process, it has been tried to draw attention to the effect of teacher-student communication on learning and the cases where students with

different characteristics are open to different teaching methods. In the next part of the study, what the MBTI inventory (Myers-Briggs Type Indicator) used in determining personality types is will be explained, and information will be given about the dimensions and contents of personality types. In addition, general results about how some researchers who aimed to determine the personality types of students and teachers in the field of music education used the MBTI (Myers-Briggs Type Indicator) inventory and what kind of findings they reached will be explained.

Methodology

The survey model was adopted as the basic approach in the research. If a research aims to describe a past or present event as it exists, scanning models are used (İslamoğlu and Alnaçık, 2014, p. 97). In the research, the data collected by the document analysis method was analyzed by content analysis. Content analysis, printed, visual, etc. It involves scanning the materials systematically and analyzing them thematically in terms of certain categories (Saban, 2009, p. 838).

In the study, firstly, what the MBTI (Myers-Briggs Type Indicator) inventory is explained. Then, different studies aiming to determine the personality types of students and teachers in the field of music education are included. Research on the subject was grouped under five themes (author of the research, year of the research, type of research, name of the research, place where the research was conducted) and analyzed by content analysis and shown in the table.

MBTI (Myers Briggs Type Indicator)

The "Psychological Types Theory", developed by Carl Gustav Jung (1921-1971) and published as a book in 1976, argues that each person has different characteristics. In this theory, the concepts of introversion and extroversion, which are the way of using mental processes, are explained together with the step of acquiring knowledge (sensing or intuitive), the step of decision-making (feeling and thinking), and how these two steps work. According to Coşkun Şentürk and Yüksel (2015 p. 32), Briggs and Myers examined this theory later and included the fourth step, the attitude towards the outside world, into the theory, although its existence was unknown. This step, like the others, is divided into two parts as judging and perception. Jung's work was extended by American psychologist Isabel Myers, the author of the MBTI (Myers Briggs Type Indicator) instrument.

Table 1. Meanings of dimensions, names and symbols of preferences in dimensions

Dimensions	Names of Dimensions	Preferences	Symbols of Preferences
1	Ways of using mental processes	Introvert	I
		Extravert	E
2	The process of acquiring knowledge	Sensing	S
		Intuitive	N
3	Decision Making	Feeling	F
		Thinking	T
4	Attitude towards the outside world	Judging	J
		Perception	P

The characteristics of extravert and introvert preferences from the ways of using mental process are as follows;

Introvert (I) individuals;

- put their thoughts into words after thinking until their thoughts are clear.
- realize their learning privately and individually.

- think more before taking action.
- need to spend time individually to gather their energy.
- show an extrovert attitude only when they are with the people they like.

Extravert (E) individuals;

- express their thoughts as they come into their minds.
- prefer to perform their learning together with other individuals.
- don't think as much as introverts before they act.
- need to interact with other people in order to gather their energy.

The characteristics of the two different preferences in the process of acquiring knowledge, which are sensing and intuitive, are as follows;

Sensing (S) individuals;

- gain information that appeals to all five senses more easily while acquiring new information.
- reach the whole by learning new information step by step.
- deal with the things happening at present and now.
- are in harmony with physical realities.
- start with solid facts.
- learn by building on existing one while acquiring new information.
- deal with the conceptual one.

Intuitive (N) individuals;

- acquire new information by associating it with other concepts in memory.
- come from the whole in acquiring new knowledge.
- are not concerned with the present and now, but with new possibilities that may happen in the future.
- focus on the big picture rather than details.
- are interested in a job that captures their creativity.
- acquire new information when it is creative with new materials.
- learn with new applications instead of applying similar ones.
- are interested in the theoretical one.

The characteristics of feeling and thinking, which are two different preferences from the decision-making step, are as follows:

Feeling (F) individuals;

- like helping people, it is their main job.
- take personal relationships as the key to learning.
- prefer teachers who organize the class according to harmony and personal relationships.
- are focused on the subjects they are deeply interested in.

- prefer an environment and the teacher where they are personally appreciated.
- like feedback that shows they have succeeded, but dislike feedback that shows they have not.
- prefer to trust people and be compatible.
- want to make decisions that will benefit those around them or their loved ones.

Thinking (T) individuals;

- apply their personal criteria and their own thoughts.
- look at logical order, analysability, and cause-effect relationships as keys to learning.
- prefer teachers who organize the classroom with logical systems.
- approach work calmly and objectively.
- prefer clear and objective feedback about success or failure.
- are sceptical and rigid-minded.
- make decisions based on their subjective criteria.

The characteristics of judging and perception, which are two different preferences from the attitude towards the outside world, are as follows:

Judging (J) individuals;

- prefer work organized according to a clear plan.
- want to have tasks with a specific endpoint.
- want things to be predictable and act accordingly.
- decide and plan the course before starting work.
- want all data to be presented to them clearly.
- are goal oriented.

Perception (P) individuals;

- prefer to do things without planning beforehand.
- want to make a sudden decision and follow their curiosity.
- like to do their jobs with situations that suddenly appear and catch their attention.
- prefer to do the given task with a sense of playing a game.
- do not like to be involved in strictly planned works.
- suddenly jump out and give direction according to the progress of the situation without a plan in their minds in the given task.
- are curious and interested.
- resist closure to gain more data.

According to the explanations above, the personality type of each individual responding to the MBTI instrument consists of four steps according to this instrument and consists of a preference sequence divided into two within the four steps. It is worth noting that, for example, the fact that an individual is judging does not mean that he/she is also non-perception. The individual can be predominantly judging and can sometimes

act perceptually. This also applies to the remaining three steps. The MBTI inventory is just a tool to see "dominant" preferences. The ways of using mental processes, which is the first step, is divided into two parts as introvert and extrovert. The ways of using mental processes step shows how we collect energy, and in a way, this first step is related to how we charge our battery. The methods that people with these two different preferences, which show themselves even in social activities during the day, while acquiring new information, are also different. An extrovert (E) person will prefer to be with people and even do a task that needs to be done alone, in front of others. He/She fills his/her social battery with others and tends to feel more tired when left alone. Group assignments will be much more productive for extravert people. I. Myers and P. Myers (1997) stated on pages 85-86 that for extroverts their behaviour is dependent on the external situation. Extroverts are more vocal in public and are easier to be understood. According to an article published on the website of the Center for the Applications of Psychological Medicine, or CAPT, an institution created to inform the public about MBTI, extroverts tend to focus primarily on the outside world, therefore they tend to focus their perceptions and judgments on people and objects (<https://www.capt.org/> 26 June 2022). An introvert (I) person prefers to spend time alone. He/She tends to prefer to do the tasks he/she needs to perform alone. While he/she fills his social battery by spending time alone, he/she feels tired after a while when he/she is with other people. He/She behaves extrovertly only when he/she is with people he/she likes. It is quite difficult for introverts to do homework in groups chosen at random by the teacher. According to Gülcan (2020, p. 292), introvert types prefer to be alone to do research and generally keep their thoughts to themselves. They don't care much about what other people are doing. The second step, the process of acquiring knowledge, is about how we gain new information. A sensing (S) person prefers to start with solid facts and use all five senses while acquiring new information. He/She acquires information by going from the part to the whole and enjoys the more precise information. According to Veznedaroğlu and Özgür (2005, p. 6), sensing people prefer concrete and precise data obtained through observation and experimentation. They are more process and practicality oriented. The intuitive (N) person is interested in information that will bring his/her creativity to the fore instead of hard facts while acquiring new information. By following a path from the whole to the part, they acquire new knowledge with what they have already learned. They prefer to receive information in a new way they find by using their creativity. According to Veznedaroğlu and Özgür (2005, p. 6), intuitive individuals look inside rather than outside. Using their imaginations, they turn to meanings and possibilities. They prefer relationships between concepts. In the third step, which is the decision-making step, the person who is in the preference of feeling (F) acts according to the wishes of his/her environment while making a decision. He/She becomes the trusting party in his/her relationships and it is important for him/her that his/her relationship with his/her teacher is good and sincere. Being appreciated and approved is very important to F individuals, so they don't want to receive a negative feedback. According to Given (1996, cited by Veznedaroğlu & Özgür, 2005, p. 5), someone who is in the preference of feeling wants to make decisions based on his/her own beliefs and values, and attaches importance to personal relationships, friendships and human values. A person who is in the preference of thinking (T) tends to think more about himself/herself while making a decision. Since logic is in the first place for T individuals, they act according to their logic when making decisions. In his/her relationship with his/her teacher, the individual focuses on the planned, organized and logical lecturing rather than sincerity. He/she is open to any criticism, either positive or negative. According to Temizkan and Arı (2019, pp. 65-75), the individuals who are in the preference of thinking make their decisions according to their logical processes, and the logical is persuasive for them. For these individuals, events should be conducted with a cause-effect relationship. They focus on analysing and making objective decisions. The person who is in the judging (J) step, which is the last step of the attitude towards the outside world, does not prefer to start work before making a plan in his/her mind before starting an assignment or task. He/She wants to go step-by-step and see task data clearly. He/She does not like sudden situations because he/she cannot make a plan in advance. The homework must have a certain deadline, and he/she must complete it before that date. According to Akdeniz (2013, p. 14), judging types tend to decide as soon as possible because they like to be

within a certain plan and want to know the end point. A person who is perceptive (P) starts an assignment or task directly without making a plan beforehand and shapes the assignment or task as things progress. He/She tends to keep an assignment due until the last day and completes the given assignment or tasks thanks to his/her ability to get things done quickly at the last moment. He/She likes sudden plans and therefore dislikes being on a plan. Doing their duties and responsibilities as if they are playing a game motivates them. According to Ekici (2003, as cited in Yıldız, 2018, p. 17), perceptive types tend to delay decision-making because they want to examine events more deeply and fully explore them. They prefer a flexible lifestyle. According to Psychological Types Theory, there are 16 different personality types and each person is one of these different personality types. These personality types are classified by the letters of the preferences that are divided into two in four steps. As a result, a personality type consists of four letters and as shown in the table below, the first step preference is written first, after that the second step preference, then the third and fourth step preferences are written side by side. According to the table, the personality type of someone who has chosen the first choice of each step as a result of the inventory will be ESTP.

Table 2. The names of the steps and the preferences within the steps

1. Step	2. Step	3. Step	4. Step
Ways of using mental processes	Acquiring knowledge	Decision making	Attitude towards the outside world
E - I	S - N	T - F	P - J

Table 3. Letter codes of different personality types

ISTJ	ISFJ	INFJ	INTJ
ISTP	ISFP	INFP	INTP
ESTJ	ESFJ	ENFJ	ENTJ
ESTP	ESFP	ENFP	ENFP

The characteristics of each personality type are different from each other. For example, a person with an ISTJ will want to handle his/her work alone, prefer a path from part to the whole while taking gaining new information, make decisions according to his/her logic and plan his/her work before doing it. However, when a single letter is changed, for example, the personality type that has the choice of F instead of T in the third step, which is the decision-making step, is of the ISFJ type. This person will act more emotionally when making a decision (as the decision-making step is feeling-F), and will have difficulty carrying out the planning process of being judging (J) without seeing that he/she is appreciated. With the principle of "student appropriateness" coming to the forefront in education more than before, the understanding of Carl Gustav Jung's Theory of Types in Psychology by teachers and their behaviour in this direction may yield positive results. According to the theory of psychological types, the characteristics of each individual with 16 different personality types are different from each other, and especially since instrument lessons are carried out individually in music education, it is important that teachers know and apply this theory in the field of music education.

Related Studies

Researcher	Year of the Research	Type of the Research	Name of the Research	Place of the Research
Yüksel, G.	2013	Doctoral Thesis	The Effect of Case to Have The Introverted And Extraverted Personality Characteristics of The	Necmettin Erbakan University, Turkey

Research Conducted Abroad				Applicants of Music Teaching on The Level of Academic Success of The Course Individual Instrument	
	Yüksel ,T.	2021	Doctoral Thesis	The Effect of Personality-Based Teaching Applications on Student Success in Clarinet Education	Hacettepe University Ankara State Conservatory, Turkey
	Kim, K.	1993	Doctoral Thesis	The Relationship between Teaching Style and Personality Characteristic of Group Piano Teacher	Boston University, U.S.A.
	Donovan, A. J.	1994	Doctoral Thesis	The Interaction of Personality Traits in Applied Music Teaching	Mississippi University and California University, U.S.A.
	Stuber, S. R.	1997	Doctoral Thesis	Teaching Behaviour Viewed as A Function of Learning Style and Personality Type: A Comparison of Experienced and Less Experienced Instrumental Music Teachers	Washington University
	Witherow, A. R.	2003	Doctoral Thesis	The Relationship Between Personality Type and Instrument Played in Undergraduate Music Majors	Miami University, U.S.A.
	MacLellan, C. R.	2009	Master's Thesis	Differences in Myers-Briggs Personality Types Among High School Band, Orchestra, and Choir Members	Bloomington North and Bloomington South High Schools, U.S.A.
	McKay, R. G.	2012	Master's Thesis	Relationships Between Personality Type and Preferred Approaches to Instruction in The Elementary General Music Classroom	60 state schools located in the State of Indiana
	Ayoubi and Ustwani	2014	Article	The Relationship Between Student's MBTI, Preferences and Academic Performance at A Syrian University	Damascus University, Syria

Studies Conducted in Turkey

In a study conducted by Yüksel in 2013, it was investigated whether the teaching practices given according to the personality types of the students determined by the MBTI inventory had an effect on the success level of the students. The research was conducted with 22 flute students studying at Necmettin Erbakan University, Ahmet Keleşoğlu Education Faculty, Fine Arts Education Department Music Education

Section in the spring semester of 2010-2011 academic year. The research conducted with the experimental and control groups lasted for a total of 10 weeks, and a set of pre-test, mid-test and post-test was applied to the participating students during the process. While teaching was applied to the students assigned to the experimental group according to the personality types determined by the MBTI inventory, the personality types of the students were not taken into account in the teaching applied to the control group. According to the results of the study, it was found that the success of the experimental group, which was taught by considering personality types, increased compared to the control group.

In a study conducted by Yüksel in 2021, it was aimed to determine the effect of teaching practices based on personality types determined according to the theory of psychological types in clarinet training on the level of student achievement and to evaluate student views on these practices. For the research, 6 students, who were studying at Hacettepe University Ankara State Conservatory, Wind and Percussion Instruments Department Clarinet Section in the academic year of 2020-2021, and who can carry out the relevant study in accordance with the design of the research were selected. The research is a single-subject quasi-experimental, mixed-method research with A-B model, which is one of the effectiveness research models, combining quantitative and qualitative research methods, and using sequential transformational design. By reaching 6 different learning preferences (ESTJ, ESTP, INFP, ENFP, INFJ, ESFP) based on 6 different type combinations obtained using the MBTI inventory, teaching practices based on different learning preferences were designed. The aim to be achieved in the designed teaching practices was to enable clarinet students to make progress in their technical and musical target behaviours. As a result of the research, it was found that the teaching practices arranged according to personality types increased the success levels of the students and the opinions received from the students also supported the success achieved.

Studies Conducted Abroad

In a study conducted by Kim in 1993, it was investigated to what extent the similarities and differences in the personality type of the students and the personality type of the teacher were successful in teaching in the group piano training. The research was carried out with 110 students from 18 classes studying at Boston University. The results of the study show that the teaching styles of extrovert (E), thinking (T) and judging (J) type teachers are similar to those of introvert (I), feeling (F) and perception (P) teachers. Teachers with a combination of E, T, J followed an analytical, group-oriented and non-verbal teaching approach, while teachers with a combination of I, F, P showed a teaching approach using general teaching approaches, individual-based teaching and more verbal behaviours.

In a study conducted by Donovan in Mississippi in 1994, the interactions of teachers and students according to the personality types determined by the MBTI inventory were examined. The aim of the research was to determine whether the personality traits of the teacher and the student affect success. The research was conducted with a total of 61 students and 7 lecturers selected from the University of Mississippi and the University of California. In order to analyse teacher-student relations, personality types are divided into four groups. These are: (1) teachers and students with extrovert types, (2) teachers and students with different types, extrovert teachers and introvert students, (3) different types of teachers and students, i.e. introvert teachers and extrovert students (4) students with similar introvert types are paired with teachers. According to the results of the study, students with extrovert (E) teachers showed more success than students with introvert (I) teachers. Sensing (S) type students paired with Intuitive (N) type teachers achieved the highest success compared to other combinations. Students with thinking (T) type paired with emotional (F) teachers achieved the highest performance compared to other combinations. No significant difference was found in the judging (J) and perception (P) categories.

In a study conducted by Stuber in Washington in 1997, lecturing of instrumental music teachers according to MBTI personality types was investigated. The teachers participating in the research were divided

into two groups as experienced and less experienced, working in high schools and secondary schools. As a result of the research, it was revealed that teachers with an abstract learning style, that is intuitive (N) use more analogies and illustrations than teachers with a concrete learning style, that is sensing (S). Among the subjects participating in this research, 70% of experienced teachers were introvert (I), while 70% of less experienced teachers were extrovert (E). Introvert teachers approved the student more, while extrovert teachers disapproved more. Feeling (F) and judging (J) teachers tended to disapprove, and it was also found that the students of teachers with FJ came to class late after the break, and it was more difficult for them to be disciplined in the classroom.

In a study conducted by Witherow at the Department of Music Education, the University of Miami in 2003, the relationship between the instrument played and the personality type was examined. In the study, which was conducted with 152 subjects from the University of Miami, the MBTI inventory was used to determine the personality type of the subjects. A limited relationship was found between personality types and the instruments played. However, extroversion and introversion preferences in the "Use of Mental Processes" step showed significant differences between string players and vocalists. It was concluded that vocalists are more extrovert than those who play string instruments. In addition, when the preferences between wind instrument players and string instrument players were examined, significant differences were found between judging and perception preferences in the last step, "Attitude towards the Outside World". It was concluded that those who play string instruments are more perceptive than those who play wind instruments. According to the results of the research, it was found that the vocalists were more extrovert than the instrument players, and the solo performers were more introvert than the others.

In a study conducted in 2009, MacLellan investigated the personality type differences among high school students in the band, orchestra and choir according to the MBTI inventory. The research was conducted with participants attending the grades between nine and twelve at Bloomington North and Bloomington South High Schools in Indiana. It was investigated in which community the personality types found were more numerous. The research was conducted with 355 students who had been in the school orchestra, band and choir for a year or more. In order for the groups to give independent results, the answers of the students who were in different groups before were eliminated and the research was conducted with the answers of a total of 270 students. 114 students were a member of the band, 79 students were a member of the orchestra and 77 students were chorus ensemble members. Personality types were compared between the three populations and personality types varied widely. Significant differences were found between orchestra and choir students in terms of introversion and extraversion. Choir students were found to be more extravert individuals compared to orchestra students. Although there was no significant difference, there were also differences between choir and band students in terms of introversion and extroversion. Choir students were more extrovert than band students. Choir and band students had significantly higher intuitive (N), feeling (F) and perception (P) preferences when compared with high school norms.

In his research conducted in 2012, McKay examined the personality types in primary school music classes and the effects of the music teaching approaches preferred according to the determined personality types on the success of the students. The aim of the research was to determine personality types and how effective the teaching methods preferred according to personality types. The music teaching methods used in the research were limited to Orff and Kodály methods. The population of the study consisted of the state of Indiana, and the sample consisted of 60 students whose levels ranged from kindergarten to sixth grade. In the study, with the help of the students' teachers, the Orff and Kodály approaches were asked to be applied to all students with different personality types in a five-month period. Before the implementation phase, the students' personality type was found to be 62% extrovert (E), 53% intuitive (N), 63% feeling (F), and 78% judging (J). At the end of the five-month period, students were found to be more successful when extrovert,

intuitive, feeling and judging students were trained using the Orff approach, and introvert, sensing, logical and perception students were trained using Kodály approach.

In a study conducted by Ayoubi and Ustwani in 2012, the relationship between the personality types found according to the MBTI inventory of students studying at university and their academic achievement levels. The research was conducted with 89 students studying at five different faculties (education, economics, science, pharmacy and fine arts) at Damascus University in Syria. In the research, the MBTI test was used to determine the personality types of the students, a form prepared for this purpose and the grade point averages were used to measure the level of appreciation of the students. The most critical result obtained from the study is that there was a large correlation between the sensing (S) and intuitive (N) students' academic success and whether they liked the lessons or not. Extrovert (E), sensing (S), thinking (T) and judging (J) aspects were more in the education faculty while thinking (T) aspect was more in the economics faculty, and extrovert (E), sensing (S), feeling (F) and judging (J) aspects were more in the faculty of science. Feeling (F) and perception (P) aspects were more common in the faculty of pharmacy, and extravert (E), intuition (N), feeling (F) and perception (P) aspects were higher in the faculty of fine arts. When the distribution of both personality types and overall mean scores were investigated, it was found that INTJ and ENFJ received higher grades than other personality types. When the findings in music education were examined, it was found that there was a significant relationship between introversion and extraversion only for this department. While extrovert individuals were more willing to study for music lessons, introvert individuals were less willing to study for them.

Conclusion And Recommendations

In studies conducted in Turkey, it has been concluded that the education process organized according to the personality types determined using the MBTI inventory has a positive effect on student achievement. In addition, in the education process organized according to the personality type of the student, the students developed in technical behaviour and showed progress in their musical target behaviours. There was no significant difference between the general academic achievement levels of introvert (I) and extrovert (E) students. In studies conducted abroad, it was investigated which instrument the students played according to their personality type, and it was concluded that extrovert (E) students mostly preferred the vocal area, while introvert (I) students preferred solo performance instruments. In another study conducted with a similar purpose, it was aimed to find out the differences between the personality types of choir, band and orchestra students. Choir students were found to be more extrovert (E) than orchestra students. Although there was no significant difference, choir students were found to be more extrovert (E) compared to band students. When compared with high school norms, it was concluded that choir and band students were highly intuitive (N), feeling (F) and perceptive (P). Students whose levels are from kindergarten to sixth grade were trained using the Orff and Kodály method and it was aimed to find out which personality type these methods were more effective on. According to the results, it was determined that students are more successful when education is given using the Orff applied to students who were extrovert (E), intuitive (N), feeling (F), judging (J), and using the Kodály method to students who were introvert (I), sensing (S), thinking (T) and perceptive (P). In a study investigating the effect of the harmony between the teacher and the student's personality type on student satisfaction, it was determined that the personality type harmony did not have an effect on student satisfaction. In another study, different from student satisfaction, it was examined whether the personality type differences between the teacher and the student had an effect on the success of the student. According to the result, students with extrovert (E) teachers showed more success than students with introvert (I) teachers; sensing (S) type students paired with intuitive (N) type teachers achieved the highest success compared to other combinations; thinking (T) type students paired with feeling (F) type teachers achieved the highest success compared to other combinations. There was no significant effect on the level of achievement between the teacher and the student being judging (J) or perception (P). In another study, teachers' attitudes towards

students in the lesson were investigated according to their personality type, and introvert (I) teachers tended to approve students more than extrovert (E) teachers. Teachers who are in the preference of feeling (F) and judging (J) are also more likely to approve students in the lesson. Similarly, it was concluded that students of teachers with feeling (F) and judging (J) preferences come to class late, and it is more difficult for them to be disciplined in the classroom. In a study conducted to determine the personality types of the students studying in five different faculties, the personality types of the students studying in the faculties of fine arts were mostly found to be extrovert (E), intuitive (N), feeling (F) and perceptive (P). It has been determined that the achievement level of students with INTJ (introvert, intuitive, thinking, judging) and ENFJ (extrovert, intuitive, feeling, judging) is higher than other type combinations. When the music education department is examined, a significant difference was found between introversion (I) and extraversion (E) only for this section. It was concluded that extrovert individuals were more willing to study than introvert individuals. Considering the results of previous studies, knowing about the personality type of the student and acting accordingly can affect the level of success, as well as change the student's motivation towards the lesson and his/her attitude towards the teacher. According to the results of the studies, it was found that the choir and vocal students were more extrovert. For example, forcing an extrovert student to solo performance instruments may negatively affect the student's perspective on music and music education. Likewise, directing an introvert student to the field of choir and vocal against his/her will can also change his/her perspective towards music. It is equally important for the teacher to know his/her personality type as well as the student. According to the results of the research, the students of extrovert teachers showed much higher success. If a teacher is an introvert personality type, he/she may aim to increase student success by exhibiting extrovert attitudes during the lesson. Alternatively, if both the teacher and the student are in the sensing (S) preference, the teacher can increase the student's success by using more analogies and illustrations, such as the intuitive (N) type teachers.

Ethics Committee Approval

Ethics committee approval was not required as the research was a review study.

REFERENCES

- Akdeniz, C. (2013). *Kişilik profillerine göre öğretmenlerin öğrenme stratejisi tercihleri ve öğretim stratejilerini kullanma durumları*. Yayınlanmamış doktora tezi, Anadolu Üniversitesi.
- Ayoubi, R. M., & Ustvani, B. (2014). The relationship between student's MBTI, preferences and academic performance at a Syrian university. *Education and Training Journal*, 56(1), 78-90, <https://doi.org/10.1108/ET-09-2012-0090>
- Coşkun, S., & Taneri, P. O. (2021). Öğretmen adaylarının eğitim yaklaşımlarının eğitim felsefeleri çerçevesinde değerlendirilmesi. *Dört Öge Dergisi*, 19, 29-48.
- Coşkun Şentürk, G., & Yüksel, G. (2015). Müzik öğretmeni adaylarının psikolojik tipleri ile eleştirel düşünme eğilimleri. *Fine Arts. E-Journal of New World Sciences Academy*, 10(1), 31-44, <https://www.doi.org/10.12739/NWSA.2015.10.1.D0163>
- Coşkuner, S. (2016). Türkiyede anadolu güzel sanatlar liseleri bireysel çalgı eğitimi dersinde (yaylı çalgılar) piyano eşlikli çalışmalara ilişkin öğretmen görüşleri. *Afyon Kocatepe Üniversitesi Akademik Müzik Araştırmaları Dergisi*, 2(3),83-104. <https://doi.org/10.5578/amrj.10806>
- Çalışkan, N., Karadağ, E. & Çalışkan, N. F. (2010). *Eğitim, iletişim ve öğretmenin beden dili*. Kök Yayıncılık.
- Çelikkaya, H. (1991). Eğitimin anlamları ve farklı açılardan görünüşü. *Marmara Üniversitesi Atatürk Eğitim Fakültesi Eğitim Bilimleri Dergisi*, 3(3),73-85.
- Darsih, E. (2018). Learner-centered learning: what makes it effective. *Indonesian EFL Journal*, 4(1),33-42. <https://doi.org/10.25134/ieflj.v4i1.796>
- Demirel, Ö. (2006). *Öğretimde planlama ve değerlendirme, öğretim sanatı*. Pegem A Yayınları.
- Donovan, A. J. (1994). *The interaction of personality traits in applied music teaching*. Unpublished doctoral thesis, The University of Southern Mississippi.
- Ercan, H., & Yıldırım Orhan, Ş. (2016). Kişiselleştirilmiş öğrenme-öğretme yaklaşımının bireysel çalgı dersiyle ilişkisi: gazi üniversitesi örneği. *Eğitim ve Toplum Araştırmaları Dergisi*, 3(1), 130-144.
- Gülcan, C. (2020). Psikolojik tipler ve Jung psikolojisi üzerine bir değerlendirme. *Karadeniz Sosyal Bilimler Dergisi*, 12(23),566-579. <https://doi.org/10.38155/ksbd.685872>
- İslamoğlu, H. ve Alnaçık, Ü. (2014). *Sosyal Bilimlerde Araştırma Yöntemleri* (4. bs.). İstanbul: Beta Basım Yayım Dağıtım.
- Kim, K. (1993). *The relationship between teaching style and personality characteristic of group piano teacher*. Unpublished doctoral thesis, Boston University.
- MacLellan C. R., (2009). *Differences in myers-briggs personality types among high school band, orchestra, and choir members*. Unpublished master's thesis, Indiana University.
- Myers I. B. (1962). CAPT.org. *Jung's Theory of Psychological Types and the MBTI Instrument*. <https://www.capt.org/mbti-assessment/mbti-overview.htm>
- McKay, R. G. (2012). *Relationships between personality type and preferred approaches to instruction in the elementary general music classroom*. Unpublished master's thesis, Indiana University.
- Myers I. B. & Myers P. B. (1997). *Kişilik, farklı tipler ve farklı yetenekler*. Pegasus Ajans Yayıncılık
- Orhaner, E. & Hussein, A. T. (2007). *Ticaret ve turizm eğitiminde özel öğretim yöntemleri*. Siyasal Kitabevi.
- Parasız, G. (2009). Eğitim müziği eksenli keman öğretiminde kullanılmakta olan çağdaş türk müziği eserlerinin tespitine yönelik bir çalışma. *Sanat Dergisi*, 0(15),19-24.
- Saban, A. (2009). Çoklu zeka kuramı ile ilgili Türkçe çalışmaların içerik analizi. *Kuram ve Uygulamada Eğitim Bilimleri*, 9(2), 833-876.
- Stuber, S. R. (1997). *Teaching behavior viewed as a function of learning style and personality type: A comparison of experienced and less experienced instrumental music teachers*. Unpublished doctoral thesis, University of Washington.

- Temizkan, S. P., & Arı, Ö. (2019). Turist rehberi adaylarının kişilik özelliklerinin mesleğin gerekleri açısından değerlendirilmesi. *Journal of Gastronomy Hospitality and Travel*, 2(1), 65-79, <http://dx.doi.org/10.33083/joghat.2019.16>
- Veznedaroğlu, R. L., & Özgür, A. O. (2005). Öğrenme stilleri: tanımlamalar, modeller ve işlevleri. *İlköğretim Online*, 4(2), 1-16.
- Yağan, S. A. (2022). Öğrenci merkezli yöntem, teknik ve stratejilerin öğrenci tutumuna etkisi: bir meta analiz çalışması. *Bayburt Eğitim Fakültesi Dergisi*, 17(33),295. <http://dx.doi.org/10.35675/befdergi.730782>
- Yeşilyurt, E. (2020). Öğretmenlerin pusulası: genel öğretim ilkeleri. *Ekev Akademi Dergisi*, 0(83),263-288.
- Yıldız, E. (2018). *Rehberlik ve psikolojik danışmanlık programı öğrencilerindeki empati, kişilik tipleri ve çoklu zeka türlerinin bazı değişkenler açısından incelenmesi*. Yayımlanmamış yüksek lisans tezi, Doğu Akdeniz Üniversitesi.
- Yüksel, G. (2013a). *Flüt öğretiminde psikolojik tipler kuramına dayalı öğrenme stili odaklı öğretim uygulamalarının öğrenci başarı düzeyine etkisi*. Yayımlanmamış doktora tezi, Gazi Üniversitesi.
- Yüksel, G. (2013b). Müzik öğretmeni adaylarının içedönük-dışadönük kişilik özelliklerine sahip olma durumunun bireysel çalgı akademik başarı düzeyine etkisi, *Eğitim ve Öğretim Araştırmaları Dergisi*, 2(3),98-104.
- Yüksel, T. (2021). *Klarinet eğitiminde kişilik tiplerine dayalı öğretim uygulamalarının öğrenci başarı düzeyine etkisi*. Yayımlanmamış doktora tezi, Necmettin Erbakan Üniversitesi.
- Witherow, A. R. (2003). *The relationship between personality type and instrument played in undergraduate music majors*. Unpublished doctoral thesis, University of Miami.

Effect of Socioscientific Issue and Argumentation-Based Inquiry Approach on Pre-Service Science Teachers' Understanding of The Nature of Science

Research Article

Sumeyra Zeynep ET¹, Mehmet Nuri GOLEKSIZ²

¹Firat University, Faculty of Education, Department of Educational Math and Science Education, Elazığ, Türkiye  0000-0002-0176-4788

²Firat University, Faculty of Education, Department of Educational Math and Science Education, Elazığ, Türkiye  0000-0002-8268-0163

To cite this article: Et, S. Z., & Goleksiz, M. N. (2023). Effect of socioscientific issue and argumentation-based inquiry approach on pre-service science teachers' understanding of the nature of science. *International Online Journal of Educational Sciences*, 15(5), 926-943.

ARTICLE INFO

Article History:

Received: 14.06.2023

Available online:
19.12.2023

ABSTRACT

In recent years, the nature of science in the education of scientifically literate individuals has been emphasized, especially in science education. Accordingly, studies on the development of individuals' understanding of the nature of science are pertinent. In this context, this study investigates the effect of two different teaching methods, which were designed based on the argumentation-based inquiry approach and socioscientific issues, on pre-service science teachers' understanding of the nature of science. This study was conducted in accordance with the mixed method, with the participation of 82 pre-service science teachers within the scope of the nature of science and history of science course. Different data collection tools were used in the study to provide data diversity. The data collection tools include Views on the Nature of Science-C questionnaire, rubrics, and socioscientific scenarios. As a result of the holistic evaluation of the qualitative and quantitative findings obtained from the research, it was observed that the involvement of pre-service teachers in the learning process contributed to the development of understanding of the nature of science. In this context, based on the research results, it can be said that the argumentation based inquiry approach and learning environments based on socioscientific issues are effective in the development of individuals' understanding of the nature of science.

© 2023 IOJES. All rights reserved

Keywords:

Argumentation-based inquiry approach, nature of science, scientific literacy, socioscientific issues

Introduction

¹Corresponding author's address: Firat Üniversitesi
Telephone: +905398263701
e-mail: sumeyra.et@gmail.com
DOI: <https://doi.org/10.15345/iojes.2023.05.003>

To develop scientific literacy in students is a main goal of science education (Baytelman & Constantinou, 2017; Liu, 2009). To achieve this goal, understanding the nature of science (NOS) is seen as a crucial factor (Upahi et al., 2020), and the idea that science education should integrate a higher scientific dimension related to NOS has become prominent in the 21st century (Ferreira & Morais, 2013). It is commonly thought that if people use their NOS knowledge to make informed decisions about science-related issues that affect their daily lives, they will progress toward becoming scientifically literate (Upahi et al., 2020). Therefore, NOS has been an important issue in science education (Khishfe, 2021) at the point of raising cultured and knowledgeable citizens (Agustian, 2020). From a holistic viewpoint, the term NOS expresses the values and assumptions necessary for the development of scientific knowledge (Phillips et al., 2015). However, the concept of NOS is difficult to define with a single term or expression, as it is inclusive and versatile (Ramnarain & Chanetsa, 2016). Yet, there is extensive literature that characterizes NOS in science education (Abd-El-Khalick et al., 1998; McComas, 2004; Khishfe & Abd-El-Khalick, 2002; Schwartz et al., 2004; Bell, 2009).

There is consensus or disagreement about the concept of NOS in this extensive literature. One consensus is the "consensus view" (Abd-El-Khalick et al., 1998) or the "Lederman's set of seven NOS objectives" (Mathews, 2012), which is perceived as a list that science educators, scientists, and philosophers of science agree on to a minimum. According to the aspects related to NOS stated within the scope of consensus view scientific knowledge can vary; (a) tentative (subject to change); (b) empirically-based (based on and/or derived from observations of the natural world); (c) subjective (theory-laden); (d) partially based on human inference, imagination, and creativity; and (e) socially and culturally embedded. In addition to these aspects, the distinction between observation and inference, and the functions of, and relationship between scientific theories and laws are included in NOS (Abd-El-Khalick & Lederman, 2000; Abd-El-Khalick et al., 1998). Despite the fact that scientists have reached a degree of agreement, there have been critiques concerning the dimensions of NOS, which is articulated as a consensus view. These criticisms have led to the emergence of alternative approaches to NOS over time (Allchin, 2011; Irzik & Nola, 2011; Matthews, 2012). Despite the criticisms, Lederman et al. (2014) stated that they do not advocate a single and universal understanding of NOS, that the consensus view does not claim a single definition of NOS, and that it only allows students to focus on the characteristics they want students to obtain about NOS. They stated that it was a framework. Moreover, they stated that the elements included in the scope of the consensus view can be excluded and are not limited to the elements stated. As demonstrated by Lederman et al. (2014), the consensus view has been a framework used by many researchers on grounds that it clearly reveals the characteristics that students want to have about NOS. Knowing how to teach NOS is as important as knowing how to characterize it. Further, NOS teaching focuses on high level skills (Türköz, 2015). In this context, previous studies have delineated different approaches in NOS teaching including historical, implicit, and explicit and reflective (Khishfe et al., 2002), and these methods are mainly used in NOS instruction. Meanwhile, it is believed that argumentation, which can also be included in other teaching approach processes, especially in the explicit and reflective teaching approach, is an inquiry-based research methodology that can be used as a tool in teaching NOS (Oğuz Ünver, 2015).

Argumentation-based inquiry approach ABI approach provides a framework for teachers to question in science lessons through a negotiation process with students (Cavagnetto et al., 2011) and increases their metacognitive knowledge about laboratory studies (Kingır, 2011). As a tool, ABI generally encourages thinking, negotiating, and writing about science lab activities (Hand et al., 2007). It facilitates in-depth understanding of science-based ideas in students by helping them to create and test questions, support their claims with evidence, compare their ideas with that of others, and consider how their ideas have changed in this process (Akkus et al., 2007). Simultaneously, ABI enables students to use embedded and open-language tasks in different frameworks (Cavagnetto et al., 2010) including individual, small group, and whole class using speaking and writing methods as epistemological tools while engaging in inquiry activities (Chen et al.,

2016). In this respect, ABI is expressed as an approach based on social constructivism as it emphasizes the social context of learning (Shamuganathan & Karpudewan, 2017). From a practical viewpoint, ABI is a set of activities to guide thinking and writing for both teachers and students (Hand et al., 2007). Socioscientific issues with the wide-ranging development of science and technology, individuals face an uncertain future driven by different issues such as COVID-19, climate change, vaccines, reproductive technologies, nuclear energy, and genetic modification (Dawson & Venville, 2020; Dawson & Carson, 2020). Individuals should consider more than scientific evidence when making decisions about such issues (Dawson & Carson, 2016). These situations, which emerge as the intersection between science and social problems in real world contexts, are called SSI (Cian, 2020). It is possible to define SSI as issues that concern society (Zeidler & Keefer, 2003; Sadler & Fowler, 2006), have scientific basis (Kolstø, 2001; Xiao, 2020), contain moral values (Zeidler & Nichols, 2009; Fang et al., 2019), can be discussed (Sadler & Donnelly, 2006; Chang et al., 2020; Lin et al., 2020), and can have more than one solution (Bossér & Lindahl, 2019; Ram, 2020). Today, many international science programs require learning environments that encourage people to participate in discussions and decision making about important societal issues (Lee et al., 2019). This also supports the functional literacy of individuals (Johnson et al., 2020; Macalalag, et al., 2020; Herman et al., 2020).

SSI provides a new sociocultural and epistemological learning environment that cannot be compared to traditional teaching when used as an effective context (Lee et al., 2019). Thus, when SSI is used as an effective context, it seems to contribute to the development of different fields such as students' field knowledge (Sadler et al., 2016) argumentation skills (Topçu & Atabey, 2017; Chen & Liu, 2018) and NOS understanding (Eastwood et al., 2012). SSI also supports the development of individuals' decision-making skills (Yavuz Topaloğlu & Balkan Kırıyıcı, 2018; Gresch, et al., 2013). Accordingly, it is possible to evaluate SSI as an educational reform (Bayram-Jacobs et al., 2019). Accordingly, teaching environments may be designed on the basis of the argumentation-based inquiry (ABI) approach (Cavagnetto, 2010) and socioscientific issues (SSI), which inherently combine inquiry-based applications, as a form of NOS teaching. Based on this literature, this study investigates the effect of two different teaching processes designed as per ABI and SSI on NOS understanding of pre-service science teachers. The research questions of this study are as follows:

- 1) What is the current state of pre-service science teachers' knowledge of NOS?
- 2) What is the effect of teaching based on SSI on NOS understanding of pre-service science teachers?
- 3) What is the effect of ABI approaches on NOS understanding of pre-service science teachers?

Methodology

This study provides a detailed examination of the effect of two different teaching processes based on ABI and SSI on the understanding of NOS of pre-service science teachers. For this purpose, the research was designed as an intertwined mixed design, which is one of the mixed method designs. Intertwined mixed design is a pattern wherein a single data set is insufficient, different questions about the problem situation of the research need to be answered, and a different data set is needed for different types of questions. It allows data to be collected using qualitative and quantitative patterns (Creswell & Plano Clark, 2011). The reason for choosing this design was that quantitative data alone would not ensure the comprehensibility of the problem situation; thus, it is possible to test the teaching process, explain the participants' reactions to the procedure, and believe that qualitative data should be embedded in the process to improve the data collection process. In this intertwined mixed pattern, the researcher designed the teaching processes to be conducted in different groups as an experimental intervention. Qualitative data were used to obtain substantial data about the application before, during, and after the experimental process. To illuminate the research problem, the quantitative data were first analyzed and then used to explain and elaborate the process.

The Study Group

Participants Research was conducted with 82 pre-service science teachers who took the course on NOS and the history of science, from the science teaching department of a medium-sized university in northwest Turkey. This study was conducted with 25 pre-service teachers in the first group (Experiment 1), 24 in the second group (Experiment 2), and finally, 33 in the third group (Control). Course information This study was conducted with third-year students from the Department of Primary Science Teaching at the Faculty of Education of a State University in Turkey. Primary Science Teaching Undergraduate Program trains teachers in primary education within the scope of the restructuring process of the Faculties of Education in Turkey and is included among undergraduate programs. Pre-service teachers in this program primarily receive theoretical science lessons for the first two years. In the following years, they take more practical lessons such as laboratory practices, teaching methods, and school experience. The nature and history of science course within the program, which is based on the teaching of science; concepts related to NOS; teaching NOS; scientific knowledge; scientific method; the relationship of science with science, technology, society, and the environment; provides training to the teachers this design was that quantitative data alone would not ensure the comprehensibility of the problem situation; thus, it is possible to test the teaching process, explain the participants' reactions to the procedure, and believe that qualitative data should be embedded in the process to improve the data collection process. In this intertwined mixed pattern, the researcher designed the teaching processes to be conducted in different groups as an experimental intervention.

Data collection tools

Different data collection tools were used according to the problem situation of the study and to reveal research questions. Detailed information on data collection tools is chronologically provided in Table 1

Table 1. Data Collection Tools Divided as per Use in Each Experiment Group

Groups	Pre-test	Through the process	Post-Test
Experiment 1	VNOS-C	Socioscientific Scenarios	VNOS-C
	Semi-structured Interview (SSQ)		SSQ
Experiment 2	VNOS-C	ABI approach	VNOS-C
	SSQ		SSQ
Control Grup	VNOS-C		VNOS-C
	SSQ		SSQ

Views of nature of science questionnaire, form C

Views of Nature of Science Questionnaire-C (VNOS-C), developed by Lederman et al. (2002), is a data collection tool used for pre- and post-test to determine students' understanding of NOS in this study. When reviewing the relevant literature, different measurement tools such as multiple choice, Likert, and open-ended questionnaires were used to assess students and teachers' views on NOS (Lederman et al., 2002). Among these measurement tools, Likert, true- false, or multiple-choice test types have a restrictive nature in revealing the opinions of individuals on NOS. As a result, VNOS-C, which is described as an opinion questionnaire concerning NOS that consists of open-ended questions and is thought to reflect pre-service science teachers' understanding of NOS in greater depth, was chosen for the study.

Socioscientific scenarios

Socioscientific scenarios are a data collection tool created to enable participants to devise arguments about SSI and further discuss it. These scenarios were created by the researcher with the help of studies containing scenario examples (Sadler & Zeidler, 2004; Jho, et al., 2014; Lee, et al., 2019), scientific journals, and

news on websites. The script texts were prepared from scientific sources to reflect the positive and negative aspects of the subject. Afterwards, the scenarios were evaluated by three different experts who had completed their doctorate in the field of SSI. After having received the feedback from the experts, the scenarios were finalized. The scenarios created were as follows: are animal experiments, hybrid embryo, technology from the future-Crispr, beneficial for or harmful to maintain the GMO balance?; are genetic copying, biofuels, etc. problems or solutions?; your baby order is ready-2030. Through the scenarios, the prospective teachers had small group discussions with their group mates for 15– 20 minutes. Small group discussions were followed by discussions ranging 45–50 minutes with the participation of the entire class, expressed as large group discussions.

Semi-structured interview

Semi-structured interviews were used as pre- and post-test to determine the pre-service teachers' understanding of NOS. Interview questions consisted of nine questions that were included in the opinions questionnaire about NOS and were thought to reveal the understanding of NOS among pre-service science teachers in a way that included the sub-objectives of the research. Semi-structured interviews were applied twice, at the beginning and end of the process, with five pre-service teachers in each group.

Views of Nature of Science Questionnaire-C rated scoring key

To ensure a reliable and valid comparison between categories obtained from qualitative data, it was preferred to digitize the data in VNOS-C analysis. After deciding how the questionnaire should be analyzed, a rubric was prepared to score the items in the questionnaire. Four distinct categories with distinct boundaries separated from each other were determined as a result of the examination of relevant literature in the evaluation of the pre-service teachers' answers. Considering that the contents of the categories were formed on the basis of the harmony between the existing situation regarding the NOS elements in the literature and the answers given by the pre-service teachers, they were labeled as incompatible, partially compatible, compatible, and irrelevant. In this context, the incompatible category means that the pre-service teachers' statements about the relevant dimension of NOS are not compatible with the perspective accepted in the literature, and the compatible category means that the pre-service teachers' statements are compatible with the perspective accepted in the literature. Statements that could not be included in compatible or incompatible categories were partially included in the context of the partially compatible category. The irrelevant category, which is the last category in this rubric, represents the answers from the participants that were not related to the question. Category scoring of this rubric was developed as follows: irrelevant (0 point), incompatible (1 point), partially compatible (2 points), and compatible (3 points). Finally, three experts in the field of science education and three experts working in the field of NOS were asked to evaluate the category–content compatibility of the rubric, numerical values used in scoring, and category names. The rubric was finalized, with the necessary arrangements made in accordance with the feedback from experts.

Data analysis

The information gathered during the interviews, conversely, was used to support the scores obtained by the VNOS-C pre-service teachers. After the qualitative data obtained from VNOS-C were converted into numerical data to be statistically analyzed, both the pre- and post-test scores of the experiment and control groups were compared. First, descriptive statistics such as arithmetic mean (\bar{X}), standard deviation (SD), minimum, maximum, skewness, and kurtosis were used to statistically evaluate the data obtained from the control and experiment groups regarding VNOS-C. Considering that examining intragroup pre- and post-test differences concerning research questions would not answer the questions for the study purpose, mixed between- and within subjects analysis of variance were used, which is a cogent analysis, thought to provide reliable results on the findings for the study purpose, and allows for the combination of intergroup and in-

group variables (Pallant, 2015). Effect size, which is a way of evaluating the significance of the findings, can be used for different purposes in research. Effect size was used considering that it would be effective at the point that other researchers are acquainted with the real value and effect of the research results (Özsoy & Özsoy, 2013). To interpret the effect size, some criterion values suggested by Cohen (1988) were taken into account. According to Cohen, as a general recommendation, if the *d* value is less than 0.2, the effect size can be defined as weak; if it is 0.5, it can be defined as medium; and if it is greater than 0.8, it can be defined as strong (Pallant, 2015).

Ethic

This study was initiated with the official permission from the faculty wherein the application of the research would be conducted. Maintaining confidentiality is crucial for any research concerning ethical principles, and privacy is an aspect of it. One strategy to maintain confidentiality was to not provide the information about the researcher's observations regarding the situation or participants' statements in the field that would make them identifiable (Hammersley & Traianou, 2012). Participants' names were kept anonymous as a privacyprotection strategy within the scope of this study. In this context, to name the participants, the first letter would indicate the application group they belonged to, while the second letter indicates the pre-service teacher; the number indicates a random order given by the researcher. Examples of abbreviations in this nomenclature are given as follows:

- A.T: Pre-service teachers in the experiment group based on ABI approach
- S.T: Pre-service teachers in the experiment group based on SSI
- C.T: Pre-service teachers in the control group

Results

This section includes the findings obtained in the context of the problem situation and sub-goals. The subsection, "Findings regarding VNOS-C," reveals quantitative findings obtained by digitizing the qualitative data. Further, interviews with 15 pre-service teachers, 5 from each group, were used to explain and support the findings obtained from VNOS-C.

Descriptive statistics of the control and experiment groups regarding the pre- and post-test scores of VNOS-C are given in Table 2. Table 2. Descriptive Statistics of Experiment and Control Groups for Views on the Nature of Science-C, Pre- and Post-Test Scores

Table 2. Descriptive Statistics of Experiment and Control Groups for Views on the Nature of Science-C, Pre- and Post-Test Scores

	Group	N	X	SD	Min.	Max.	Skewness	Kurtosis
Pre-Test	Experiment 1	25	1.00	.265	.50	1.50	-.084	-.572
	Experiment 2	24	1.10	.226	.67	1.42	-.296	-.898
	Control	33	1.14	.161	.75	1.42	-.261	-.112
	Total	82	1.09	.222	.50	1.50	-.468	-.191
Post-Test	Experiment 1	25	2.06	.328	1.33	2.58	-.785	-.083
	Experiment 2	24	1.99	.317	1.00	2.42	-1.55	3.30
	Control	33	1.33	.255	1.00	2.25	1.31	3.67
	Total	82	1.75	.451	1.00	2.58	-.093	-1.31

While the lowest score that could be obtained from VNOS-C was 0, the highest score was 3. Therefore, the range of scores was 2. The average of 82 pre-service teachers' scores from the VNOS-C pre-test was 1.09. The sample size of each group was greater than 20. It is important to have a sample size of more than 20 to

ensure that the normality assumption is achieved (Tabachnick & Fidell, 2014). Additionally, skewness and kurtosis values provide information on whether the sample is normally distributed. In this context, it was observed that the skewness and kurtosis values of the VNOS-C pre-test scores of the experiment and control groups were between +2 and -2. These two examples were used to demonstrate that the VNOS-C pre-test scores of the control and experiment groups were normally distributed (Peşman, 2012). However, the overall average of the VNOS-C post-test scores of 82 prospective teachers was 1.75. It was observed that the skewness and kurtosis values were between +2 and -2 as in the pre-test, but the kurtosis values of Experiment 2 and control groups were beyond the range of +2 and -2. It is thought that this situation does not seriously violate the assumption of normality. Additionally, the sample size of each group was greater than 20. This has been considered as important for maintaining the assumption of normality, following Tabachnick and Fidell (2014). In this context, these situations were evaluated as evidence that the VNOS-C post-tests of the control and experiment groups showed normal distribution.

Mixed-design analysis of variance results of experiment and control groups within and between views on the nature of science-C post-test groups

In comparing the post-test scores of the control and experiment groups, mixed-design analysis of variance within and between groups was used, which facilitates bringing together intergroup and intragroup variables within a single analysis (Pallant, 2015).

Table 3. Mixed-design Analysis of Variance Results of the Experiment and Control Groups Within and Between Views on the Nature of Science-C Post-Test Groups

Variance Resource	Wilks Lambda	F	Hypothesis SD	Error SD	p	Partial eta Square	Observed Power
Time	.169	387.36	1.000	79.000	.169	387.36	1.000
Time* Group	.393	61.06	2.000	79.000	.000	.607	1.000

As seen in Table 3, when the value of time interaction in the context of dependent variables is examined, it can be said that there is evidence of a statistically significant effect for time (F (61.06) =.00; Wilks Lambda =.393; p =.000; partial eta square =.607). In other words, there is evidence that there is a significant difference between the post-test average scores of preservice teachers in the control and experiment groups. Moreover, the effect size was determined to be in a high range because it was >0.138 when compared to the values suggested by Cohen (Pallant, 2015). Qualitative data that support the finding that the significant difference between the average scores of the pre-service teachers in the control and experiment groups obtained as a result of the quantitative analysis is in favor of the experiment group have been included in each group. It was observed that the VNOS-C post-test total scores of the pre-service teachers in the Experiment 1 group on which SSI is based were \bar{X} = 2.06. It is possible to say that the post-test mean scores of the pre-service teachers in the Experiment 1 group are partly in the compatible category in the VNOS-C rubric. The quotations obtained from the post-teaching interview recordings with S.T-3, S.T-7, and S.T-23, which support the answers of the participants in this category, are given below.

Researcher: Do you think science is affected by cultural, social, and political norms?

S.T-23: It is affected.

Researcher: So how do you think it is affected?

S.T-23: Cultural, social and political values are involved in science.

Researcher: How do you associate the concepts of imagination and creativity with science or scientists?

S.T-7: In reality, it all starts with imagination. The wider our imagination, the more different studies we can carry out. We can make different inventions. Imagination and creativity is very important, so I think being creative is one of the most important skills at present.

Researcher: So how do you relate the concepts of imagination and creativity with the scientist?

S.T-7: The scientist dreams before doing the study. In other words, the thinker should be creative so that he can come up with something new, that is, find a different invention. It is very important for a person to be creative. **Researcher:** Is there a difference between scientific theory and scientific law? Can you explain your answer with an example?

S.T-3: Both theory and law are now legitimate, but theories may change as a result of our analysis.

Researcher: Do you believe the laws are unchangeable?

S.T-3: It is more difficult to change laws as compared to theories.

In line with the interviews that took place with the pre-service teachers in Experiment 1 group after the application process wherein SSI was taken as the basis, some interpretations were made about the opinions of the participants on NOS. First, the answer given by S.T-23 to the question about whether science reflects cultural and social values was examined. In this context, the pre-service teacher expressing that science is influenced by cultural, social, and political values shows that he has an acceptable perspective regarding the influence of science by sociocultural values. Another situation examined within the scope of the interview concerned creativity and imagination in science. In this context, S.T-7's statement that imagination and creativity are important in science, as well as that they are necessary for different studies in science, shows that he has an acceptable viewpoint. The last quote about the interviews with pre-service teachers was aimed at revealing the difference between theory and law. It is possible to say that S.T-3 has a belief that theory can be changed more easily as compared to law. This suggests that pre-service teachers' ideas about theories and laws continue in similar manner to that before the training. The opinions of the pre-service teachers, which have both acceptable and sometimes incorrect perspectives that were revealed in the interviews about NOS, support and explain the average scores they obtained from the post-test ($\bar{X}= 2.06$) related to VNOS-C.

It has been observed that the post-test total score average of the pre-service teachers in the post-teaching Experiment 2 group based on ABI approach is $\bar{X}= 1.99$. Accordingly, the post-test mean scores of the pre-service teachers in Experiment 2 group are in the partially compatible category in the rubric used to evaluate the VNOS-C. The opinions regarding this situation are as follows:

Researcher: Do you think science is affected by cultural, social, and political norms?

A.T-11: Absolutely affected.

Researcher: How do you think it is affected?

A.T-11: Human beings develop according to their environment. They can make experiments according to that environment. For example, we now have the opportunity to experiment with water. For example, how many experiments can be done in a desert environment? It definitely changes according to the environment, and it changes according to the thoughts around it. Not everyone has a broad back. **Researcher:** How do you associate the concepts of imagination and creativity with science and scientists?

A.T-9: In all the observations we make, the research reveals human creativity, for example, even if we use the same way, the result we arrive at the end may be different.

Researcher: Is there a difference between scientific theory and scientific law? Can you explain your answer with an example?

A.T-9: Theories are knowledge that has validity in themselves like laws.

Researcher: Do you believe the laws are unchangeable?

A.T-3: It is more difficult to change compared to theories.

In accordance with the interviews that took place after ABI-based teaching with the pre-service teachers in Experiment 2 group, some interpretations were made about the opinions of the individuals concerning NOS. In this context, the question asked about whether science reflects cultural and social values, the response is based on the opinion that the environment has an effect on the experiments conducted in the scientific studies, and therefore, science is affected by cultural and social values thereby making it an acceptable perspective. Pertaining to the question asked regarding relationship between creativity and imagination in science, A.T-9 answered that scientists may arrive at different results even if they use the same methods. This shows that the teacher had an acceptable viewpoint on scientists' creativity and imagination. The last quote from the interviews with pre-service teachers was aimed at revealing the difference between theory and law. S.T-9 believed that theories have validity similar to laws, which shows a correct viewpoint regarding theory and laws. Accordingly, it shows that S.T-9 has an acceptable belief on theory and laws, which are sub-elements of NOS. The progress in the total scores of the pre- ($\bar{X}= 1.10$) and post-test ($\bar{X}= 1.99$) related to VNOS-C of the participants in Experiment 2 group also supports the findings obtained in individual interviews.

After the training in the control group, the average post-test total score of the pre-service teachers in this group for VNOS-C was determined as $\bar{X}= 1.33$. However, it is possible to say that the post-test mean scores of the pre-service teachers in the control group are in the incompatible category. The opinions of the pre-service teacher are given as follows:

Researcher: Do you think science is affected by cultural, social, and political norms?

C.T-16: Actually it should not be affected. But I think we are influenced by them as a society.

Researcher: Why do you think it shouldn't be affected?

C.T-16: It shouldn't be affected because it has to be objective. If affected, it would be biased. There'll be other things involved. So, it should be a bit farther away from them, but I think we are affected by them as a society.

Researcher: How do you associate the concepts of imagination and creativity with science and scientists?

C.T-5: There is nothing to be thought about something and trying to create it.

C.T-4: Without imagination and creativity, it wouldn't be science anyway.

Researcher: Is there a difference between scientific theory and scientific law? Can you explain your answer with an example?

C.T-16: First, a hypothesis is put forward. Hypotheses are established. Then these hypotheses become laws. In other words, it is not based on whether it is proven, but it turns into theory or law. And for example, if it can be proven better, it becomes a law if it has reached definite judgments. So, it becomes law.

Researcher: Is there a relationship between them or not? If so, how do you think so?

Researcher: So there is a relationship between them.

Researcher: What kind of relationship is there?

C.T-16: How can I explain it? Take atomic theories, for example. In atomic theories, there was the Dalton theory first, and then the Thomson atomic theory came in place and newer ones have emerged and will also emerge as long as new ones can be proven to be true. They remained the theory. There is currently modern

atomic theory. I think it remains as a theory at the moment because something can come up and something can be investigated and more definitive conclusions can be reached. I think it hasn't been enacted yet.

C.T-4: The theory is not proven correct, the law is its proven version. If the information is verified, it becomes a law.

In response to the question of whether science reflects cultural and social values, C.T-16 argued that although science is influenced by sociocultural values, it should be objective; otherwise, some variables will influence the outcome. Considering the literature and the idea that science is a major enterprise in the social system and is affected by sociocultural values, it may be interpreted that the pre-service teacher has ignored this thought. Another idea that does not comply with the literature is related to the theories and scientific laws mentioned by C.T-4. C.T-4's interpretation that theories are unproven and laws are proven versions of the theories exemplifies a false hierarchy established between theory and law.

Conclusion and Discussion

This study investigates the impact of two different trainings designed in an ABI and SSI-based learning environment on NOS of third-grade pre-service science teachers. In this context, the results obtained as a result of the analysis made on the data, including the control and experiment groups of 82 pre-service science teachers are given below:

- It has been determined that pre-service science teachers have some inaccurate ideas about NOS.
- As a result of the interpretation of both qualitative and quantitative data, it was determined that the inclusion of pre-service science teachers in the ABI process significantly affected their understanding of NOS.
- As a result of the interpretation of both qualitative and quantitative data, it was determined that the inclusion of pre-service science teachers in the SSI process significantly affected their understanding of NOS

The involvement of participants in the process of SSI practices has an impact on the development of understanding of NOS as a result of the joint interpretation of quantitative and qualitative data obtained within the scope of this study. In the group where SSI-based arguments are made, pre-service teachers first make a due diligence on the problem situation in the scenarios given to them. Participants reveal their existing knowledge on the subject and reach a conclusion by associating the information required for the solution of the problem with their experience or personal values. In the next stage, they solve the problem by exchanging views and having discussions with both group friends and other classmates. Thus, it is thought that pre-service teachers present data to support the claims they made during the process of determining the problem and solving it, causing cognitive conflict and allowing them to restructure their knowledge schemes as a result of this situation. In this restructuring process, the epistemological beliefs of individuals, which are defined as their personal beliefs about the nature of knowledge and acquiring knowledge (Schommer, 1990), play a vital role. Sönmez (2015) stated that in the epistemic belief system, teachers who perceive knowledge with certainty also perceive scientific knowledge with certainty. In this context, it is possible to say that pre-service teachers' perspectives on scientific knowledge before the application are included in an undeveloped (naive) epistemic system. However, during the teaching process, the discussions about different SSIs required the pre-service teachers to question the information and the ways of obtaining the information. Pre-service teachers stating that there may be mistakes in science, that science can be variable or affected by belief and culture, and that it does not belong to a single group, explains the change in the perspectives of scientific knowledge and its source. In this context, it is possible to assess pre-service teachers' questions about knowledge and methods of obtaining knowledge as a situation that supports their understanding of NOS because the concept of NOS is, in fact, closely related to the values and beliefs specific to science or the development of scientific knowledge (Lederman, 1992). In the group wherein SSI-based teaching is conducted, pre-service teachers first determine

a situation regarding the problem in the scenarios given to them. To reveal their existing knowledge on the subject and arrive at a result by associating it with the literature, experience or personal values required for the solution of the problem caused them to think of themselves in a learning environment. It is possible to say that this provides an understanding of the phenomenon of a subjective component of science as well as an awareness of the dynamic relationship between sociocultural values and science, as it is a human activity for pre-service teachers. This awareness was perceived as another occasion that supports the shift in pre-service teachers' understanding of NOS.

Although the involvement of SSI in the process has changed the perceptions of pre-service teachers about NOS in a positive way in general, it is not possible to say that the participants' understanding of NOS has been improved in a holistic way (Çam, 2023). In other words, it is not impossible to say that development is the same in all dimensions of NOS. Findings about theory and law are particularly striking. At the beginning of the study, it was observed that almost all of the participants had poor views of this dimension. This finding has also been demonstrated in the findings of numerous studies that examined teachers' and pre-service teachers' understanding of NOS (Buaraphan, 2010; Tatar et al., 2011; Özden & Yenice, 2016). As in the theories, although the pre-service teachers use different definitions for laws, the majority preferred the expressions of "being proven; the certainty being accepted by everyone." It is possible to say that the majority of the students' views that there is a hierarchical relationship between law and theory, that law is at a higher level than theory, stem from the traditional understanding of science, that is, scientific laws as absolute truths and that theories become laws with ample proof. Accordingly, it can be said that pre-service teachers misjudge theory, law, and the relationship between them. This could be because the participants encounter situations that cause them to have incorrect ideas about NOS during primary, secondary, and university education, necessitating the need for a lengthy process that addresses all aspects of individuals' understanding of NOS.

The fact that the pre-service teachers in Experiment 2 group formed questions during ABI applications and tried these questions in the laboratory environment led them to experience a positive change in their understanding of NOS, which can be explained from a variety of perspectives. First, ABI process has a structure built on questions that will lead students to think scientifically (Kabataş-Memiş, 2011). Asking questions is an effective factor in the formation of meaningful learning and scientific inquiry in the classroom environment. Simultaneously, it is pivotal in the process of putting forward the opinions of individuals, forming claims, and supporting them (Günel et al., 2012). Individuals must form scientific arguments to ensure ABI activities in which various modes of language (speaking, listening, writing, making connections, and visualizing) are used together (Kabataş-Memiş, 2011). The inquiries that take place in the process of forming scientific arguments include authentic ways for students to research the natural world, suggest ideas, explain arguments based on evidence, and perceive the spirit of science in the process (Hofstein & Lunetta, 2004). This process aids understanding of the epistemology of science, as well as the values and beliefs specific to scientific knowledge, and thus of NOS.

Keys (2000) states that the collaborative NOS is emphasized, as individuals involved in the ABI process aim to make sense of a problem situation with their peers when making a determination about the difference of ABI functioning from traditional laboratory functioning. Individuals in small group discussions, in particular, seek to cooperate in persuading or arguing with one another, giving them an understanding of how science progresses and how scientists can work as a social group. This caused a change in the beliefs of most pre-service teachers, who previously initially believed that scientists were objective and that scientists' personal values, beliefs, and theories had no bearing on scientific studies. In the process of persuading the peers and then the entire class for the claims they create during the activities, it has been important for individuals to evaluate that science is a human endeavor and depends on basic human characteristics such as scientific study, reasoning, intuition, diligence, skill, and creativity (NRC, 1996). Moreover, it is thought that

pre-service teachers make observations, assertions, defend their thoughts, compare their ideas with others', and make inquiries about how their thoughts have changed during ABI activities. It is thought to contribute to the development of NOS, as it provides individuals with the opportunity to construct knowledge and understand NOS (Kabataş-Memiş, 2011; Omar, 2004; Mohammed, 2007). Further, as the learning environments wherein argumentation is based in a framework within which students can pose questions through the negotiation process (Cavagnetto et al., 2011) and increase their metacognitive knowledge about laboratory studies (Kıngır, 2011), ABI approach can help develop NOS. In this context, ABI approach is considered as an effective way for participants to develop their understanding of NOS (Omar, 2004; Mohammed, 2007). However, although the teaching process based on ABI approach creates a difference in pre-service teachers' understanding of NOS, there is no improvement as a whole. One of the obstacles to such holistic development is the need for a long process to change views on NOS (Abd-El-Khalick & Akerson, 2004; Akerson et al., 2006; Köseoğlu et al., 2010).

Suggestions

In order for teaching environments based on ABI approach or SSI to be effective and ensure the continuity of dialog, researchers should consider the roles of teachers and students. Teachers must act as a guide in this process, avoid directing individuals, have classroom management skills, and maintain their impartiality in the process, as well as have sufficient knowledge of the field of discussion topics. Some of the student roles that are deemed necessary for the process to be properly implemented during the discussions are students' respect for different ideas while expressing their own and preparations for the subject that are scheduled for discussion.

Disclosure statement

No potential conflict of interest was reported by the authors.

REFERENCES

- Abd- El- Khalick, F., & Akerson, V. L. (2004). Learning as conceptual change: Factors mediating the development of preservice elementary teachers' views of nature of science. *Science Education*, 88(5), 785-810. <https://doi.org/10.1002/sce.10143>
- Abd- El- Khalick, F., Bell, R. L., & Lederman, N. G. (1998). The nature of science and instructional practice: Making the unnatural natural. *Science Education*, 82(4), 417- 436. [https://doi.org/10.1002/\(SICI\)1098-237X\(199807\)82:43.0.CO;2-E](https://doi.org/10.1002/(SICI)1098-237X(199807)82:43.0.CO;2-E)
- Abd- El- Khalick, F., & Lederman, N. G. (2000). The influence of history of science courses on students' views of nature of science. *Journal of Research in Science Teaching*, 37(10), 1057-1095. [https://doi.org/10.1002/1098-2736\(200012\)37:103.0.CO;2-C](https://doi.org/10.1002/1098-2736(200012)37:103.0.CO;2-C)
- Allchin, D. (2011). Evaluating knowledge of the nature of (whole) science. *Science Education*, 95(3), 518-542. <https://doi.org/10.1002/sce.20432>
- Agustian, H. Y. (2020). Students' understanding of the nature of science in the context of an undergraduate chemistry laboratory. *The Electronic Journal for Research in Science & Mathematics Education*, 24 (2), 56-85. file:///C:/Users/lenovo/Downloads/19986-Article%20Text-88241-1-10- 20200701.pdf
- Akerson, V. L., Morrison, J. A., & McDuffie, A. R. (2006). One course is not enough: preservice elementary teachers' retention of improved views of nature of science. *Journal of Research in Science Teaching*, 43(2), 194-213. <https://doi.org/10.1002/tea.20099>
- Akkus, R., Gunel, M., & Hand, B. (2007). Comparing an inquiry- based approach known as the science writing heuristic to traditional science teaching practices: Are there differences?. *International Journal of Science Education*, 29(14), 1745-1765. <https://doi.org/10.1080/09500690601075629>
- Bayram- Jacobs, D., Henze, I., Evagorou, M., Shwartz, Y., Aschim, E. L., Alcaraz- Dominguez, S., & Dagan, E. (2019). Science teachers' pedagogical content knowledge development during enactment of socioscientific curriculum materials. *Journal of Research in Science Teaching*, 56(9), 1207- 1233. <https://doi.org/10.1002/tea.21550>
- Baytelman, A., & Constantinou, C. P. (2017). Investigating the relationship between content knowledge and the construction of ethical arguments on Socio-scientific issues. In O. Finlayson, E. McLoughlin, S. Erduran, P. Childs (Eds.) *Electronic Proceedings of the ESERA 2017 Conference. Research, Practice and Collaboration in Science Education, Part 8: Scientific Literacy and Socio Scientific Issues* (pp.1031-1038). Dublin City University.
- Bell, R. (2009). *Teaching the nature of science: Three critical questions. In Best Practices in Science Education*. Carmel, CA: National Geographic School Publishing.
- Bossér, U., & Lindahl, M. (2019). Students' positioning in the classroom: A study of teacher-student interactions in a socioscientific issue context. *Research in Science Education*, 49, 371-390. <https://doi.org/10.1007/s11165-017-9627-1>
- Buaraphan, K. (2010). Pre-service and in-service science teachers' conceptions of the nature of science. *Science Educator*, 19 (2), 35-47. <https://files.eric.ed.gov/fulltext/EJ906189.pdf>
- Cavagnetto, A. R. (2010). Argument to foster scientific literacy: A review of argument interventions in K-12 science contexts. *Review of Educational Research*, 80(3), 336-371. DOI: 10.3102/0034654310376953
- Cavagnetto, A. R., Hand, B., & Norton Meier, L. (2010). The nature of elementary student science discourse in the context of the science writing heuristic approach. *International Journal of Science Education*, 32(4), 427-449. <https://doi.org/10.1080/09500690802627277>

- Cavagnetto, A. R., Hand, B., & Norten Meier, L. (2011). Negotiating the inquiry question: A comparison of whole class and small group strategies in grade five science classrooms. *Research in Science Education*, 41(2), 193-209. DOI 10.1007/s11165-009-9152-y
- Chang, H. Y., Liang, J. C., & Tsai, C. C. (2020). Students' context-specific epistemic justifications, prior knowledge, engagement, and socioscientific reasoning in a mobile augmented reality learning environment. *Journal of Science Education and Technology*, 29(3), 399-408. <https://doi.org/10.1007/s10956-020-09825-9>
- Chen, Y. C., Hand, B., & Park, S. (2016). Examining elementary students' development of oral and written argumentation practices through argument-based inquiry. *Science & Education*, 25, 277-320. DOI 10.1007/s11191-016-9811-0
- Chen, S. Y., & Liu, S. Y. (2018). Reinforcement of scientific literacy through effective argumentation on an energy-related environmental issue. *EURASIA Journal of Mathematics, Science and Technology Education*, 14(12), 1-15. <https://doi.org/10.29333/ejmste/95171>
- Cian, H. (2020). Assessing student knowledge, values, and personal experience to determine associations with socioscientific reasoning. *The Electronic Journal for Research in Science & Mathematics Education*, 24(1), 56-85.
- Creswell, J. W., & Clark, V. L. P. (2011). *Designing and conducting mixed methods research* (2nd ed.). Sage.
- Dawson, V., & Carson, K. (2016). Using climate change scenarios to assess high school students' argumentation skills. *Research in Science & Technological Education*, 35(1), 1-16. <https://doi.org/10.1080/02635143.2016.1174932>
- Çam, A. (2023). Examination of training on pre-service science teachers' views on socio-scientific issues and nature of science. *Journal of Educational Research and Practice*, 13(1), 12. <https://doi.org/10.5590/JERAP.2023.13.1.13>
- Dawson, V., & Carson, K. (2020). Introducing argumentation about climate change socioscientific issues in a disadvantaged school. *Research in Science Education*, 50(3), 863-883. <https://doi.org/10.1007/s11165-018-9715-x>
- Dawson, V., & Venville, G. (2020). Testing a methodology for the development of socioscientific issues to enhance middle school students' argumentation and reasoning. *Research in Science & Technological Education*, 1-16. <https://doi.org/10.1080/02635143.2020.1830267>
- Demirbağ, M., & Günel, M. (2014). Argümantasyon tabanlı fen eğitimi sürecine modsal betimleme entegrasyonunun akademik başarı, argüman kurma ve yazma becerilerine etkisi. *Kuram ve Uygulamada Eğitim Bilimleri*, 14(1), 373-392. doi: 10.12738/estp.2014.1.1632
- Eastwood, J. L., Sadler, T. D., Zeidler, D. L., Lewis, A., Amiri, L. & Applebaum, S. (2012). Contextualizing nature of science instruction in socioscientific issues. *International Journal of Science Education*, 34(15), 2289-2315. <https://doi.org/10.1080/09500693.2012.667582>
- Fang, S. C., Hsu, Y. S., & Lin, S. S. (2019). Conceptualizing socioscientific decision making from a review of research in science education. *International Journal of Science and Mathematics Education*, 17(3), 427-448. <https://doi.org/10.1007/s10763-018-9890-2>
- Ferreira, S., & Morais, A. M. (2013). The nature of science in science curricula: methods and concepts of analysis. *International Journal of Science Education*, 35(16), 2670-2691. <https://doi.org/10.1080/09500693.2011.621982>

- Gresch, H., Hasselhorn, M., & Bögeholz, S. (2013). Training in decision-making strategies: an approach to enhance students' competence to deal with socioscientific issues. *International Journal of Science Education*, 35(15), 2587- 2607. <https://doi.org/10.1080/09500693.2011.617789>
- Günel, M., Kınır, S. & Geban, Ö. (2012). Argümantasyon tabanlı bilim öğrenme (ATBÖ) yaklaşımının kullanıldığı sınıflarda argümantasyon ve soru yapılarının incelenmesi. *Eğitim ve Bilim*, 37(164), 316-330. <http://egitimvebilim.ted.org.tr/index.php/EB/article/view/1050/381>
- Hammersley, M., & Traianou, A. (2012). Ethics in qualitative research: Controversies and contexts (1nd ed.). Sage. <https://dx.doi.org/10.4135/9781473957619>
- Hand, B., & Keys, C. W. (1999). Inquiry investigation. *The Science Teacher*, 66(4), 27-29. <https://www.proquest.com/openview/7966bdf472571ab608d601483b108cbe/1?pq-origsite=gscholar&cbl=40590>
- Hand, B., Wallace, C. W., & Yang, E. M. (2007). Using a science writing heuristic to enhance learning outcomes from laboratory activities in seventh- grade science: quantitative and qualitative aspects. *International Journal of Science Education*, 26(2), 131-149. <https://doi.org/10.1080/0950069032000070252>
- Herman, B. C., Zeidler, D. L., & Newton, M. (2020). Students' emotive reasoning through place-based environmental socioscientific issues. *Research in Science Education*, 50, 2081–2109. <https://doi.org/10.1007/s11165-018-9764-1>
- Hofstein, A., & Lunetta, V. N. (2004). The laboratory in science education: Foundations for the twenty- first century. *Science education*, 88(1), 28-54. <https://doi.org/10.1002/sce.10106>
- Irzik, G. & Nola, R. (2011). A family resemblance approach to the nature of science for science education. *Science & Education*, 20, 591-607. <https://doi.org/10.1007/s11191-010- 9293-4>
- Johnson, J., Macalalag, A. Z., & Dunphy, J. (2020). Incorporating socioscientific issues into a STEM education course: exploring teacher use of argumentation in SSI and plans for classroom implementation. *Disciplinary and Interdisciplinary Science Education Research*, 2(9), 1-12. <https://doi.org/10.1186/s43031-020-00026-3>
- Jho, H., Yoon, H. G., & Kim, M. (2014). The relationship of science knowledge, attitude and decision making on socio-scientific issues: The case study of students' debates on a nuclear power plant in Korea. *Science & Education*, 23, 1131-1151. <https://doi.org/10.1007/s11191-013-9652-z>
- Kabataş Memiş, E. (2011). Effects of the argumentation based science learning approach and self evaluation on primary school students' science and technology course achievement and retention of the achievement. (Unpublished doctoral thesis). Ataturk University.
- Keys, C. W. (2000). Investigating the thinking processes of eighth grade writers during the composition of a scientific laboratory report. *Journal of Research in Science Teaching*, 37(7), 676-690. [https://doi.org/10.1002/1098- 2736\(200009\)37:73.0.CO;2-6](https://doi.org/10.1002/1098- 2736(200009)37:73.0.CO;2-6)
- Khishfe, R., & Abd- El- Khalick, F. (2002). Influence of explicit and reflective versus implicit inquiry- oriented instruction on sixth graders' views of nature of science. *Journal of Research in Science Teaching*, 39(7), 551-578. <https://doi.org/10.1002/tea.10036>
- Khishfe, R. (2021). Explicit Instruction and student learning of argumentation and nature of science. *Journal of Science Teacher Education*, 32 (3), 325-349. <https://doi.org/10.1080/1046560X.2020.1822652>
- Kınır, S. (2011). Using the science writing heuristic approach to promote student understanding in chemical changes and mixtures. (Unpublished doctoral thesis). Middle East Technical University.
- Kolstø, S. (2001). Scientific literacy for citizenship: Tools for dealing with the science dimension of controversial socioscientific issues. *Science Education*, 85(3), 291- 310. <https://doi.org/10.1002/sce.1011>

- Köseoğlu, F., Tümay, H., & Üstün, U. (2010). Developing a professional development package for nature of science instruction and discussion about its implementation for preservice teachers. *Ahi Evran Üniv. Kırşehir Eğitim Fakültesi Dergisi*, 11(4), 129-162. <https://www.researchgate.net/publication/264129619>
- Lederman, N. G. (1992). Students' and teachers' conceptions of the nature of science: A review of the research. *Journal of Research in Science Teaching*, 29(4), 331-359. <https://doi.org/10.1002/tea.3660290404>
- Lederman, N. G., Abd- El- Khalick, F., Bell, R. L., & Schwartz, R. S. (2002). Views of nature of science questionnaire: toward valid and meaningful assessment of learners' conceptions of nature of science. *Journal of Research in Science Teaching*, 39(6), 497-521. <https://doi.org/10.1002/tea.10034>
- Lederman, N. G., Antink, A., & Bartos, S. (2014). Nature of science, scientific inquiry, and socio-scientific issues arising from genetics: A pathway to developing a scientifically literate citizenry. *Science & Education*, 23, 285-302. <https://doi.org/10.1007/s11191-012-9503-3>
- Lee, Y. C., Grace, M., Rietdijk, W., & Lui, Y. C. (2019). A cross-cultural, cross-age, and crossgender study of Hong Kong and UK secondary students' decision making about a biological conservation issue. *International Journal of Science Education*, 41(18), 2696-2715. <https://doi.org/10.1080/09500693.2019.1693662>
- Lee, H., Lee, H., & Zeidler, D. L. (2019). Examining tensions in the socioscientific issues classroom: Students' border crossings into a new culture of science. *Journal of Research in Science Teaching*, 57, 672-694. <https://doi.org/10.1002/tea.21600>
- Lin, J. W., Cheng, T. S., Wang, S. J., & Chung, C. T. (2020). The effects of socioscientific issues web searches on grade 6 students' scientific epistemological beliefs: The role of information positions. *International Journal of Science Education*, 42(15), 2534- 2553. <https://doi.org/10.1080/09500693.2020.1821258>
- Liu, X. (2009). Beyond science literacy: Science and the public. *International Journal of Environmental and Science Education*, 4(3), 301-311. <https://files.eric.ed.gov/fulltext/EJ884399.pdf>
- Macalalag, A. Z., Johnson, J., & Lai, M. (2020). How do we do this: learning how to teach socioscientific issues. *Cultural Studies of Science Education*, 15, 389-413. <https://doi.org/10.1007/s11422-019-09944-9>
- Matthews, M. R. (2012). Advances in nature of science research. In M. S. Khine, (Eds.). *Changing the focus: from nature of science (nos) to features of science (fos)* (pp. 3- 26). Dordrecht.
- McComas, W. F. (2004). Keys to teaching the nature of science. *The Science Teacher*, 71(9), 24-27. <https://www.proquest.com/openview/6d6537720a553856d71f9f72c447b0c5/1?cbl=40590&pq-origsite=gscholar&accountid=107421>
- Mohammed, E. G. (2007). *Using the science writing heuristic approach as a tool for assessing and promoting students' conceptual understanding and perceptions in the general chemistry laboratory*. (Unpublished doctoral thesis). Iowa State University.
- Nam, J., Choi, A., & Hand, B. (2011). Implementation of the science writing heuristic (swh) approach in 8th grade science classrooms. *International Journal of Science and Mathematics Education*, 9, 1111-1133 <https://doi.org/10.1007/s10763-010-9250-3>.
- National Research Council (NRC). (1996). *National science education standards*. Washington DC, National Academy Press.
- Omar, S. (2004). *Inservice teachers' implementation of the science writing heuristic as a tool for professional growth*. (Unpublished doctoral thesis). Iowa State University.
- Özden, B., & Yenice, N. (2016). Preservice science teachers' views towards scientific law and theory concepts: A qualitative case study. *Elementary Education Online*, 15(4), 1090-1113. <https://doi.org/10.17051/ieo.2016.98302>


- Özsoy, S., & Özsoy, G. (2013). Effect size reporting in educational research. *Elementary Education Online*, 12(2), 334- 346. <https://dergipark.org.tr/tr/download/article-file/90484>
- Pallant J. F. (2015). *SPSS survival manual: A step by step guide to data analysis using SPSS*. (6nd ed.). Allen & Unwin.
- Peşman, H. (2012). *Method-approach interaction: the effects of learning cycle vs traditional and contextual vs non-contextual instruction on 11th grade students achievement in and attitudes towards physics*. (Unpublished doctoral thesis). Middle East Technical University.
- Phillips, M. C., Vowell, J. E., Lee, Y. H., & Plankis, B. J. (2015). How do elementary science textbooks present the nature of science?. In *The Educational Forum*, 79(2), 148- 162. <https://doi.org/10.1080/00131725.2015.1004210>
- Ram, R. (2020). Engaging young people in science education through socioscientific issues of biosecurity. *Kōtuitui: New Zealand Journal of Social Sciences Online*, 15(1), 22- 37. <https://doi.org/10.1080/1177083X.2019.1637908>
- Ramnarain, U. D., & Chanetsa, T. (2016). An analysis of South African Grade 9 natural sciences textbooks for their representation of nature of science. *International Journal of Science Education*, 38(6), 922-933. <https://doi.org/10.1080/09500693.2016.1167985>
- Sadler, T. D., & Donnelly, L. A. (2006). Socioscientific argumentation: The effects of content knowledge and morality. *International Journal of Science Education*, 28(12), 1463- 1488. <https://doi.org/10.1080/09500690600708717>
- Sadler, T., & Fowler, S. R. (2006). A threshold model of content knowledge transfer for socioscientific argumentation. *Science Education*, 90(6), 986-1004. <https://doi.org/10.1002/sce.20165>
- Sadler, T. D., Romine, W. L., & Topçu, M. S. (2016). Learning science content through socioscientific issues-based instruction: A multi-level assessment study. *International Journal of Science Education*, 38(10), 1622-1635. <https://doi.org/10.1080/09500693.2016.1204481>
- Sadler, T. D., & Zeidler, D. L. (2004). The morality of socioscientific issues: construal and resolution of genetic engineering dilemmas. *Science Education*, 88, 4-27. <https://doi.org/10.1002/sce.10101>
- Schwartz, R. S., Lederman, N. G., & Crawford, B. A. (2004). Developing views of nature of science in an authentic context: An explicit approach to bridging the gap between nature of science and scientific inquiry. *Science Education*, 88, 610-645. <https://doi.org/10.1002/sce.10128>
- Schommer, M. (1990). Effects of beliefs about the nature of knowledge on comprehension. *Journal of Educational Psychology*, 82(3), 498-504. <https://doi.org/10.1037/0022-0663.82.3.498>
- Shamuganathan, S., & Karpudewan, M. (2017). Science writing heuristics embedded in green chemistry: A tool to nurture environmental literacy among pre-university students. *Chemistry Education Research and Practice*, 18, 386-396. <https://doi.org/10.1039/C7RP00013H>
- Sönmez, A. (2015). *Investigation of the relationships between science teachers' epistemological belief systems and their teaching of socioscientific issues*. (Unpublished doctoral thesis). Abant İzzet Baysal University
- Şahin, E. (2018). The effect of argumentation based science learning approach on academic success of gifted students in science classes. *TURAN-CSR: TURAN Center for Strategic Researches*, 10(38), 111-121. <http://dx.doi.org/10.15189/1308-8041>
- Tabachnick, B. G., & Fidell, L. S. (2014). *Using multivariate statistic*. (6nd ed.). Pearson Education.
- Tatar, E., Karakuyu, Y., & Tüysüz, C. (2011). Prospective primary school teachers' concepts of the nature of science: theory, law and hypothesis. *Mustafa Kemal University Journal of Social Sciences Institute*, 8(15), 363-370. <https://dergipark.org.tr/tr/pub/mkusbed/issue/19555/208678>


- Topçu, M. S., & Atabey, N. (2017). The effect of socioscientific issues based field trips on elementary school students' argumentation quality. *Bartın Üniversitesi Eğitim Fakültesi Dergisi*, 6(1), 68-84. <https://doi.org/10.14686/buefad.263541>
- Türköz, G. (2015). *The effect of nature of science activities on students' scientific process skills, conceptual learning and nature of science approaches*. (Unpublished doctoral thesis). Pamukkale University.
- Upahi, J. E., Ramnarain, U., & Ishola, I. S. (2020). The nature of science as represented in chemistry textbooks used in Nigeria. *Research in Science Education*, 50(4), 1321- 1339. 10.1007/s11165-018-9734-7
- Oğuz Ünver, A. (2015). Bilimin doğası gelişimi ve öğretimi. In N. Yenice (Eds.), *Bilimin doğası ve bilimsel sorgulama ilişkisi*, (pp. 217-256). Anı Yayıncılık.
- Xiao, S. (2020). Rhetorical use of inscriptions in students' written arguments about socioscientific issues. *Research in Science Education*, 50, 1233–1249. <https://doi.org/10.1007/s11165-018-9730-y>
- Yavuz Topaloğlu, M., & Balkan Kıyıcı, F. (2018). The effect of the activities carried out in outof-school learning environments based on socio-scientific issues on the decision-making of the students. *Kastamonu Education Journal*, 26(5), 1667-1678. <https://doi.org/10.24106/kefdergi.2200>
- Zeidler, D. L., & Nichols, B. H. (2009). Socioscientific issues: Theory and practice. *Journal of Elementary Science Education*, 21(2), 49-58. <https://doi.org/10.1007/BF03173684>
- Zeidler, D. L., & Keefer, M. (2003). The role of moral reasoning on socioscientific issues and discourse in science education. In D. L. Zeidler (Eds.). *The role of moral reasoning and the status of socioscientific issues in science education* (pp. 7-38). Kluwer Academic Publishers. 10.1007/1-4020-4996-X


Examining the Relationships Between Instagram and Snapchat Usage Frequency, Fear of Missing Out, Self-Esteem and Internet Addiction

Research Article

Abdullah MANAP¹, Yasin DEMIR², Ismail YELPAZE³, Cemal KARADAS³

¹Batman University, Faculty of Education, Department of Educational Science, Batman, Türkiye  0000-0001-5531-5745

²Kahramanmaraş İstiklal University University, Faculty of Humanities and Social Sciences, Department of Psychology, Kahramanmaraş, Türkiye  0000-0002-2456-1449

³Kahramanmaraş Sütçü İmam University, Faculty of Education, Department of Psychological Counseling and Guidance, Kahramanmaraş, Türkiye  0000-0003-4428-0502

⁴İnönü University, Faculty of Education, Department of Psychological Counseling and Guidance, Malatya, Türkiye  0000-0002-3551-5077

To cite this article: Manap, A., Demir, Y., Yelpaze, I., & Karadas, C. (2023). Examining the relationships between instagram and snapchat usage frequency, fear of missing out, self-esteem and internet addiction. *International Online Journal of Educational Sciences*, 15(5), 944-956.

ARTICLE INFO

Article History:

Received: 12.07.2023

Available online:
19.12.2023

ABSTRACT

The aim of this research is to examine the complex relationships between Instagram and Snapchat usage frequency, FoMO, self-esteem and internet addiction. The method of the study was designed with a predictive relational research design. The study group consists of university students. Personal information form, Fear of Missing Out Scale, Rosenberg Self-Esteem Scale and Young Internet Addiction Scale were used to collect data. Frequency and descriptive statistical analyzes, correlation analysis and path analysis were applied to reach the findings. According to the findings; while there was no significant relationship between Instagram and Snapchat usage frequency and self-esteem, significant relationships were found between all other variables. In addition, it was concluded that the effect of Instagram and Snapchat usage frequency on internet addiction was mediated by the fear of missing out, and internet addiction increased when accompanied by low self-esteem.

© 2023 IOJES. All rights reserved

Keywords:

Instagram, Snapchat, FoMO, Self-esteem, Internet Addiction

⁴Corresponding author's address: Batman Üniversitesi
e-mail: yasinpdr@hotmail.com
DOI: <https://doi.org/10.15345/iojes.2023.05.004>

Introduction

In today's technology world, the Internet is at the center of the life of almost every person who has the opportunity. As of 2022, 5.3 billion people (66% of the world's population) use the internet (International Telecommunication Union [ITU], 2023). The internet is mostly used for messaging and social networks (Dataportal, 2022). Social media applications are web-based software with which people can easily communicate with others and share about themselves (Carr & Hayes, 2015). According to 2022 data, there are 4.2 billion social media users in the world, which accounts for 58.5% of the world's population. These statistics show that more than 90% of internet users use social media. Considering the purposes of social media use, it is seen that the most common purposes are spending time with family and friends and filling free time. It is seen that Whatsapp and Instagram are the most favorite social media platforms among social media users aged 16-64 (Dataportal, 2022). Looking at these platforms, it is seen that they offer opportunities for users to share about themselves, to be informed about their friends or events. This indicates that users use social media to follow current developments. Especially due to the widespread use of social media platforms, the fear of missing out (FoMO) has emerged as a psychological phenomenon that has often been the subject of research in recent years.

FoMO is a common psychological phenomenon defined as the anxiety and apprehension of individuals being deprived of rewarding experiences, especially in social contexts (Przybylski et al., 2013). The relationship between FoMO and social media use has been extensively studied in academic research. Social media platforms, with their continuous updates and carefully selected features, are seen as potential triggers of FoMO. Many studies have revealed a positive relationship between FoMO and social media use. In other words, it is seen that individuals with higher FoMO levels participate in social media activities more frequently (Elhai et al., 2017; Seidman, 2013). It has also been found that certain social media platforms, such as Instagram and Facebook, can increase the relationship between FoMO and social media use, due to their focus on idealized images and lifestyle sharing (Buglass et al., 2017; Krasnova et al., 2013). Understanding the complex relationship between FoMO and social media use is important for the development of interventions that promote healthier online behaviors and mitigate the potential negative effects associated with excessive social media use. In order to investigate this complex structure, the first of the hypotheses investigated within the scope of this research is as follows:

H1. As university students' Instagram and Snapchat social media usage times increase, their FoMO levels also increase.

Individuals who experience FoMO may turn to excessive use of social media to alleviate their anxiety and follow other people's activities. However, being constantly exposed to the neatly organized and idealized lives of others can increase social media users' feelings of inadequacy and lower their self-esteem (Appel et al., 2016). Many studies have found that FoMO is negatively associated with self-esteem and leads to feelings of inadequacy and dissatisfaction with their own lives. Chen and colleagues (2016) conducted a study showing a significant negative relationship between FoMO and self-esteem in a sample of university students. Similarly, Elhai and colleagues (2016) found that FoMO was associated with lower self-esteem, increased symptoms of depression and anxiety. There are many research findings showing that excessive use of social media triggered by FoMO can lead to negative consequences such as increased stress, anxiety and depression (Andrews et al., 2015; Dhir et al., 2018).

Also, the relationship between FoMO and self-esteem is bidirectional, meaning individuals with low self-esteem may be more prone to experience FoMO. Przybylski and colleagues (2013) found that individuals with low self-esteem tended to report higher FoMO levels, indicating a vicious circle where low self-esteem contributes to FoMO, which further reduces self-esteem. In conclusion, the impact of FoMO on self-esteem is a complex and important issue, as it can have significant consequences on individuals' psychological well-

being and overall quality of life. The fear and anxiety associated with FoMO can lead to low self-esteem and feelings of inadequacy. The fact that social media exacerbates these effects needs to be taken into account. More research is needed to recognize the detrimental effect of FoMO on self-esteem and to explore effective interventions that can help reduce these negative consequences.

H2: As the university students' FoMO level increases, their self-esteem decreases.

It is noteworthy that different studies have been detailed to understand the complex effect of FoMO on human behavior and health. It has been found that FoMO plays a mediating role in the relationship between psychological factors such as loneliness, depression and internet addiction (Elhai et al., 2016; Przybylski et al., 2013; Seo et al., 2016). The effect of FoMO on internet addiction goes beyond psychological factors.

Internet addiction has become a serious concern in today's technology-driven society. The widespread use of the Internet and digital devices has led to the emergence of a series of addictive behaviors that can have profound effects on individuals' lives. Internet addiction encompasses a range of obsessive behaviors such as excessive gaming, social media use, online shopping and broadcasting. This addiction is of great importance, which can lead to various negative consequences such as social isolation, worsening physical health, impaired academic or professional performance, and psychological distress. Moreover, studies show that internet addiction is seen at higher rates in conditions such as depression, anxiety and sleep disorders. (Kuss & Griffiths, 2017a; Pontes, 2017). As the prevalence of Internet addiction continues to increase, it is important for individuals, families and society as a whole to recognize the importance of this problem and take proactive steps to prevent it.

Many studies have investigated the relationship between FoMO and internet addiction and shed light on the negative impact of FoMO on individuals' online behavior. Academic studies examining the effect of FoMO on internet addiction show that there is a positive relationship between FoMO and internet addiction (Kim et al., 2018; Seo et al., 2016). Individuals with high FoMO levels tend to use the internet obsessively in order not to miss social connections, updates and the agenda (Kuss & Griffiths, 2017b; Seo et al., 2016). Individuals with higher FoMO may resort to excessive internet use to cope with their social insecurities or to escape negative emotions.

H3: As the FoMO level of the university students increases, their internet addiction level also increases.

FoMO has been associated with increased problematic internet use and decreased self-control (Li et al., 2018). This finding indicates that there may be a relationship between self-esteem and internet addiction. The effect of self-esteem on internet addiction has been a topic of interest in psychological research. Self-esteem is defined as an individual's self-evaluation and can significantly affect their psychological well-being. On the other hand, internet addiction refers to the excessive and impulsive use of the internet and leads to negative consequences in various areas of life. Also, this study aims to explore the potential effects of self-esteem levels on internet addiction.

Many studies have shown that there is a significant relationship between low self-esteem and internet addiction (Caplan, 2007; Kim et al., 2018; Park et al., 2014). Individuals with low self-esteem may use the Internet as a means of escape or seek approval and acceptance from online communities (Whang et al., 2003). An excessive dependence on the Internet for self-affirmation can further reinforce the feeling of low self-worth and contribute to the cycle of addictive behaviors (Kuss et al., 2014). Moreover, low self-esteem can also lead to increased susceptibility to negative online experiences such as cyberbullying and social exclusion, which can further exacerbate internet addiction (Błachnio et al., 2013; Yen et al., 2008). Individuals with low self-esteem may be more vulnerable to the negative effects of online interactions and may seek solace in excessive internet use as a coping mechanism (Andreassen et al., 2016).

On the contrary, studies also show that individuals with high self-esteem may be less prone to internet addiction (Whang et al., 2003). High self-esteem levels can provide individuals with a stronger sense of self-worth and satisfaction in offline activities, thereby reducing the need for excessive internet use as a source of approval or escape (Kuss et al., 2014; Shaw & Black, 2008).

In conclusion, self-esteem plays an important role in the development and maintenance of internet addiction. Low self-esteem is associated with increased susceptibility to internet addiction, while high self-esteem appears to be a protective factor. Understanding the impact of self-esteem on internet addiction can contribute to the development of preventive measures and interventions for at-risk individuals, promoting healthier online behaviors and general psychological well-being.

H4: As the self-esteem of the university students increases, their internet addiction decreases.

H5: Self-esteem has a mediating role in the relationship between FoMO and internet addiction.

H6: FoMO has a mediating role in the relationship between using social media platforms and internet addiction.

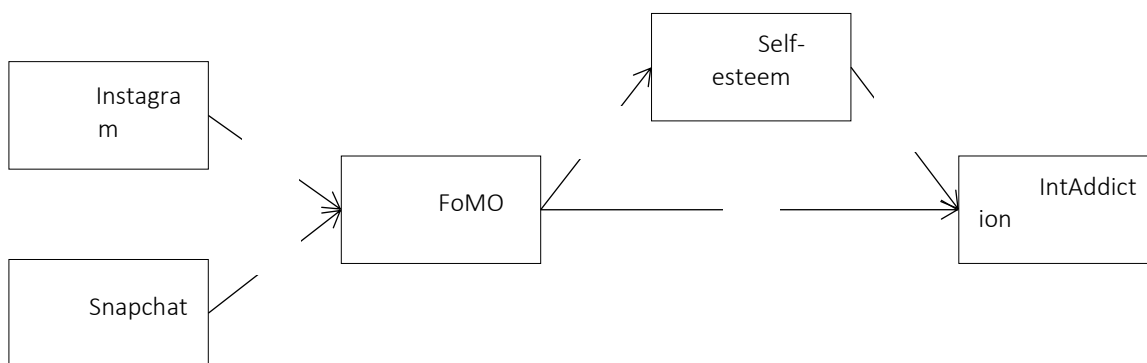


Figure 1. Hypotheses of the research

METHOD

Research Model

The relational research design was used in this study. Relational studies aim to see how the change between variables occurs (Gay et al., 2009) and to reveal the researched problem in detail (Creswell, 2008). In this study, predictive relational research design was used. The purpose of predictive relational research designs is to analyze according to cause-effect relationship (Fraenkel et al., 2012).

Participants

The study group of this research consists of university students (N=290). It was determined that 77.2% of the students participating in this study in Türkiye were female (N=224) and 22.8% were male (N=66). 25.5% (N=74) of the students perceive that they are in the low income group, 69.3% (N=201) are in the middle income group, and 5.2% (N=15) are in the high income group. It was concluded that the age of the participants was between 18-29 and the mean age was 21.34±2.27.

Data Collection Tools

Personal Information Form: Personal information form developed by researchers; it consists of questions asked to the participants of the study, which include options about the information about the individual (gender, perceived income level, age, frequency of Instagram use, frequency of Snapchat use). Frequency of Instagram and Snapchat usage items consist of "1=I never use it, 2=I use it rarely, 3=I use it moderately, 4=I use it often, 5=I use it very often".

Fear of Missing Out Scale: The scale was developed by Przybylski and adapted into Turkish by Gökler, Aydın, Ünal, and Metintaş (2016); it is designed with 10 items and a 5-point Likert type. The items in the scale are scored between 1-5 points (1=not at all true, 5=extremely true). The lowest score that can be obtained from the scale is 10, and the highest score is 50. As the score obtained from the scale increases, the fear of missing out on the developments also increases. When the validity results in the Turkish version are examined; It was stated that the KMO value was 0.80, the explained variance was 39.4%, and the item factor loads varied between .36 and .77. When the results of the reliability analysis are examined; It was stated that the Cronbach's alpha coefficients ranged between .81 and item-total correlation coefficients between .30 and .61. In this study, the Cronbach's alpha coefficient was found to be .76. As a result of CFA for the validity of the scale in this study, goodness of fit values [$\chi^2/df = 2.704 (89.22/33)$, IFI= .92, TLI (NNFI)= .889, CFI= .919, SRMR= .0558, and RMSEA: .077)] and these values seem to indicate a good fit (Sümer, 2000; Tabachnick & Fidel, 2007).

Rosenberg Self-Esteem Scale: The scale was adapted into Turkish by Çuhadaroğlu (1986) and was developed by Rosenberg (1963). It consists of a total of 63 items and includes 12 sub-dimensions. In this study, only the 10-item "self-esteem" subscale of the related scale was used. Items are answered on a 4-point rating scale. Each item is graded as "strongly agree (1) and "strongly disagree (4). Items 1, 2, 4, 6 and 7 are reverse scored. The lowest score that can be obtained from the scale is calculated as 10 and the highest score as 40. Higher scores on the scale mean that self-esteem increases. The internal consistency of the original scale was 0.80, and the test-retest reliability coefficient was 0.85. In the Turkish version of the scale, the internal consistency coefficient was calculated as .71 and the test-retest reliability coefficient as .75. In this study, the Cronbach's alpha coefficient was found to be .851. As a result of CFA for the validity of the scale in this study, goodness of fit values [$\chi^2/df = 3.465 (110.880/32)$], IFI= .929, TLI (NNFI)= .898, CFI= .928, SRMR= .0643, and RMSEA: .092)] and these values seem to indicate a good fit (Sümer, 2000; Tabachnick & Fidel, 2007).

Young Internet Addiction Scale: The YIBT-SF, developed by Young and converted into a short form by Pawlikowski et al., consists of 12 items and is a five-point Likert scale (1=Never, 5=Very often). In the original form of the scale, the internal consistency reliability coefficient was calculated as 0.85. There is no reverse scored item in the scale. High scores from the scale indicate a high level of internet addiction. When the psychometric findings in the adaptation study of the scale, which was adapted into Turkish by Kutlu, Savcı, Demir, and Aysan (2016), were examined; Cronbach's alpha coefficient was found to be .91, and goodness of fit values were found to be $\chi^2=144.93$, $df=52$, RMSEA=0.072, RMR=0.70, GFI=0.93, AGFI=0.90, CFI=0.95 and IFI=0.91. In this study, the Cronbach's alpha coefficient was found to be .864. As a result of CFA for the validity of the scale in this study, goodness of fit values [$\chi^2/df = 2.738 (142.367/52)$], IFI= .917, TLI (NNFI)= .894, CFI= .916, SRMR= .0577, and RMSEA: .078)] and these values seem to indicate a good fit (Sümer, 2000; Tabachnick & Fidel, 2007).

Data Collection Process

Ethics committee permission was obtained from Batman University (Batman University Ethics committee decision, date 09.04.2021, decision number 2021/01-40) to collect the research. The data collection process of the research was run. Data were collected from individuals aged 18 and over via Google Form. There is no missing data since all items are required to be marked. Each participant has the right to fill out the form only once.

Analysis of Data

The data of the research were analyzed using AMOS 24.0 and SPSS 25.0 package programs. Before starting the analysis, the multicollinearity problem of structural equation modeling, multicollinearity problem, normality and extreme values were examined (Ullman, 2013). Data that did not have a Z score between (-3) and (+3) were excluded from the data set, and analyzes were carried out on 290 data (Kline, 2011).

According to the analysis results of the multicollinearity problem; it was concluded that the correlation values of the variables were below .90. According to the analysis results of the multicollinearity problem, it was determined that the VIF values varied between 1.03 and 1.15 and the tolerance values varied between .86 and .96. VIF and tolerance values were determined to be within acceptable limits (Allison, 1999; Hair, Black, Babin, & Anderson, 2010; Ullman, 2013). In addition, it was determined that the Skewness and Kurtosis values were between -1 and +1 limits. According to the results of the analysis obtained, it can be said that the research does not have multicollinearity and multicollinearity problems (Field, 2013). The model designed for this research was tested through Path analysis.

Results

First of all, correlation analysis was carried out in order to reveal whether the relationships between variables are significant or not. According to this; the findings of the relationships (correlation, mean, standard deviation) between the Instagram, Snapchat, Fomo, Self-esteem and Internet Addiction variables are given in Table-1.

Table 1. Correlation Results Between Variables

	\bar{x}	ss	1	2	3	4	5
1- Instagram	2.29	.97					
2- Snapchat	.98	1.1	.325*				
3- Fomo	21.57	6.43	.211*	.179*			
4- Self-esteem	30.37	5.17	-.037	.062	-.151*		
5- Internet addiction	25.87	8.29	.223*	.127**	.377*	-.317*	

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

According to Table 1; individuals' Instagram usage is positively related with Snapchat ($r = .325$, $p < .001$), Fomo ($r = .211$, $p < .001$) and internet addiction ($r = .223$, $p < .001$). Similarly, there is a positive relationship between Snapchat and Fomo ($r = .179$, $p < .001$) and Internet addiction ($r = .127$, $p < .05$). Apart from these, there is a negative relationship between Fomo and Self-Esteem ($r = -.151$, $p < .001$), and a positive relationship between Fomo and internet addiction ($r = .377$, $p < .001$). There was also a negative relationship between self-esteem and internet addiction ($r = -.317$, $p < .001$). Finally, no significant relationship was found between Self-esteem and Instagram and Snapchat variables.

Before starting the path analysis, the measurement models of the variables were put forward. Goodness of fit values of the measurement model of the research were calculated as $\chi^2 = 815,910$, $sd = 453$ and $\chi^2/df = 1.801$, TLI (NNFI) = .872, CFI = .883, SRMR = .0738, RMSEA = .053. Direct, indirect and total effects between all variables of the study; determined by path analysis (Figure-2).

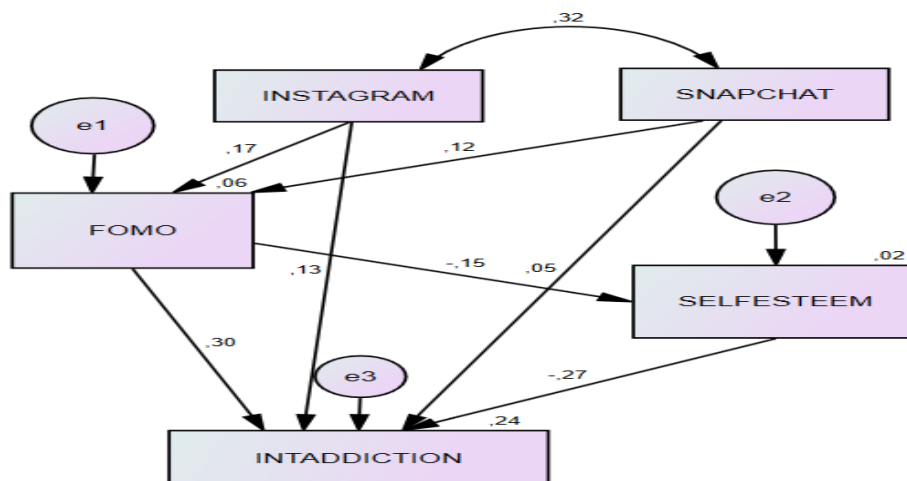


Figure 2. Path Analysis Diagram

According to the findings of the path analysis; goodness of fit indices ($\chi^2= 2.746$, $df= 2$, $p= .253$ and $\chi^2/df= 1.373$, $IFI= .994$, $TLI (NNFI)= .970$, $CFI= .994$, $SRMR= .0238$, $RMSEA = .036$) are acceptable. According to Figure 2, the use of Instagram and Snapchat explains internet addiction by 24 percent with the mediating effect of fomo and selfesteem.

Discussion

The aim of this study is to reveal the complex relationship between Snapchat and Instagram use, FoMO, self-esteem and internet addiction. The first of the hypotheses to explain this relationship was confirmed. In other words, it was found that as the duration of use of these two social media platforms increased, the FoMO levels of the participants also increased. Many studies have shown that increased exposure to social media content increases FoMO levels (Appel et al., 2016; Elhai et al., 2016).

With the emergence of social media platforms, it has transformed the way people interact and led to new psychological phenomena. The influence of two leading social media platforms like Snapchat and Instagram on FoMO also shows this. One of the key factors contributing to FoMO is social comparison; individuals evaluate themselves by comparing their characteristics, achievements and experiences with others. Snapchat and Instagram can provide users with a steady stream of carefully curated content, leading individuals to engage in upward social comparison who perceive others to have more rewarding experiences. The fear of missing social information and updates may lead individuals to constantly check their social media streams to alleviate anxiety and feel well-informed (Alt, 2015).

On the other hand, because Snapchat and Instagram allow users to create and present an idealized profile through carefully selected photos and videos, users often share posts highlighting their achievements, enjoyable activities and positive emotions, creating the impression that they have an exciting and fulfilling life. As a result, individuals may feel obliged to be more active on these platforms in order to maintain a positive self-image and not miss opportunities for self-expression and validation (Choi & Kim, 2016).

Despite the negative connotations associated with FoMO, it is important to recognize the potential positive effects of Snapchat and Instagram as well. These platforms allow individuals to maintain and strengthen their relationships even if they are physically far away (Fardouly et al., 2018). It provides virtual social support and friendship opportunities, reduces the feeling of isolation and increases well-being (Dhir et al., 2018). In addition, exposure to the positive experiences and achievements of others through social media can provide inspiration and motivation for personal growth (Chou & Edge, 2012). Therefore, the positive and negative effects of using social media platforms should be considered together.

As a result, Snapchat and Instagram play an important role in shaping individuals' FoMO experiences. Through social comparison, self-presentation, and knowledge seeking, these platforms contribute to the fear and anxiety associated with fear of missing out and anxiety. However, it is important to acknowledge the positive effects that can result from the use of these platforms, such as enhanced social connections and inspiration for personal growth. Future research may be recommended to explore strategies to reduce the negative effects of FoMO.

The effect of FoMO on self-esteem, another hypothesis of the study, was confirmed and it was found that as the FoMO levels of the participants increased, their self-esteem decreased. Due to the opportunities offered by social media in the age of technology and internet, individuals are increasingly experiencing FoMO. Many studies have shown the negative relationship between FoMO and self-esteem. For example, researchers found that higher FoMO levels were associated with lower self-esteem and individuals perceived themselves as less capable and socially desirable (Elhai et al., 2018; Elhai, Levine, Dvorak, & Hall, 2016). Similarly, Przybylski et al. (2013) discovered that FoMO predicted decreased self-esteem and consequent increased loneliness and anxiety.

Continuous exposure to the chosen and seemingly attractive experiences of others on social media platforms can reduce an individual's sense of worthiness by promoting feelings of inadequacy and social comparison (Oberst et al., 2017). Individuals who experience FoMO may perceive that their own experiences, social interactions, or achievements are inadequate compared to their peers, which may lower their self-esteem. Moreover, the continued search for approval and validation on social media platforms can exacerbate self-esteem issues as individuals place excessive emphasis on the approval and validation of others (Beyens, Frison, & Eggermont, 2016).

On the other hand, there are also studies showing that FoMO has positive effects. For example, in Alt's (2015) research, it was stated that due to FoMO, university students would be more motivated in academic subjects and this would increase their self-esteem. Similarly, there are research results indicating that FoMO encourages more interaction, which has a positive effect on meeting social needs and increasing individuals' self-esteem (Beyens, et al., 2016). Therefore, new studies can be planned to reveal the complex relationship between FoMO and self-esteem.

The third hypothesis of the current study was established as "Internet addiction decreases as the self-esteem levels increase" and this hypothesis was also confirmed. When the research results on this subject are examined, it is seen that the current research result is supported. For example, Elhai, Dvorak, Levine, and Hall (2016) found that FoMO predicted problematic smartphone use and symptoms of internet addiction. Similarly, Wegmann, Oberst, Stodt, and Brand (2017) revealed a positive relationship between FoMO and internet addiction and emphasized the role of FoMO in excessive use of online activities. Also, FoMO has been found to be associated with certain online behaviors such as excessive social media use (Buglass et al., 2017; Elhai et al., 2016; Kuss & Griffiths, 2017).

FoMO is an important source of motivation for individuals to stay connected online. FoMO can lead individuals to constantly seek social approval, compel them to compare themselves with others and cause them to participate in excessive online activities, leading to loss of control over internet use (Li et al., 2018). The attraction of social media platforms, where users display their experiences and social interactions, increases the desire to be constantly engaged online, which can lead to addicted behaviors (Beyens, Frison, & Eggermont, 2016). In addition, FoMO is associated with internet addiction as it increases the need for instant gratification and approval (Chen et al., 2017; Hong, Huang, Lin, & Chiu, 2014).

In conclusion, there is a strong relationship between FoMO and internet addiction. Online experiences and fear of missing out on social connections lead individuals to obsessively engage with digital devices and online platforms; it contributes to the development of excessive internet use and addiction. Understanding the impact of FoMO on internet addiction is important for developing effective prevention and intervention strategies. Because they emphasized the mediator role of FoMO in the relationship between psychological factors and internet addiction (Darcin et al., 2016; Kardefelt-Winther, 2014). Further research may be planned to develop interventions that address FoMO-related concerns and prevent adverse outcomes associated with internet addiction.

The fourth hypothesis of the study was also confirmed and it was found that as self-esteem increased, internet addiction decreased. It is possible to reach many studies that support this finding of the research (Ceyhan, & Ceyhan, 2008; Gao et al., 2018; Tang et al., 2018). The relationship between self-esteem and internet addiction has been the subject of extensive research and internet addiction, which is characterized by excessive and uncontrolled internet use, has become a growing concern in contemporary society. This research also revealed the role of self-esteem on internet addiction.

Self-esteem is an individual's subjective perception of his or her own worth, including self-confidence, self-esteem, and self-acceptance (Rosenberg, 1965). Therefore, self-esteem has become a factor that can

determine people's behavior. High self-esteem was associated with positive psychological outcomes such as greater life satisfaction and adaptive coping strategies (Baumeister et al., 2003), while low self-esteem was associated with various negative outcomes such as depression, anxiety, social withdrawal, and susceptibility to psychopathology (Orth et al., 2003). For this reason, the fact that low self-esteem is associated with negative outcomes such as internet addiction is a result consistent with the literature.

There may be several reasons why low self-esteem predisposes to excessive internet use. For example, individuals with low self-esteem may turn to the online world as a way of escape or compensation, and seek validity and acceptance in virtual societies where they can create idealized personalities (Park et al., 2008). The anonymity and perceived social support provided by the Internet can act as a buffer against negative self-perception and further reinforce addictive behaviors (Caplan, 2007).

On the other hand, individuals with high self-esteem may also be prone to internet addiction. Studies show that individuals with inflated self-esteem may engage in excessive online behaviors to attract the attention of others, arouse admiration or approval, and may be even more susceptible to the addictive nature of the internet (Kuss et al., 2013).

As a result, self-esteem has a significant impact on the development and maintenance of internet addiction. Although both low and high self-esteem contribute to excessive internet use through different mechanisms, it can be said that low self-esteem is a more important factor in internet addiction. Promoting healthy self-esteem, supporting offline social connections, and establishing a balanced relationship with technology can help alleviate the negative effects of Internet addiction on individuals' psychological well-being and overall quality of life.

The direct relationship between FoMO and internet addiction has been supported by both current research and previous studies. However, in order to show how this relationship is formed, the fifth hypothesis of this study was tested and it was found that self-esteem had a mediating role between FoMO and internet addiction. Although no research on this subject has been found, there are similar research results supporting this finding. For example, in the research conducted by Yang et al. (2017), it was found that social comparisons on social media platforms cause a decrease in self-esteem and an increase in internet addiction. Similarly, Park et al. (2008) stated in their study that individuals with low self-esteem use the Internet more frequently to reduce their sense of inadequacy and gain acceptance in their virtual social relationships. Lee et al. (2014) also obtained similar results in their study on smartphone use. This study found that individuals with higher FoMO tend to use excessive smartphones to alleviate their anxiety and meet their social connection needs; it was stated that this situation would be related to self-esteem.

As a result, it is seen that people with high FoMO levels have low self-esteem. It can be interpreted that this connection is related to some personal characteristics of people with low self-esteem, such as maintaining their virtual social relations and feeling obliged to follow what is happening in virtual environments. Since social platforms are the fastest and liveliest way to get information about the virtual world, people start to use the internet more and uncontrollably and they become addicted to the internet.

The sixth hypothesis of the study was also confirmed and FoMO was found to have a mediating role in the relationship between Instagram and Snapchat social media use and internet addiction. No research directly related to this research finding could be found. However, similar studies supporting this finding are available in the literature. For example, Elhai et al. (2016) found that FoMO has a mediating role in the relationship between social media addiction and problematic smartphone use. Similarly, Wegmann et al. (2018) showed that FoMO mediated the relationship between social media use and internet addiction among university students.

Social media platforms offer a constant stream of information and social engagement that triggers fear of missing out on exciting events, news or social interactions (Wegmann et al., 2018). This fear, which is strengthened by the desire to follow developments, intensifies the interaction of individuals on social media. In conclusion, excessive use of social media supported by FoMO indirectly contributes to the development of internet addiction.

The available literature provides consistent evidence supporting the mediator role of FoMO in the relationship between social media use and internet addiction. Future research should explore additional factors that may interact with FoMO and may focus on longitudinal studies to identify causal relationships between these variables.

Conclusion

This study was designed to reveal the complex relationship between social media use, FoMO, self-esteem and internet addiction. When the findings of the research and the literature are considered together, current study sheds light on the complex structure. As a result, the features and content of social media platforms such as Instagram and Snaphcahat encourage users to spend more time on social comparison and virtual social relationships. This live content causes the fear of users to miss the content there. This fear causes individuals to feel less valuable and lower their self-esteem. With the decrease in self-esteem, more internet is used to strengthen the self-perception and this causes internet addiction.

Suggestions

FoMO has a negative effect on individuals' self-esteem. The fear of being left out and constantly exposed to the seemingly satisfying experiences of others can lead to low self-esteem, social comparison, and heightened feelings of inadequacy. Understanding the impact of FoMO on self-esteem is important for addressing and mitigating the negative psychological consequences associated with this phenomenon. Future research should focus on developing interventions and strategies to promote healthy social media use and increase individuals' self-esteem in the face of FoMO. With this method, it may be possible to reduce internet addiction.

REFERENCES

- Alt, D. (2015). Students' wellbeing, fear of missing out, and social media engagement for leisure in higher education learning environments. *Current Psychology, 34*(3), 445-455.
- Andreassen, C. S., Torsheim, T., Brunborg, G. S., & Pallesen, S. (2016). Development of a Facebook Addiction Scale. *Psychological reports, 119*(2), 501-517.
- Andrews, S., Ellis, D. A., Shaw, H., & Piwek, L. (2015). Beyond self-report: Tools to compare estimated and real-world smartphone use. *PLOS ONE, 10*(10), e0139004.
- Appel, H., Crusius, J., & Gerlach, A. L. (2016). Social comparison, envy, and depression on Facebook: A study looking at the effects of high comparison standards on depressed individuals. *Journal of Social and Clinical Psychology, 35*(1), 28-43.
- Baumeister, R. F., Campbell, J. D., Krueger, J. I., & Vohs, K. D. (2003). Does high self-esteem cause better performance, interpersonal success, happiness, or healthier lifestyles? *Psychological Science in the Public Interest, 4*(1), 1-44.
- Beyens, I., Frison, E., & Eggermont, S. (2016). "I don't want to miss a thing": Adolescents' fear of missing out and its relationship to adolescents' social needs, Facebook use, and Facebook related stress. *Computers in Human Behavior, 64*, 1-8.
- Błachnio, A., Przepiorka, A., & Pantic, I. (2013). Association between Facebook addiction, self-esteem and life satisfaction: A cross-sectional study. *Computers in Human Behavior, 29*(4), 1792-1797.
- Buglass, S. L., Binder, J. F., Betts, L. R., & Underwood, J. D. M. (2017). When 'FOMO' meets social media: Exploring the relationship between the fear of missing out and social media engagement in young adults. *International Journal of Environmental Research and Public Health, 14*(3), 238.
- Caplan, S. E. (2007). Relations among loneliness, social anxiety, and problematic Internet use. *CyberPsychology & Behavior, 10*(2), 234-242.
- Carr C. T. & Hayes R. A. (2015). Social media: defining, developing, and divining. *Atl. J. Commun. 23*, 46-65. doi: 10.1080/15456870.2015.972282
- Ceyhan, A. A., & Ceyhan, E. (2008). Loneliness, depression, and computer self-efficacy as predictors of problematic Internet use. *CyberPsychology & Behavior, 11*(6), 699-701.
- Chen, L., Yan, Z., Tang, W., Yang, F., & Xie, X. (2016). The relationship between mobile social media use and academic performance among university students. *Journal of Educational Computing Research, 54*(4), 446-468.
- Chen, S. H., Weng, L. J., Su, Y. J., Wu, H. M., & Yang, P. F. (2017). Development of a Chinese internet addiction scale and its psychometric study. *Chinese Journal of Psychology, 59*(4), 295-309.
- Choi, M., & Kim, S. (2016). How does Facebook self-presentation affect social support in relationships? The role of narcissism, self-esteem, and perceived social support. *Computers in Human Behavior, 63*, 594-602.
- Chou, H. G., & Edge, N. (2012). "They are happier and having better lives than I am": The impact of using Facebook on perceptions of others' lives. *Cyberpsychology, Behavior, and Social Networking, 15*(2), 117-121.


- Darcin, A. E., Kose, S., Noyan, C. O., Nurmedov, S., Yilmaz, O., & Dilbaz, N. (2016). Smartphone addiction in relation with social anxiety and loneliness among university students in Turkey. *European Psychiatry*, 33, S157.
- Datareportal. (2022). Digital 2022: Global overview report. <https://datareportal.com/reports/digital-2022-global-overview-report>
- Dhir, A., Yossatorn, Y., Kaur, P., & Chen, S. (2018). Online social media fatigue and psychological wellbeing — A study of compulsive use, fear of missing out, fatigue, anxiety and depression. *International Journal of Information Management*, 40, 141-152.
- Elhai, J. D., Levine, J. C., Dvorak, R. D., & Hall, B. J. (2016). Fear of missing out, need for touch, anxiety and depression are related to problematic smartphone use. *Computers in Human Behavior*, 63, 509-516.
- Elhai, J. D., Yang, H., & Montag, C. (2018). Fear of missing out (FoMO): Overview, theoretical underpinnings, and literature review on relations with severity of negative affectivity and problematic technology use. *Internet Addiction and problematic Internet use*, 35-44.
- Elhai, J. D., Yang, H., Fang, J., Bai, X., & Hall, B. J. (2017). Depression and anxiety symptoms are related to problematic smartphone use severity in Chinese young adults: Fear of missing out as a mediator. *Addictive Behaviors Reports*, 6, 105-111.
- Fardouly, J., Diedrichs, P. C., Vartanian, L. R., & Halliwell, E. (2018). Social comparisons on social media: The impact of Facebook on young women's body image concerns and mood. *Body Image*, 26, 38-45.
- Gao, T., Li, J., Zhang, H., Wu, Z., & Wang, Y. (2018). The influence of big five personality traits on mobile phone addiction: The mediating role of loneliness and self-esteem. *International Journal of Mental Health and Addiction*, 16(3), 699-717.
- Hong, F. Y., Huang, D. H., Lin, H. Y., & Chiu, S. L. (2014). Analysis of the psychological traits, Facebook usage, and Facebook addiction model of Taiwanese university students. *Telematics and Informatics*, 31(4), 597-606.
- International Telecommunication Union (ITU). (2020). Statistics. <https://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx>
- Kardefelt-Winther, D. (2014). A conceptual and methodological critique of internet addiction research: Towards a model of compensatory internet use. *Computers in Human Behavior*, 31, 351-354.
- Kim, J., LaRose, R., & Peng, W. (2018). Loneliness as the cause and the effect of problematic Internet use: The relationship between Internet use and psychological well-being. *Cyberpsychology, Behavior, and Social Networking*, 21(6), 361-366.
- Kim, J., Seo, M., & David, P. (2018). Alleviating depression only to become problematic mobile phone users: Can face-to-face communication be the antidote? *Computers in Human Behavior*, 82, 71-79.
- Krasnova, H., Wenninger, H., Widjaja, T., & Buxmann, P. (2013). Envy on Facebook: A hidden threat to users' life satisfaction? *Wirtschaftsinformatik Proceedings*, 1-15.
- Kuss, D. J., & Griffiths, M. D. (2017a). *Internet addiction in psychotherapy*. London, England: Academic Press.
- Kuss, D. J., & Griffiths, M. D. (2017b). Social networking sites and addiction: Ten lessons learned. *International Journal of Environmental Research and Public Health*, 14(3), 311.
- Kuss, D. J., Griffiths, M. D., & Binder, J. F. (2013). Internet addiction in students: Prevalence and risk factors. *Computers in Human Behavior*, 29(3), 959-966.


- Kuss, D. J., Griffiths, M. D., & Binder, J. F. (2014). Internet addiction in students: Prevalence and risk factors. *Computers in Human Behavior, 29*(3), 959-966.
- Li, Y., Zhang, X., Lu, F., Zhang, Q., & Wang, Y. (2018). Internet addiction among elementary and middle school students in China: A nationally representative sample study. *PLoS ONE, 13*(6), e0190253.
- Oberst, U., Wegmann, E., Stodt, B., Brand, M., & Chamarro, A. (2017). Negative consequences from heavy social networking in adolescents: The mediating role of fear of missing out. *Journal of Adolescence, 55*, 51-60.
- Orth, U., Robins, R. W., & Roberts, B. W. (2008). Low self-esteem prospectively predicts depression in adolescence and young adulthood. *Journal of Personality and Social Psychology, 95*(3), 695-708.
- Park, S. K., Kim, J. Y., & Cho, C. B. (2008). Prevalence of Internet addiction and correlations with family factors among South Korean adolescents. *Adolescence, 43*(172).
- Pontes, H. M. (2017). Internet addiction disorder and internet gaming disorder: Clinical insights from neurobiological and genetic research. In A. Montag & M. Reuter (Eds.), *Internet addiction* (pp. 61-79). Cham, Switzerland: Springer.
- Przybylski, A. K., Murayama, K., DeHaan, C. R., & Gladwell, V. (2013). Motivational, emotional, and behavioral correlates of fear of missing out. *Computers in Human Behavior, 29*(4), 1841-1848
- Rosenberg, M. (1965). *Society and the adolescent self-image*. Princeton, NJ: Princeton University Press.
- Seidman, G. (2013). Self-presentation and belonging on Facebook: How personality influences social media use and motivations. *Personality and Individual Differences, 54*(3), 402-407.
- Seo, M., Kang, H. S., & Yoon, H. (2016). Impulsivity and internet addiction in adolescents: A moderated mediation analysis of the association between family functioning and internet addiction. *Journal of Korean Medical Science, 31*(10), 1544-1550.
- Shaw, L. H., & Black, D. W. (2008). Internet addiction: Definition, assessment, epidemiology and clinical management. *CNS Drugs, 22*(5), 353-365.
- Tang, J. Y., Chen, M. C., Yang, C. Y., Chung, T. Y., & Lee, Y. A. (2018). Low self-esteem promotes problematic internet use in adolescents: Bidirectional mediation models of internet-specific and general psychopathology. *Journal of Adolescence, 64*, 90-99.
- Wegmann, E., Oberst, U., Stodt, B., & Brand, M. (2017). Online-specific fear of missing out and internet-use expectancies contribute to symptoms of internet-communication disorder. *Addictive Behaviors Reports, 5*, 33-42.
- Whang, L. S., Lee, S., & Chang, G. (2003). Internet over-users' psychological profiles: A behavior sampling analysis on Internet addiction. *CyberPsychology & Behavior, 6*(2), 143-150.
- Yen, J. Y., Ko, C. H., Yen, C. F., Chen, S. H., & Chung, W. L. (2008). Psychiatric symptoms in adolescents with Internet addiction: Comparison with substance use. *Psychiatry and Clinical Neurosciences, 62*(1), 9-16.

Attitude of Parents Who Have Primary School Children Towards Private Tutoring

Research Article

Oguzhan KURU¹, Burcu BASPINAR²

¹Kahramanmaraş Sütçü İmam University, Faculty of Education, Department of Primary Education, Kahramanmaraş, Türkiye  0000-0002-1772-4406

²Kahramanmaraş Sütçü İmam University, Institute of Social Education, Kahramanmaraş, Türkiye  0000-0002-6798-5881

To cite this article: Kuru, O., & Baspinar, B. (2023). Attitude of parents who have primary school children towards private tutoring. *International Online Journal of Educational Sciences*, 15(5), 957-968.

ARTICLE INFO

Article History:

Received: 19.07.2023

Available online:
19.12.2023

ABSTRACT

Parents prefer private tutoring for their children for a variety of reasons. Reasons such as the idea that education given in schools is not sufficient and that extra lessons might have positive effects on the success of students can steer parents and students towards private tutoring. As in all over the world, the demand for private tutoring which has become widespread in Turkey as well has increased even more in the recent years. This study aims at identifying the attitude of parents, who live in the city of Kahramanmaraş and have primary school children, towards private tutoring. This study, in which the survey model was used, consists of 418 parents selected through the simple random sampling method and the data were collected through the "Private Tutoring Tendency Scale." The obtained data were analyzed with the SPSS 22.0 software. As a result of the analysis of data, a significant difference was not found in the attitude of parents who have primary school children towards private tutoring in the sub-dimensions and total values in terms of the age of the parents, number of children in primary school and grade level of the children. However, a significant difference was found in the socio-economic dimension in terms of the parents' gender; in the cognitive and socio-economic dimensions in terms of the parents' education level; in the cognitive dimension and total values in terms of the parents' monthly income; in the socio-economic dimensions in terms of the school type of the children and in the cognitive, affective dimensions and total values in terms of the private tutoring situation of the children.

© 2023 IOJES. All rights reserved

Keywords:

Primary School, Tutoring, Tutoring in the Primary School Period, Parents' Attitude Towards Tutoring

Introduction

Education is society's effort of raising generations that can guide and adapt to the future by making use of the accumulation of the past with the purpose of realizing common goals (Tileği, 2014). There are two main categories in the Turkish education system as formal and informal education. Formal education takes place

¹Corresponding author's address: Kahramanmaraş Sütçü İmam Üniversitesi
Telephone: +905053651530
e-mail: okuru82@hotmail.com
DOI: <https://doi.org/10.15345/iojes.2023.05.005>

by grouping children according to age and level through programs prepared in line with the goals of education in schools (Kızıllhan, 2023). Schools which transmit the goals of the society to the future generations operate in a systematic manner by taking certain principles and certain education programs as the basis. Primary school is defined as “A four-year school, first school opened by the state to provide for the basic education and training of girls and boys who are in the mandatory education period,” by the Turkish Language Association (TDK, 2020). What is expected of primary schools is that they help students acquire cognitive skills and adapt to society, as well as develop their individual potentials and self-esteem (Adıgüzel, Ergünay and Dalioğlu, 2016). In many countries and in Turkey, primary school constitutes the initial step of mandatory basic education. According to Lockheed and Verspoor, primary education has two goals: The first is to raise individuals who can solve the problems they come across with at home and work and the second is to raise a literate population that can basically serve the upper steps of education (Babayiğit, 2019). School is an important turning point for children to start life (Çeliktürk Sezgin, 2020). As Fabian states, since starting primary school is the initial step in the life of the child and even his/her family for education-training, it is an important and critical process for the social, mental, psychomotor, and emotional development of the child (Özdemir and Battal, 2019). Students acquire reading-writing, mathematics, and other basic skills. In addition, primary school constitutes the main step of the whole education system (Babayiğit, 2019). In this respect, parents also have expectations from schools. According to Can (2010), some of the expectations of parents from primary education is listed as: raising individuals who are responsible and self-confident, raising individuals who have character and the ability for self-realization, providing schools which give high-quality education, raising social individuals who can establish good communications with others, preparing students for life and making it possible for students to acquire basic mathematics skills besides reading and writing.

Parents have expectations from classroom teachers as well besides schools. Çelik ve Hotaman (2018) state the expectations of parents from classroom teachers mainly as; being positive role models, academic success, displaying interest and love to students, helping students develop positive characters, being in communication with parents, being just, discipline, class management and professional competency. Of course, students who are the indispensable factor of education have expectations from teachers as well to have a healthy education environment. In a study carried out in the USA, students answered the question, “What kind of teachers do students want?” as; teachers who behave friendly towards their students, act like one of the students, have character, trust, and believe in their students, have good communication skills, do not pressure students in the lessons but are efficient (Mızrak Karıcı, 2016).

One of the problems of the education system which is known but usually ignored and lowers the rate of meeting expectations is crowded classrooms. Although developed countries manage to solve this problem, it affects the quality of education in Turkey as a developing country due to the increase in the young population and the number of students in classrooms (Yaman, 2010). For healthy and productive education to be possible, teachers need to attend to all of the students in their classes (İlgar, 2007). However, this is not always possible in crowded classes. When the disadvantages of crowded classes are analyzed, the following conclusions can be made. During and after the lessons, students do not get a chance to speak to their teachers one to one; the variety of education methods and techniques which can be applied in the lessons are more limited; students experience motivation problems during the lessons; teachers experience difficulties in controlling the whole class and teacher-parent communication and cooperation is more limited (Yaman, 2010).

Since education is given in groups in schools and this makes it difficult to learn, individual teaching should be preferred for a more quality learning to be possible (Senemoğlu, 2004). Despite physical, social, and cognitive differences, expecting the same education performance from the students in the same class causes education given in crowded classes to be criticized (Akdemir and Kılıç, 2020). Today, schools which have become routine and ignore the changing dynamics of society (Aslanargun, 2007), putting the teacher factor on

the backburner in these schools, academic success being measured only through grades and parents' wish to see higher grades steer children and families to different solutions (Akdemir and Kılıç, 2020). One of these alternative methods is private tutoring. Since private lessons are imitations of formal education programs, they are referred to as shadow education, applied individually or in small groups, provide academic supports to students and are given after school in return for a fee (Akdemir and Kılıç, 2022).

As for parents' preference of private tutoring, the reasons can be listed as their wish for their children to be successful at higher grade entrance exams and to be accepted to schools of high quality, to make it possible for their children to be more disciplined and to reach their goals in a faster manner and to provide a better education environment for their children (Koçak, 2022). In addition, while private tutoring has been preferred as preparation for the central exams, compensation for academic content children lack and to develop children's special interest areas for a long time, it is seen that families have started to prefer private tutoring as an alternative for their children at early ages in the recent years. It is considered that this study is important in the sense that it will contribute to teachers' in-class lesson planning and attending to students and the management of the process of taking and giving private tutoring in a more detailed and professional manner.

The main aim of this study is to present the attitude of parents who have primary school children towards private tutoring, which is now preferred as early as primary school level, in terms of some variables. In the light of this aim, the answers to "What are the attitude of parents with primary school children to private tutoring in terms of gender, age, education level, monthly income level, number of primary school children, their children's grade level, school type and providing private tutoring for their children?" sub-aims were sought.

Method

Study Model

In this study which aims at identifying the attitude of parents with primary school children towards private tutoring, the survey model was used as one of the quantitative research methods. Studies with survey model are based on the principle of reflecting the existing situation as it is without any interventions (Karasar, 2009; Büyüköztürk, Ş., Kılıç Çakmak, E., Akgün, Ö.E., Karadeniz, Ş. and Demirel, F., 2010).

Study Group

The study group of the study consists of the parents of a total of 418 students, 259 of whom are female and 159 are male, whose children went to the 1st, 2nd, 3rd and 4th grades in primary schools affiliated with Kahramanmaraş Provincial Directorate for National Education in the 2021-2022 academic year, lived in different socio-demographic areas and selected through the simple random sampling method as one of the random sampling methods.

Data Collection Tool and Analysis of Data

In this study, the Private Tutoring Tendency Scale developed by Çeliköz and Türkan (2018) with 33 items was used. The scale consists of four sub-dimensions as; "Cognitive", "Affective", "Actional" and "Socio-Economic." As a result of the reliability test for the scale, the reliability coefficient for the cognitive dimension was found as .84; for the affective dimensions as .79; for the actional dimensions as .77; for the socio-economic dimensions as .87 and for the whole scale as .84.

In this study, the reliability coefficients of the sub-dimensions of the scale were found as; .68 for the cognitive dimension; .72 for the affective dimension; .70 for the actional dimension; .73 for the socio-economic dimension and the Cronbach Alpha coefficient for the whole scale as .67.

In this study, it was attempted to present the attitude of parents with primary school children towards private tutoring and the data obtained as a result of the study were analyzed with the SPSS 22.0 software as one of the quantitative data analysis techniques. The data related to gender, school type and the child's private tutoring state independent variables of the study were analyzed with the T-test; the data related to age, education level, monthly income level, number of primary school children and the child's grade level were analyzed with One Way Anova.

Findings

The t-test results for the attitude of parents with primary school children towards private tutoring in terms of the gender variable are given in Table 1.

Table 1. The t-test results for the attitude of parents with primary school children towards private tutoring in terms of the gender variable

Attitude towards private tutoring	Gender	n	X	s	sd	t	P
Cognitive dimension	Female	259	34,03	4,44	416	-,049	,961
	Male	159	34,05	4,48			
Affective dimension	Female	259	30,12	4,51	416	-,374	,707
	Male	159	30,29	4,59			
Actional dimension	Female	259	17,73	2,84	416	-,909	,341
	Male	159	18,03	3,48			
Socio-economic dimension	Female	259	20,58	3,91	416	-2,349	,019
	Male	159	21,55	4,35			
Total	Female	259	102,47	9,75	416	-1,426	,155
	Male	159	103,93	10,76			

P<.05

The t-test results for the sub-factors and total value of the attitude of parents in terms of the gender variable are given in the table. According to the table, a significant difference was not found in the cognitive (t= -.049, p>.05), affective (t= -.374, p>.05), actional (t= -.909, p>.05) dimensions' sub-factors and total values (t= -1.426, p>.05) in terms of the gender variable. However, a significant difference in favor of the female parents was found in the socio-economic dimension (t= -2.349, p<.05) sub-factor.

The One Way Anova results for the attitude of parents with primary school children towards private tutoring in terms of the parents' age variable are given in Table 2.

Table 2. The LSD results for the attitude of parents with primary school children in terms of the parents' age variable

Attitude towards private tutoring	Age	N	Mean	SD	F	P
Cognitive dimension	20-30	60	34,56	4,21	1,215	,304
	31-40	236	34,09	4,62		
	41-50	116	33,55	4,16		
	51 and over	6	36,16	5,19		
Affective dimension	20-30	60	30,73	4,98	,840	,472
	31-40	236	30,28	4,24		
	41-50	116	29,79	4,85		
	51 and over	6	28,66	5,12		
Actional dimensions	20-30	60	17,48	3,17	,682	,563
	31-40	236	17,91	3,06		
	41-50	116	17,81	3,15		
	51 and over	6	19,16	2,99		
Socio-economic dimension	20-30	60	20,01	4,08	1,577	,194

	31-40	236	21,22	4,14		
	41-50	116	20,96	4,04		
	51 and over	6	20,95	3,01		
Total	20-30	60	102,80	8,94	,504	,680
	31-40	236	103,52	10,76		
	41-50	116	102,12	9,48		
	51 and over	6	103,66	10,98		

The One Way Anova test results for the sub-factors and total value of the attitude of parents in terms of the age variable are given in the table. According to the table, a significant difference was not found in the attitude of parents towards private tutoring in terms of the age variable in the cognitive (F= 1.215, p=.304), affective (F= .840, p= .472), actional (F= .682, p=.563), socio-economic (F= 1.577, p= .194) dimensions' sub-factors and total values (F= .504, p=.680).

The One Way Anova test results for the attitude of parents with primary school children towards private tutoring in terms of the education level of the parents are given in Table 3.

Table 3. The LSD results for the attitude of parents with primary school children in terms of the parents' education level variable

Attitude towards private tutoring	Education level	N	Mean	SD	F	P	Difference
Cognitive dimension	Primary school	96	34,53	4,91	2,238	,064	
	Middle-school	57	34,82	4,02			
	High-school	110	34,37	4,35			
	University	134	33,24	4,15			
	Graduate school	21	33,04	5,11			
Affective dimension	Primary school	96	29,33	4,93	4,624	,001	Primary-middle school
	Middle-school	57	31,10	4,55			Primary-high-school
	High-school	110	31,38	4,24			Middle school-university
	University	134	29,70	4,36			Middle-school-graduate school
	Graduate school	21	28,47	3,47			High-school-university
Actional dimension	Primary school	96	17,92	2,92	,930	,446	-
	Middle-school	57	17,45	3,32			
	High-school	110	17,60	3,22			
	University	134	18,20	3,07			
	Graduate school	21	17,52	2,73			
Socio-economic dimension	Primary school	96	20,52	3,61	2,413	0,48	Primary school-graduate school
	Middle-school	57	20,45	4,47			Middle-school-graduate school
	High-school	110	20,60	4,34			
	University	134	21,46	3,93			

	Graduate school	21	22,90	4,41			High-school-graduate school
Total	Primary school	96	102,31	10,69			
	Middle-school	57	103,84	11,69			
	High-school	110	103,95	9,35	,550	,699	
	University	134	102,61	9,80			
	Graduate school	21	101,95	9,92			

The One Way Anova results for the attitude of parents with primary school children in terms of the education level variable are given in the table. According to the table, a significant difference was not found in the attitude of parents with primary school children in terms of the education level variable in the actional and cognitive dimensions' (F= 2.238, p= .064) sub-factors (F=.930, p= ,446). However, a significant difference as found in the affective (F= 4.624, p=.001) and socio-economic dimensions' (F= 2.413, p=0.48) sub-factors. In addition, a significant difference was not found in the total scores either (F= .550, p= .699). As for the LSD test results, significant differences were found between parents who are graduates of primary-middle-school, primary-high-school, middle-school-university, middle-school, graduate school, high-school-university and high-school-graduate school in the affective dimension and parents who are graduates of primary-school-graduate school, middle-school-graduate school, and high-school-graduate school in the socio-economic dimension.

The One Way Anova test results for the attitude of parents with primary school children towards private tutoring in terms of the monthly income level of the parents are given in Table 4.

Table 4. The LSD results for the attitude of parents with primary school children in terms of the parents' monthly income level variable

Attitude towards private tutoring	Monthly income	N	Mean	SD	F	P	Difference
Cognitive dimension	0-4250	184	34,77	4,60	4,532	,004	1-2
	4251-10000	191	33,39	4,10			1-4
	10001-20000	38	34,31	4,93			3-4
	20001 and over	5	30,00	2,34			
Affective dimension	0-4250	184	30,41	4,73	,329	,804	
	4251-10000	191	29,98	4,46			
	10001-20000	38	30,23	4,11			
	20001 and over	5	29,40	3,71			
Actional dimension	0-4250	184	17,99	3,06	1,418	,237	
	4251-10000	191	17,60	3,08			
	10001-20000	38	18,52	3,22			
	20001 and over	5	16,60	3,43			
Socio-economic dimension	0-4250	184	21,07	4,05	,702	,551	
	4251-10000	191	20,77	4,24			
	10001-20000	38	21,50	3,34			
	20001 and over	5	19,20	6,30			
Total	0-4250	184	104,25	10,67	3,231	,022	1-2
	4251-10000	191	101,75	9,73			1-4

10001-20000	38	104,57	9,04
20001 and over	5	95,20	6,72

According to the table, significant differences were not found in the attitude of parents with primary school children in terms of their monthly income level in the (F= .329, p=.804), actional (F= 1.418, p=.237) and socio-economic dimensions' (F= .702, p=.551) sub-factors. However, a significant difference was found in the cognitive dimension's (F=4.532, p=.004) sub-factor and total values (F=3.231, p=.002). As for the LSD test results, a significant difference was found between the 0-4250 and 4251-10000, 0-4250 and 20001 and over, 10001-20000 and 20001 and over monthly income groups in the cognitive dimension. In the total values, a significant difference was found between the 0-4250 and 4251-10000, 0-4250 and 20001 and over monthly income groups.

The One Way Anova test results for the attitude of parents with primary school children towards private tutoring in terms of the number of primary school children they have are given in Table 5.

Table 5. The LSD results for the attitude of parents with primary school children in terms of the number of primary school children they have variable

Attitude towards private tutoring	Number of children	N	Mean	SD	F	P
Cognitive dimension	1	343	33,98	4,53	,307	,736
	2	68	34,23	4,18		
	3	7	35,14	3,28		
Affective dimension	1	343	30,26	4,45	,412	,662
	2	68	29,75	4,97		
	3	7	30,71	4,60		
Actional dimension	1	343	17,85	3,15	,066	,937
	2	68	17,83	2,78		
	3	7	17,42	3,50		
Socio-economic dimension	1	343	20,91	4,16	,569	,567
	2	68	21,29	3,72		
	3	7	19,71	4,88		
Total	1	343	103,01	10,19	,003	,997
	2	68	103,11	10,24		
	3	7	103,00	9,01		

When the LSD results for the attitude of parents with primary school children towards private tutoring in terms of the number of children variable according to the table were analyzed, a significant difference was not found between the cognitive (F= .307, p=.736), affective (F= .412, p= .662), actional (F= .066, p=.937) and socio-economic dimensions' (F= .569, p= .567) sub-factors and total values (F= .003, p= .997).

The LSD test results for the attitude of parents with primary school children towards private tutoring in terms of the grade level of the children are given in Table 6.

Table 6. The LSD test results for the attitude of parents with primary school children towards private tutoring in terms of the grade level of the children

Attitude towards private tutoring	Children's garde level	N	Mean	SD	F	P
Cognitive dimension	1 st grade	100	34,13	4,13	,349	,790

	2 nd grade	96	33,66	4,89		
	3 rd grade	126	34,26	4,49		
	4 th grade	96	34,03	4,30		
Affective dimension	1 st grade	100	29,73	4,96	2,122	,097
	2 nd grade	96	29,85	4,32		
	3 rd grade	126	30,04	4,62		
	4 th grade	96	31,18	4,06		
Actional dimension	1 st grade	100	17,97	3,26	,211	,899
	2 nd grade	96	17,76	2,85		
	3 rd grade	126	17,71	3,18		
	4 th grade	96	17,97	3,08		
Socio-economic dimension	1 st grade	100	20,86	4,00	,739	,530
	2 nd grade	96	20,82	4,06		
	3 rd grade	126	21,38	3,95		
	4 th grade	96	20,61	4,44		
Total	1 st grade	100	102,69	10,17	,553	,646
	2 nd grade	96	102,10	10,31		
	3 rd grade	126	103,42	10,02		
	4 th grade	96	103,81	10,23		

When the LSD results for the attitude of parents with primary school children towards private tutoring in terms of the grade level of children variable according to the table were analyzed, a significant difference was not found in the cognitive ($F = .349$, $p = .790$), affective ($F = 2.122$, $p = .097$), actional ($F = .211$, $p = .899$) and socio-economic ($F = .739$, $p = .530$) dimensions' sub-factors and total values ($F = .553$, $p = .646$).

The T-test results for the attitude of parents with primary school children towards private tutoring in terms of the school type of the children are given in Table 7.

Table 7. The T-test results for the attitude of parents with primary school children towards private tutoring in terms of the school type of the children variable

Attitude towards private tutoring							
	School type	n	X	s	sd	t	P
Cognitive dimension	Private school	14	33,14	3,52	331,9	-,049	,961
	State school	404	33,92	4,35			
Affective dimension	Private school	14	29,85	4,89	329,8	-,374	,708
	State school	404	30,20	4,53			
Actional dimension	Private school	14	19,57	3,41	284,3	-,909	,364
	State school	404	17,78	3,07			
Socio-economic dimension	Private school	14	20,78	3,72	307,3	-2,290	,023
	State school	404	20,96	4,12			
Total	Private school	14	103,35	7,58	309,2	-1,393	,165
	State school	404	102,87	9,96			

$P < .05$

When the T-test results for the attitude of parents with primary school children towards private tutoring in terms of the school type of children variable according to the table were analyzed, a significant difference was not found in the cognitive ($t = -.049$, $p > .05$), affective ($t = -.374$, $p > .05$), actional ($t = -.909$, $p > .05$) dimensions

and total values ($t = -1.393, p > .05$). However, a significant difference was found in the favor of parents whose children go to state school in the socio-economic dimension ($t = -2.290, p < .05$).

The T-test results for the attitude of parents with primary school children towards private tutoring in terms of the private tutoring state of the children are given in Table 8.

Table 8. The T-test results for the attitude of parents with primary school children towards private tutoring in terms of the private tutoring state of the children variable

Attitude towards private tutoring	Getting private tutoring	n	X	s	sd	t	P																																												
Cognitive dimension	Yes	20	36,05	4,98	416	2,290	,023																																												
	No	398	33,79	4,26				Affective dimension	Yes	20	32,25	3,16	416	2,090	,037	No	398	30,08	4,57	Actional dimension	Yes	20	19,15	2,68	416	1,933	,054	No	398	17,78	3,10	Socio-economic dimension	Yes	20	20,25	3,12	416	-,786	,432	No	398	20,98	4,14	Total	Yes	20	107,70	8,79	416	2,241	,026
Affective dimension	Yes	20	32,25	3,16	416	2,090	,037																																												
	No	398	30,08	4,57				Actional dimension	Yes	20	19,15	2,68	416	1,933	,054	No	398	17,78	3,10	Socio-economic dimension	Yes	20	20,25	3,12	416	-,786	,432	No	398	20,98	4,14	Total	Yes	20	107,70	8,79	416	2,241	,026	No	398	102,64	9,88								
Actional dimension	Yes	20	19,15	2,68	416	1,933	,054																																												
	No	398	17,78	3,10				Socio-economic dimension	Yes	20	20,25	3,12	416	-,786	,432	No	398	20,98	4,14	Total	Yes	20	107,70	8,79	416	2,241	,026	No	398	102,64	9,88																				
Socio-economic dimension	Yes	20	20,25	3,12	416	-,786	,432																																												
	No	398	20,98	4,14				Total	Yes	20	107,70	8,79	416	2,241	,026	No	398	102,64	9,88																																
Total	Yes	20	107,70	8,79	416	2,241	,026																																												
	No	398	102,64	9,88																																															

$P < .05$

The sub-factors and total values t-test results for the attitude of parents with primary school children towards private tutoring in terms of the private tutoring state of the children are given in the table. According to the table, a significant difference was not found in the actional ($t = 1.993, p > .05$) and socio-economic dimensions' ($t = -.786, p > .05$) sub-factors. However, a significant difference was found in the attitude of parents with primary school children towards private tutoring in terms of getting private tutoring in favor of parents whose children did not get private tutoring in the cognitive ($t = 2.290, p < .05$) level, affective ($t = 2.090, p < .05$) level and total values ($t = 2.241, p < .05$) level.

Conclusion, Discussion and Suggestions

According to the findings of the study, a significant difference was found in the cognitive, affective and actional dimensions and total values of the attitude of parents with primary school children towards private tutoring only in the socio-economic dimensions in favor of male parents. It is considered that the reason for this finding is due to the higher work rate of male parents and the limited amount of time they allocate for their children' work rate leading them to compensate for this situation by getting private tutoring for their children and try to feel better.

As for the age intervals of the parents, a significant difference was not found in the attitude of parents towards private tutoring in the cognitive, affective, actional and socio-economic dimensions and total values. In the light of this finding, the age variable is not a distinguishing factor in terms of the attitude of parents towards private tutoring.

When the attitude of parents towards private tutoring in terms of the education level of the parents was analyzed, a significant difference was not found in the actional dimension and total values. However, a significant difference was found in the cognitive dimension between parents who are primary school and university graduates, parents who are middle-school and university graduates and parents who are high-school and university graduates. In the affective dimension, a significant difference was found between

parents who are primary school and middle-school graduates, parents who are primary school and high-school graduates, parents who are middle-school and university graduates, parents who are middle-school and graduate school graduates, parents who are high-school and university graduates and parents who are high-school and graduate school graduates. In the socio-economic dimension, a significant difference was found between parents who are primary school and graduate school graduates, parents who are middle-school and graduate school graduates, parents who are high-school and graduate school graduates in favor of parents who are graduate school graduates. The reason why parents with lower education levels prefer private tutoring more might be due to their wish for their children to be accepted to higher quality schools in the middle-school, high-school and university levels and plan their education lives in a better manner.

As for the attitude of parents towards private tutoring in terms of their monthly income level, a significant difference was not found in the affective, actional and socio-economic dimensions. However, a significant difference was found in the cognitive dimension between parents with a monthly income between 0-4250 and 4251-10000; between 0-4251 and 20001 and over in favor of those with 0-4250 monthly income interval; between 10001-20000 and 20001 and over in favor of those with 10001-20000 monthly income interval. In addition, a significant difference was found in the total values between parents with a monthly income between 0-4250 and 4251-10000, between 0-4250 and 20001 and over in favor of parents with a monthly income of 0-4250. The reason why parents with lower education levels prefer private tutoring more might be due to their wish for their children to be at higher levels in terms of academic success and in turn find occupations with higher incomes and not experience financial problems throughout their lives.

As for the attitude of parents in terms of the number of primary school children variable, a significant difference was not found in the cognitive, affective, actional and socio-economic dimensions and total values. In the light of these findings, the number of primary school children is not a distinguishing factor in the attitude of parents towards private tutoring.

As for the attitude of parents in terms of the grade level of the primary school children, a significant difference was not found in the cognitive, affective, actional and socio-economic dimensions and total values. In the light of these findings, the grade level of primary school children is not a distinguishing factor in the attitude of parents towards private tutoring.

As for the attitude of parents in terms of the school type of their primary school children, a significant difference was not found in the cognitive, affective and actional and total values. However, a significant difference was found only in the socio-economic dimension in favor of parents whose children go to state schools. It is considered that this significant difference might be related to not receiving the productivity expected from education due to crowded classes in state schools. However, it is considered that parents whose children go to private schools do not need private tutoring for their children since the classes are less crowded and their children's cognitive and affective needs are met in a better manner.

Lastly, as for the attitude of parents towards private tutoring in terms of the private tutoring state of their children, a significant difference was not found in the actional and socio-economic dimensions, whereas a significant difference as found in the cognitive and affective dimensions and total values in favor of parents whose children get private tutoring. It is considered that the reason for this difference is the idea that private tutoring can positively affect the success of students in their lessons.

The expectations of students and parents from schools are increasing each day. An alternative for students and parents who do not benefit sufficiently from the meeting of their needs is private tutoring. Private lessons have become an indispensable part of all of the stages of the educational system. The most crucial factor for parents to prefer private tutoring is that private tutoring takes academic success as the basis. With the effect of the expectation of high levels of success and the competitive environment of the central exams

applied in our country, the interest in private tutoring increases each day. It is considered that the reason for preferring private tutoring in the primary school level is to be able to compensate for the lacking points when passing to a higher level of education, get higher grades from the lessons and support the lessons given in school and that as a result, private tutoring is preferred by parents with an academic purpose.

Suggestions

In Turkey, no studies were found on the reasons why private tutoring is preferred in the primary school level and studies on this subject can be carried out.

The effects of making use of different methods in the private tutoring process on the productivity of private tutoring can be analyzed.

The effects of private tutoring on students' exam anxiety can be analyzed.

Author Contribution Rates

All of the authors have taken equal responsibility in all the stages of the article. All of the authors have read and approved of the final version of the study.

Ethics Committee Declaration

This study was carried out with the approval of the Kahramanmaraş Sütçü İmam University, Social and Human Sciences Scientific Research and Publications Ethics Committee (Protocol No. 2023/19) dated 29.05.2023 in the 2023/19 meeting.

Conflict of Interest Declaration

The authors declare that they do not have a conflict of interest with any organizations or persons within the scope of the study.

REFERENCES

- Adıgüzel, C. O., Ergünay, O., & Dalioğlu, S. T. (2016). *İlkokulların Günümüz ve Gelecekteki İşlevlerinin Sınıf Öğretmenlerinin Görüşlerine Dayalı Olarak İncelenmesi*.
- Akdemir, A. B., & Kılıç, A. (2020). *Ortaöğretim öğrencilerinin özel ders alma nedenlerinin incelenmesi*. Abant İzzet Baysal Üniversitesi Eğitim Fakültesi Dergisi, 20(2), 1008-1023.
- Akdemir, A. B. ve Kılıç, A. (2022). *Özel ders işleniş süreçlerinin incelenmesi*. Batı Anadolu Eğitim Bilimleri Dergisi, 13 (1), 688-715
- Aslanargun, E. (2007). *Okul - aile işbirliği ve öğrenci başarısı üzerine bir tarama çalışma*. Manas Üniversitesi Sosyal Bilimler Dergisi, 9 (18) , 119-135
- Babayiğit, Ö. (2019). *Dünya'da ve Türkiye'de İlkokul Eğitimindeki Yönelimlerin İncelenmesi*. Anemon Muş Alparslan Üniversitesi Sosyal Bilimler Dergisi, 7(5), 45-54.
- Büyüköztürk, Ş., Kılıç Çakmak, E., Akgün, Ö.E., Karadeniz, Ş. ve Demirel, F. (2010). *Bilimsel Araştırma Yöntemleri*. Ankara: Pegem Akademi.
- Can, İ. (2010). *Velilerin ilköğretimden beklentileri (Osmaniye örneği)* (Yüksek Lisans Tezi, Sosyal Bilimler Enstitüsü).
- Çelik, H., & Hotaman, D. *Okul Sisteminde Sınıf Öğretmenlerine Dair Beklentilerin İncelenmesi*. Yıldız Eğitim Araştırmaları Dergisi 3(2), 59-75
- Çeliktürk Sezgin, Z. (2020). *İlkokul birinci sınıf çocuklarının velisi olmak: Heyecan ve endişeyi dengeleyebilmek*. Eğitimde Nitel Araştırmalar Dergisi – 8(1), 1-17. doi:10.14689/issn.2148-2624.1.8c.1s.1m
- İlgar, L., & Erdoğan, İ. *İlköğretim Öğretmenlerinin Sınıf Yönetimi Becerileri Üzerine Bir Araştırma*.
- İlhan, M. (2016). *Araştırmacıların nicel veri analizinde karşılaştıkları güçlüklerin ikili karşılaştırmalar yoluyla incelenmesi*. Eğitim ve Psikolojide Ölçme ve Değerlendirme Dergisi 7(1), 73-84.
- Karasar, N. (2009). *Bilimsel araştırma yöntemi*. Ankara: Nobel Yayın Dağıtım.
- Kızılhan, P. (2023, Nisan 19). *Eğitimde Etkin Öğrenme* (PowerPoint slaytları) <https://akademiksunum.com/index.jsp?modul=document&folder=31013afcaaed15faea7005ab32cad924d59a1e38> adresinden alındı.
- Koçak, E. (2022). *Matematik öğretmenlerinin özel derse bakış açısı ve* (Doktora Tezi, Yüksek Lisans Tezi, Cumhuriyet Üniversitesi. Sivas, Türkiye).
- Mızrak Karcı, M. (2016). *Öğrenci gözüyle ideal öğretmenin özellikleri: Gazi mesleki ve teknik Anadolu lisesi örneği*. Milli Eğitim, 45(209), 80-101.
- Millî Eğitim Bakanlığı Talim ve Terbiye Kurulu Başkanlığı, 2021
- Özdemir, A., & Battal, Ş. (2019). *İlkokula erken yaşta başlayan öğrencilerin okula uyum süreci ve akademik başarı bağlamında yaşadıkları sorunlar*. OPUS Uluslararası Toplum Araştırmaları Dergisi, 11(18), 1633-1683.
- Senemoğlu, N. (2004). *Gelişim Öğrenme ve Öğretim*, Ankara: Gazi Kitabevi
- Sezgin, Z. Ç. (2020). *İlkokul birinci sınıf çocuklarının velisi olmak: Heyecan ve endişeyi dengeleyebilmek*. Eğitimde Nitel Araştırmalar Dergisi, 8(1), 1-17.
- Sözlük, TDK. (2021) Türk Dil Kurumu Sözlükleri. <https://sozluk.gov.tr/> adresinden alındı.
- Tileği, H. (2014). *İlkokul ve ortaokullarda görev yapan öğretmenlerin algılarına göre öğretmen yeterlilikleri*. Yayınlanmamış Yüksek lisans Tezi. Zirve Üniversitesi, Sosyal Bilimler Enstitüsü, Gaziantep.
- Turkan, A. & Çeliköz, N. (2018). *Ortaöğretim Öğrencilerine Yönelik Özel Ders Eğilim Ölçeğinin Geçerlik Ve Güvenirlik Çalışması*. Uluslararası Bilimsel Araştırmalar Dergisi (IBAD) , 3 (2) , 398-410
- Yaman, E. (2006). *Eğitim Sistemindeki Sorunlardan Bir Boyut: Büyük Sınıflar Ve Sınıf Yönetimi*. Türk Eğitim Bilimleri Dergisi, 4(3), 261-274.
- Yaman, E. (2010). *Kalabalık Sınıfların Etkileri: Öğrenciler Ne Düşünüyor?*. Kastamonu Eğitim Dergisi, 18(2), 403-414.

An Overview of Innovative Approaches in Early Childhood Education with Field Practices: Naturalistic Teaching in Inclusive Classrooms

Research Article

Sinem IPEK¹, Ayperi DIKICI SIGIRTMAC²

¹Firat University, Faculty of Education, Department of Basic Education, Elazığ, Türkiye  0000-0001-9073-9850

²Firat University, Faculty of Education, Department of Basic Education, Elazığ, Türkiye  0000-0002-8167-8467

To cite this article: Ipek, S., & Dikici-Sigirtmac, A. (2023). An overview of innovative approaches in early childhood education with field practices: Naturalistic teaching in inclusive classrooms. *International Online Journal of Educational Sciences*, 15(5), 969-986.

ARTICLE INFO

ABSTRACT

Article History:

Received: 11.08.2023

Available online:
26.12.2023

One-on-one interviews were conducted with seven preschool teachers in this study, which aims to present the current situation regarding the natural teaching strategy in practices in mainstream classrooms in a multi-faceted manner by considering different instructional components. The research was carried out using the case study pattern, which is included in the qualitative research method. As a result of the research, it was observed that the teachers incorporated the natural teaching approach into their classrooms by repeating methods that were not purposeful and were tested to be successful through trial and error. In addition to this finding, general knowledge about the natural teaching approach is not sufficient; there are inadequacies in identifying, planning, evaluating, and recording the educational needs of children. It has been determined that these inadequacies are influenced by the physical conditions of the school, the attitudes of families, and the school administrators of children with special needs and normal development. In this respect, it is thought that informing teachers about natural teaching and systematically supporting them in the subjects they find challenging is important in increasing the frequency of the use of the natural teaching approach in special education.

© 2023 IOJES. All rights reserved

Keywords:

naturalistic teaching, embedded teaching, special education, innovative approaches in preschool education, case study

¹Corresponding author's address: Firat Üniversitesi
Telephone: +04242370000
e-mail: sinemipek@gmail.com
DOI: <https://doi.org/10.15345/iojes.2023.05.006>

Introduction

One of the main aims of special education is to support the self-confidence development of children with disabilities and to provide non-artificial opportunities for them to integrate into social life (National Autism Center [NAC], 2015; National Professional Developmental Center on Autism Spectrum Disorders [NPDC], 2014). In this respect, the use of the naturalistic teaching approach has become increasingly important in teaching target behaviors to children with developmental disabilities. It is known that the naturalistic teaching approach, also referred to as embedded teaching in the literature, is a highly effective method for children to acquire target behaviors in various areas (Özen et al., 2013; Özen & Ergenekon, 2011; Pretti-Frontczak & Bricker, 2000).

In recent years, with more scientific studies on naturalistic teaching, it has started to be included in the category of recommended practices (Snyder et al., 2015). In our country, there is a higher tendency towards the behaviorist approach, one of the two main philosophical movements forming the basis of the naturalistic teaching approach (Rakap & Rakap, 2014). However, naturalistic teaching includes a developmental approach as well as a behaviorist approach based on evidence-based practices (Pretti-Frontczak & Bricker, 2004). In other words, instead of the teacher only transferring the target behavior with a strategy based on imitation as a model, giving clues and support according to the developmental characteristics and needs of the child makes the child much more active in the process. The child's active participation is crucial for the permanence of teaching. In this sense, it is possible to say that the naturalistic teaching approach is a synthesis of many ongoing teaching strategies (Barnett et al., 1993; Novick, 1993).

The naturalistic teaching approach can be applied not only in classroom activities but also in all areas of a child's daily life. Children who experience this approach in the classroom adopt a more active and solution-oriented attitude in their daily lives. Various practitioners, including teachers, teacher assistants, parents, and auxiliary staff, can easily use the naturalistic teaching approach in accordance with the characteristics and routines of the environment without disrupting the daily program (Pretti-Frontczak and Bricker, 2004). Although the behaviors planned to be taught in the natural teaching approach are attempted to be imparted in the natural flow, there is implicit intervention by the teacher. For example, a teacher adapting the acquisition in the daily flow to a special child may add a material that the special child can use more easily or remove a material that they think is not functional from the environment before applying it. As a result, the naturalistic teaching approach is a process initiated and controlled by the adult but in which the child is active and determinant (NAC, 2015; NPDC, 2014; Snyder et al., 2015).

One of the most important factors in choosing the naturalistic teaching approach is to support the independence of children with special needs. Teaching strategies in traditional approaches are centered around performing and measuring the target behavior. Consequently, even if a child can replicate the target behavior through imitation or observation, they may struggle to generalize it to different situations due to a lack of internalization of the behavior. In such cases, presenting an infinite behavior pattern to the child, step by step, becomes impractical. Therefore, it is crucial to provide support to the child at points of difficulty and allow them to manage the process independently within their natural life routines (Clifford et al., 2005; Noonan & McCormick, 2006).

Since the naturalistic teaching approach includes various strategies, methods, and techniques (Barnett et al., 1993; Odom, 2016), it is recognized in the literature as an umbrella concept (Pretti-Frontczak & Bricker, 2004). Horn et al., in their classification considering the areas of strategy use, delineate these strategies as opportunity teaching, natural context-based language teaching, activity-based teaching, routine-based teaching, transition-based teaching, peer teaching, embedded teaching, and basic response teaching. One of the key aspects that underscores the importance of the naturalistic teaching approach is its capacity to support the child's development in multiple ways, regardless of the specific strategy employed by the instructor

(Daugherty et al., 2001; Pretti-Frontczak & Bricker, 2004; Macy & Bricker, 2007). This circumstance provides a significant educational opportunity for concurrently supporting and monitoring different developmental areas of the child within the classroom, even within a limited time period.

When the literature is analyzed, it is observed that the naturalistic teaching process is predominantly employed with children with disabilities during the preschool period. In studies focusing on the naturalistic teaching process within the context of inclusive education for children with disabilities in preschool, various disability groups are considered, including those with delayed speech and language development, Autism Spectrum Disorder, hearing impairment, multiple disabilities, and intellectual disability, typically ranging in age from 3 to 6 (Kohler et al., 1997; Macy & Bricker, 2007). These studies cover a wide range of cognitive and pre-academic skills, such as recognizing colors and numbers, and naming shapes, letters, and pictures (Pretti-Frontczak & Bricker, 2000), as well as language and communication skills, including expressing needs and wants, and expressing oneself using three words (Grisham-Brown et al., 2006). Motor and adaptation skills, such as tying shoes, putting on and taking off clothes, and manipulating toys, are also addressed (Daugherty et al., 2001; Grisham-Brown et al., 2000). Furthermore, social and emotional skills, such as initiating communication with peers and initiating communication for cooperative play, are emphasized (Fox & Hanline, 1993). Naturalistic teaching has proven to be effective in imparting these skills, which are crucial for preschool education (Chiara et al., 1995).

On the other hand, when the national literature was analyzed, a limited number of studies on the naturalistic teaching process and its implementation in inclusive environments were found. In a study conducted by Kılıç and Erim (2022), current information on practices to support the early literacy skills of children facing challenges in language, speech, and hearing fields was synthesized. This recent literature review highlighted activities primarily used to integrate naturalistic teaching into the classroom environment, focusing on analyzing and understanding dimensions. In a study by Aksoy and Akgün Giray (2022), which didn't aim to examine the effect of natural developmental behavioral play intervention on the play skills development of children diagnosed with autism spectrum disorder, a single-subject research model was used. The study's findings indicated that play activities designed in a natural environment can assist preschool children diagnosed with autism spectrum disorder in acquiring, maintaining, and generalizing target behaviors by embedding them into games. In a study conducted by Tomris (2020), the aim was to develop an early intervention program that increases the interaction of parents of children diagnosed with Down Syndrome with their children. The program also aimed to provide parents with knowledge and skills to support their children's development naturally. The study involved 10 parent-child pairs with children with Down Syndrome aged between 25-48 months. The pretest-posttest unbalanced group mixed-method experimental design revealed significant improvements in participants' interactional behaviors and a notable increase in the frequency of parents' use of naturalistic teaching strategies. In Rakap and Balikci's (2016) study, which tested the effectiveness of prompting instruction frequently used in the naturalistic teaching approach, a 49-month-old child diagnosed with ASD was studied. Cues were presented through picture cards over three skills for eight weeks, and the instruction's effectiveness was determined by a decrease over time. The study used a multiple-probe-between-behaviors model, and at the end of the application, it was observed that the child acquired three skills with retention achieved during the follow-up process. In a study conducted by Berkeban (2013), embedded instruction with simultaneous prompting was used to support social-emotional development in three children under 72 months of age with developmental disabilities. At the end of the study, it was reported that children with developmental disabilities could say the names of social warning signs and generalize them to other routines. Teachers expressed positive opinions about the process. In his study, Odluyurt (2011) examined whether the fixed waiting period instruction embedded in activities was effective in teaching the behavior of verbally saying the names of clothes to three preschool children with developmental disabilities aged between 43 and 46 months. The study used a multiple-probe model with a

probe phase. At the end of the study, it was determined that the children acquired the target behaviors and generalized the acquired behaviors to different activities, times, and tools. After the completion of the teaching sessions, all the children were observed to achieve the permanence of the target behavior.

In these studies, the study groups generally consist of children with disabilities in different developmental areas (autism, Down syndrome, developmental disabilities) and their families. The studies focus on specific skills, such as preparation for inclusion, language, and leisure time skills, using naturalistic teaching methods. The same studies analyze activities and play processes. Mixed research methods or mainly single-subject quantitative methods were used as research methodologies.

In studies that explore the place of the naturalistic teaching process within structured curricula or the effectiveness of intervention programs, it is observed that preschool teachers, who are crucial participants in the process, are given limited voice. Additionally, it is argued that children with disabilities in inclusion practices should be supported by the natural teaching process in the natural environment. However, a fundamental problem revealed by scientific studies is the lack of knowledge and resources about the natural teaching process among preschool inclusion teachers in our country (Sucuoğlu, Bakkaloğlu, Karasu, Demir, & Akalın, 2014). In this context, it can be said that the number of current studies on the extent to which naturalistic teaching methods/strategies are used and the results of this situation is limited in studies conducted both in Turkey and abroad. It is of great importance for preschool inclusion teachers to gain awareness about naturalistic teaching strategies/methods through such scientific studies, acquire knowledge, and apply what they have learned in their classrooms to enhance the quality of inclusion practices. It is anticipated that teachers who gain awareness on this issue will have a positive impact on other teachers, school management, and families, indirectly increasing awareness. Therefore, it will be crucial in structuring in-service trainings for teachers to determine their use of natural teaching strategy in applications for children with special needs in preschool classes, their opinions on this issue, and whether they face any difficulties. The problem of the study is to determine the use of the naturalistic teaching approach, proven to be effective in inclusive education during the preschool period, by preschool teachers working with children with different diagnoses and demographic characteristics and to raise awareness on this issue.

In line with the detailed problem situation mentioned, the general aim of the research is to determine the current situation regarding the natural teaching strategy in applications in inclusive classrooms from a multidimensional perspective, taking into account the factors affecting the professional performance of the teacher. In line with the general purpose, answers to the following questions were sought:

- What are teachers' views on the naturalistic teaching strategy?
- What are the issues that teachers have difficulties with in the implementation of the naturalistic teaching strategy?
- With which method(s) is the natural teaching strategy applied in daily practice?
- How often is the naturalistic teaching strategy applied in daily practice?
- How is the natural teaching strategy evaluated by the teacher?

Method

The study was conducted using a case study design, one of the qualitative research methods. A case study is a methodological approach that involves an in-depth examination of a limited system to collect systematic information about how that system functions and works (Chmiliar, 2010). Case studies are analyzed in four main types: single case-holistic design, single case-embedded design, multiple case-holistic design, and multiple case-embedded design (Yin, 1984). The general aim is to reveal the current situation regarding the naturalistic teaching strategy in inclusive classrooms in line with the data obtained from teachers

who are field practitioners. In the study, the goal was to determine not only the naturalistic teaching approach but also other factors affecting the use of the naturalistic teaching approach. In this direction, the holistic single case design, which is one of the case study designs and allows for evaluating a single situation from a holistic perspective, was preferred.

Data collection tool

For the study, a semi-structured interview form prepared to obtain information about the naturalistic teaching strategy from the teachers was used. The form consists of two parts, including demographic data and questions. This form was organized based on the input of one expert in the field of preschool education and another expert in the department of measurement and evaluation. The interview questions were tested by conducting pilot interviews with three teachers working in different schools with mainstreaming students. At the end of the interviews, it was deemed appropriate to add explanatory short questions at the end of the existing questions. After the revision, focus group interviews were conducted with the teachers, and they were asked again whether the questions were clear enough. Upon the positive opinions of the teachers, the finalized interview questions were sent for expert opinions again, and the process was completed. Since the pilot interview duration was similar to the target interview duration, no adjustments were made in this regard.

Study Group

The study group for the research was determined using the criterion sampling method, one of the purposeful sampling methods. The aim of this method is to examine and evaluate all situations that meet some predetermined importance criteria within the boundaries of the research. This criterion or criteria can be prepared by the researcher, or the research can be carried out with an existing criterion (Başaran, 2014). The criterion used when determining the study group is that the teachers had worked with a child with special needs in their classrooms within the scope of inclusive education from 2021 to 2023. Since the teacher will base the evaluation on their own experiences, this period is limited to a maximum of the past two years. The study group consisted of seven preschool teachers working in two independent kindergartens in the Eastern Anatolia region. Table 1 shows the demographic data of the teachers.

Table 1. Demographic data of teachers

Code	Graduation Degree	Service Year	Diagnosis of a child with special needs	Class Size
T1	Licence	3 Years	Mild Intellectual Disability	17
T2	Licence	7 Years	Speech Difficulty	18
T3	Licence	3 Years	Auditory Impairment	18
T4	Licence	11 Years	Speech Difficulty	17
T5	Licence	9 Years	Autism	16
T6	Licence	2 Years	Speech Difficulty	21
T7	Associate degree	13 Years	Physical inadequacy	24

Teachers agreed to participate in the study on a voluntary basis. Among the teachers, T1-T5 work at school number 1, and T6-T7 work at school number 2. Both schools have similar demographic characteristics and operate as independent kindergartens. T4 has an intern student in the classroom, while the other teachers work as the sole teacher in their respective classrooms.

Data Collection Process

The interviews were conducted in rooms designated for administrative staff in the schools, suitable for one-to-one interviews. The interviews were completed within a time frame of 9-13 minutes. The audio

recordings of the interviews with the teachers were documented and analyzed using the descriptive analysis method.

Data Analysis

The data were analyzed using the descriptive analysis method, one of the qualitative analysis methods. In the descriptive analysis method, the process includes steps such as data processing by establishing an analytical framework, defining, and interpreting the findings (Yıldırım & Şimşek, 2008). The identification of main themes was guided by the research sub-objectives, adhering to the characteristics of the analysis technique. Subsequently, titles highlighted by the participants within the overarching theme were designated as sub-themes.

Findings

In this study, semi-structured interviews with teachers were analyzed to assess preschool teachers' utilization of the naturalistic teaching method for children with special needs and their corresponding experiences. The findings, obtained through descriptive analysis, are presented in accordance with the study objectives. The themes and sub-themes are illustrated in Figure 1.

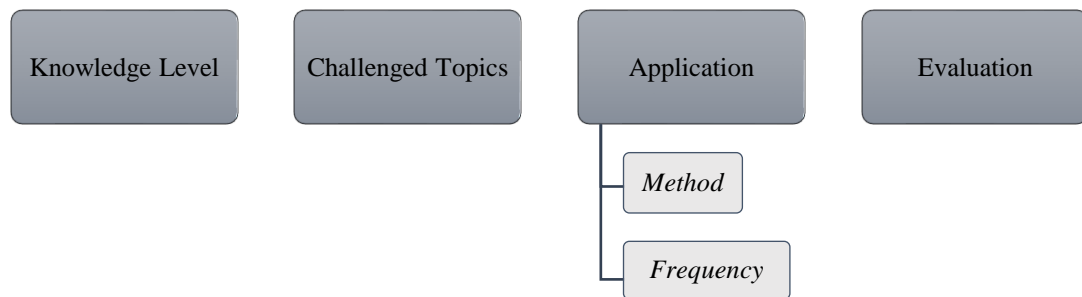


Figure 1. Themes and sub-themes

Knowledge Level

The theme of knowledge level involves analyzing teachers' existing knowledge and misconceptions about the naturalistic teaching approach. It was noted that, with the exception of T1, T4, and T7, teachers had prior knowledge about the naturalistic teaching approach. Upon analyzing the demographic data of the teachers, it can be inferred that the professional experience (length of service) of the teachers plays a role in this situation. Teachers who possessed prior knowledge acquired this information through various channels, such as social media, in-service training, documents provided by guidance and research centers, and interactions with other teachers working with children with special needs. Those with prior knowledge elucidated naturalistic teaching through classroom practices and emphasized its significance in the realm of special education. Notably, T1, T4, and T7 sought information from the researcher to inform their comments, which indicated a lack of prior knowledge. In addition, they were observed to occasionally incorporate practices resembling the naturalistic teaching approach.

"When you say natural teaching, do you mean outdoor use is like education in nature or you say it is different, but I couldn't fully understand the question, teacher..." (T1)

"...(Waiting) Can you ask me with an example, we do a lot of things in the classroom and I am new and will be my first student. I honestly didn't understand what to explain..." (S4)

"...when I think of natural teaching, I think of open space, use of natural materials, stones, leaves, waste materials." (S7)

However, based on the data within the scope of the current research, the practices mentioned were not considered conscious applications of naturalistic teaching. This is because they either incompletely or entirely omitted crucial steps integral to naturalistic teaching.

"... I think what you mean by natural teaching is what we practically do in the classroom. For example, if the child is distracted from the activity, I let him/her move his/her cushion aside, but I sit right next to him/her or I organise the classroom in a way to attract his/her attention before starting the activity..." (T2)

"Very important. Now, there are some children who have never received any attention at home and who have never been to school, that child will cower in a corner. First of all, it is necessary to organise the classroom in the new class for the child to feel belonging. That is to say, you are a part of this class." (T1).

"Since I work in special education, I think I am familiar with many concepts without being appointed. The child may refuse even a game that he/she likes very much that day. For example, a tumbling activity. This requires whole body coordination. If the special child could not do it, the class activity will continue, I will immediately hold their hands and we will turn around. You asked what I think, I think it is very important." (S5)

It was noted that teachers discussed all four fundamental building blocks of the naturalistic teaching approach during the interviews. These include following the child's leadership and interest, utilizing routines, activities, and transitions as teaching environments, employing activities, objects, or toys as reinforcers, and teaching generalization. In the naturalistic teaching process, it is crucial for practices to center around the child's interests and motivation, guided by the child's leadership and interaction with the teacher. The emphasis by T5 and T1 on the importance of being a keen observer for the child and the process is a positive finding in this context.

However, in the majority of findings under this theme, instead of setting instructional objectives and taking action, the approach is centered on repeating information that the teacher mentioned on that day. This information may consist of content covered in a whole-class activity or information determined by the teacher during the process. Consequently, it is evident that the majority of teachers' classroom practices lack purposefulness.

Purposeful practices involve determining the level of support the child needs, outlining how the relevant skill will be taught throughout the day, identifying materials or tools that can be utilized, planning how the child will generalize the information, considering how the skill will be applied in familiar environments, ensuring that the relevant skill is expressed in an observable and measurable manner for accurate evaluation, and establishing criteria for the child to acquire the relevant skill. Despite appearing as an unplanned intervention that evolves throughout the process, purposeful practices within naturalistic teaching exhibit a high degree of measurability. This aspect provides the teacher with empirical data on the next steps and offers reliable, longitudinal data for monitoring the child's development. Therefore, the failure of teachers to fully adhere to the principles of purposeful practices was considered one of the negative findings of the study.

"...children can obsessively play with the same toy. I try to remove it before the child comes to the classroom and draw his/her attention to a point related to the activity. When the activity is over, I give the toy again." (T2)

"We had removed all the chairs one day. When I asked them to take their seats, they first looked puzzled and then sat in their imaginary chairs (laughs)." (Ö3)

"...the day we learnt geometric shapes, my intern brought plastic square plates and spoons with square ends. They placed the glasses in square boxes. They were very excited when they saw them."
(S5)

"...I saw a teacher in my old school making covers for the chairs while teaching colours. I did the same in this class. When they came back from dinner, they were surprised by the chairs dressed with the colours they had learned. We repeated the colour every time Firat sat down." (T1)

One of the important elements in the naturalistic teaching process is the provision of cues. Physical situations (such as being cold or uncomfortable with excessive heat, excessive noise, darkness, or excessive light) can serve as natural cues. Similarly, social environments like the classroom, the bank, home, park, etc., provide natural cues to the child regarding appropriate behavior in terms of adaptation. Additionally, individuals can offer natural cues about expected behaviors. It is observed that teachers make reference to cues in their classroom practices.

"I use every opportunity. When he puts on his shoes, if I'm at the door, I tell him again that the door is white and the mat is green. It may be a month before he says the mat is green by himself... If I constantly give new information, if I do not repeat it, the result will be zero. Therefore, I make up songs without boring the other children, such as 'I took a step and pressed red'..." (T6)

"My observation is that if the family continues at home, progress is very fast. I send a text message about the topic of that day. We learnt about the triangle, let them find the triangular items in the house. For example, it happens like this for a week. When the child comes to the classroom, he/she shows the triangle at the door, then I realise that the game was played at home, I thank him/her." (T1)

If natural teaching strategies and techniques are implemented in the classroom, it is crucial that they are integrated into the daily flow. In this regard, it is evident that teachers in practice are attentive to this aspect, incorporating them into transition times, free time activities, routines, as well as structured activities. Furthermore, in addition to this observation, it was noted that T1, T2, T3, and T5 among the participating teachers emphasized the importance of physical arrangements. While physical arrangements are not a teaching technique in themselves, they constitute one of the fundamental elements of the natural teaching process. Effective implementation can only occur within a suitable physical environment. Hence, the teachers' attention to physical arrangements was regarded as a positive finding. It was also observed that, in the physical arrangements made as part of naturalistic teaching, teachers did not mention the concept of making things inaccessible. Instead, they used terms such as giving limited access, leaving things incomplete, and creating surprising/unexpected situations.

Challenged Topics

Another theme identified through the interviews with teachers is the challenges they face in implementing naturalistic teaching in their classrooms. Within this theme, teachers primarily highlighted communication issues arising from the lack of awareness among families and school administrators about special education. It was emphasized that this situation significantly affected their professional motivation. Additionally, other challenges mentioned included "impracticality," "lack of materials," "absence of a second teacher," and "feeling inadequate in special education." The following are the complete statements from the teachers expressing their views on this matter.

"Actually, if there were two of us, it would be perfect like abroad. We are not robots and there is no maths in working with special children." (S3)

"I do not know if you saw the garden when you came in. If I got out, I'd fall... I haven't taken the other children out yet. As for the material, it should be updated every year because children with different disabilities come because there is no normal material let alone that..." (T1)

"I think we lack a lot of information, too much. First of all, it is impossible to allocate enough time for a special child in a classroom with 24 small children. No one can say that they can do this. We do not get anything in the undergraduate programme. You learn by trial and error. We enter the field as preschoolers and these children are like a 'bonus'." (T7)

"I mean the family... The family in every aspect... If the family is good, I do not even feel that I have a special child, but if there is a family that is completely unaware of the process and has no understanding, that year stretches like ten years for me." (S4)

"When I was working in the district, the school principal used to come to the classroom and say '...the parents complained about you, the children were fighting, are you watching them in the classroom?'. He had no knowledge about special education and he didn't want to take special children to school anyway. It was a year when I really thought of quitting my job." (Ö2)

"I love my administrator very much, but I will criticise him, I think it is unfair that a teacher who is successful in working with special children is constantly given special children. I really love my children, but I am surprised when I hear statements like 'she is very naive and cannot cope' for some teachers. Do we have such a luxury?" (T6)

"Our principal told the local station that we were the best equipped, the best school (smiles). We had Montessori toys... But were they used for their intended purpose? Absolutely not because we didn't have carpets or proper floors yet. Our priority is more basic things, so the question of what we can do about education is unfortunately not our priority right now." (Ö4)

"It is really difficult if the grandmother, grandfather is raising them. Because they only look at it with compassion, a serious agitation and drama dominates that relationship. The child also feels sorry for himself/herself, I observe that he/she is weaker and insecure. But if the family is young and not divorced, the process is usually good." (Ö5)

"I wish the staff were trained. For example, our sister who takes the children to the bathroom does not bring them back without making them cry. I couldn't explain the child's obsessions. The child complains about him, she complains about him... These are simple things but they affect stress and aggression in children." (Ö3)

"You are labelling the child, right, how can this happen in 1 hour? I am not a special educator, but isn't it a great loss to send a traumatised child to us because he/she has a speech disorder? I would exclude good examples, but I have more painful experiences. Therefore, considering that this process starts with diagnosis, the greatest care should be there." (S2)

Application

Under the theme of implementation, the techniques, methods, or materials that the teachers used to support naturalistic teaching in the classroom environment and the ways they applied these methods were analyzed.

Method

Under the sub-theme of method, the manner in which teachers applied the naturalistic teaching approach and the points they considered in relation to the naturalistic teaching process were analyzed.

"If there is a speech disorder, the most common group I come across is the group with speech disorder. I make a leader, for example, when we go to dinner, he gives commands by shouting. Even if he swallows letters, children start to understand the special child after a while and the special child's self-confidence definitely increases. As he thinks he is understood, his speech in the classroom increases. Or in general, I extend the singing activities because hearing and language are related." (S3)

"...actually, as I said, it depends on what is developing at that moment. For example, I can sing the colours song during hand washing. The children clap their hands and sing along and so does the special child." Upon this answer, S6 was asked whether she took into consideration the fact that the child with special needs did not know the colours based on observation or not. In response to this question, it was observed that S6 thought that children generally could not learn information such as colours and numbers and acted on the basis of this experience and did not make a planning based on the needs of the child.

"It depends on the child, but if he/she can't stand still, let's see, you are the second teacher today, you are the assistant teacher etc... Yes, today Ayşegül will check your colouring, if I taught the bee, she will tell us the bee in the colouring that day..." (T3)

It was observed that T7 included practices in which he tried to include the family of the special child in the process, but he did not evaluate these practices within the natural teaching process; he described them as hidden repetitions.

"...at the end of the day, we sit on the cushions and chat with the children until the buses arrive. We make a short evaluation of the day. I ask (special) questions about home, I bring the subject to the information of that day through conversation. I give examples from home so that it sticks in their minds. When they go home, they tell their family about it and the family talks about it. Thus, you make hidden repetitions." (S7).

Naturalistic teaching covers inclusion practices, teaching in the home environment, generalization of acquired knowledge, developmentally appropriate, and evidence-based practices. In addition to adopting the method, it is crucial to adhere to principles such as following the child's leadership, creating routines, activities, and transitions as the teaching environment, using activities, objects, or toys as natural reinforcers, generalizing across different environments, situations, instruments, and individuals, and planning the natural teaching process in the most appropriate manner. It was observed that the teachers did not mention developmentally appropriate and evidence-based practices when discussing inclusion practices, teaching in the home environment, and generalization of learned material. While teachers incorporated monitoring the child's leadership during implementation, establishing routines, activities, and transitions as the teaching environment, utilizing activities, objects, or toys as natural reinforcers, and generalizing across different environments and individuals, it was noted that they did not engage in planning/preparation based on developmentally appropriate and evidence-based practices. These practices are recognized as crucial steps in the natural teaching process. Instead, their focus was on enhancing the child's adaptation skills in the classroom.

Frequency

Since the naturalistic teaching approach is founded on the principle of embedding into educational activities and seizing appropriate opportunities, it is crucial to make use of all educational chances. Here, it becomes essential to create suitable opportunities or capture those that naturally arise in the course of activities. In this context, it was observed that the teachers did not actively assess opportunities throughout the day but rather embedded acquired skills into the daily routine based on situations they identified, positioning themselves as the determinants of the approach's frequency of use.

"...sometimes very often, sometimes less, but I cannot say never. I do it involuntarily because if something comes to my mind at that moment, I do it when there is a suitable environment." (S2)

"I mean, I would say mostly at dinner. I sit next to her at mealtimes, I think this is the time when I can be alone with her the most. If I am available, we can talk one-to-one at dinner and it does not attract the attention of other children." (S3)

"Always! (laughs). This is not a formal job. It's informal. There is no plan. If I am in the garden at that moment, why shouldn't I make use of it, or when we hand it over to the family, I told you..." (S6)

T6, unlike other teachers, stated that he paid attention to the evaluation by drawing attention to the opportunities in the process, but it is seen that the environment directs the process, not the outcome. Although S6 recognises the opportunities, she evaluates natural teaching from a purposeless, random perspective as in her previous answers.

While S4 mentioned that he did not frequently apply naturalistic teaching with a similar approach, he noted that he implemented an application deviating from the basic principles of naturalistic teaching. It is evident that S4 adopted a method of isolation from the class rather than creating opportunities for adaptation or embedded teaching during whole-class activities. This situation can be considered one of the reasons explaining the low preference for naturalistic teaching in classroom activities.

"To be honest, we cannot always allocate the same time. I leave the interns and older sisters in the class to take care of that child only. They do Lego, colouring, dough." (S4)

S4 responded to the clarifying question about whether this situation happens all day: "That sister is responsible for that child in my class. I do my activity and the intern sits with her and supports her in the activity. If she does not, then they move to a separate area and play games".

It was observed that T1 applied naturalistic teaching only in the classroom and did not prefer transition time, play or family participation.

"If the activity is available, it is done, I cannot say anything about the frequency." (S1)

T7 described the instructional activities based on the use of free and transition times as a prescribed, compulsory and boring teaching process for the child. In this context, it can be interpreted that T7's knowledge about naturalistic teaching process and practices is insufficient.

"I think that constant education, education, education overwhelms the child with these new things. I do not find it right to give information to the child with a syringe at every opportunity. I wouldn't do something like the German education logic, which should have some fun, in my class. After all, these are five-year-old children..." (T7).

Evaluation

Evaluation, a component considered within the scope of naturalistic teaching, serves as the final step that encompasses the planning and implementation phases of the teaching process. Within this context, the coherence of teachers' evaluation of the naturalistic teaching process with the preceding steps, the criteria used during evaluation, and the planning considerations based on the evaluation results were analyzed.

"I do not have a document for evaluation. If he/she has learnt pink, I have a self-evaluation such as successful, if not, unsuccessful." (S5)

"For lack of recognition, the principal is already talking to us. We get information. Generally, there are things like mild mental retardation, problems with speech, low hearing, autism that is not

overly aggressive. I have never seen down, for example. It is already written in the report, and we try to give education according to what is retarded, but we do not receive education according to those children in undergraduate education. So the child actually adapts to the class a little bit. I mean, he can do as much as he can do and what he cannot do, he cannot do." (T1)

"Special children are the same as normal children. The teacher should spend a long time to get to know them. If you do not know what they like and what they like, that child will not trust you. For a child who does not trust, learning becomes secondary. Actually, there are documents. The forms from RAM and the forms we receive at the beginning of the term are sufficient. It is not difficult to fill in for a child. Of course, I cannot say that I keep it very organised and plan overnight. But I pay attention as much as possible. If there is a very basic deficiency, I aim to give it in natural teaching, sometimes self-care skills, sometimes knowledge." (T5)

"I do not have a specific plan to do this or that on this day. But there are special documents for that child. The official from the CRC also wants to see this, and if the family is conscious, the family also wants to see it. If there is progress, it is impossible not to see it anyway, then I feel successful as a teacher. We also have monitoring forms for the child and we mark them there. There are also CRC documents, but of course they are not activity-based. But I can say without a doubt that these implicit activities in transition times yield important results." (S3)

"Of course we have forms. I did not see anything like naturalistic teaching or not in the forms, or I do not have such forms. The form is filled in through the child. But of course it gives the chance to evaluate the process. The parents are happy when they see it, they think that my child is being taken care of." (S7)

While the natural teaching steps are integrated into the implementation process, the lack of a purposeful implementation process renders it unclear which criteria will be utilized in the evaluation step. Consequently, it is observed that teachers commence this stage by focusing on observable outcomes and use the generalization of the child's behavior to another situation as a basis. In this scenario, it becomes apparent that there is no planned and systematic orientation in the evaluation stage, similar to the implementation stage.

Discussion and Conclusion

Instead of isolating children with special needs in lower age groups from natural environments, it is crucial to ensure that they interact with their peers to enhance their adaptation abilities. Therefore, it is recommended that children with special needs continue to be part of inclusive classrooms. In recent years, innovative approaches for children in inclusive classrooms have gained prominence both in our country and globally (Ninlawan, 2015; İyigün & Tortop, 2018). The findings of this study, which examined the perspectives of preschool inclusion class teachers on the naturalistic teaching process, revealed that the general knowledge level of teachers regarding the principles of implementing the naturalistic teaching approach was insufficient. Additionally, it was observed that they encountered challenges in identifying the educational needs of children, establishing criteria based on these determinations, conducting evaluations aligned with criteria, recording evaluation data, and planning. Throughout the process, it was evident that the working climate, known to impact the professional performance of teachers, influenced the natural teaching practices of the teachers. Factors such as the attitudes of families and school administrators of children with special needs and those with typical development, the physical conditions of the school, and the class size were emphasized in this regard.

In the interviews with the teachers participating in the research, the characteristics of the naturalistic teaching approach and its importance in terms of special education were initially explored. It was observed that teachers shaped their understanding of the naturalistic teaching approach based on the experiences

gained from field practices. Three teachers who participated in the research explicitly stated at the beginning of the interview that they did not have any information. However, one noteworthy result of the research was that the teachers who claimed to have no knowledge about the naturalistic teaching approach (T1, T4) and those who mentioned hearing about it for the first time (T7) still incorporated the naturalistic teaching approach into their daily routines. It was found that the factor motivating teachers to use the naturalistic teaching approach in their classrooms was the positive impact of coincidental applications related to the naturalistic teaching approach over the years on the children. Teachers referred to this situation as professional experience. It is recognized that one of the most effective learning styles for children with special needs in inclusive classrooms is practices conducted within the scope of the naturalistic teaching approach (Allen & Cowan, 2008). Therefore, it can be inferred that the teachers' adoption and continuation of this approach, which they stumbled upon, is linked to the observable results of the naturalistic teaching approach (Rakap, 2017). Examining the data on teachers' practices of the naturalistic teaching approach, it is evident that they prefer activity-based teaching, modeling using extensions, modeling without waiting for a response, and demanding-modeling strategies within naturalistic teaching strategies.

Although environmental arrangements are not a direct strategy in the naturalistic teaching approach, they have a significant impact on the efficient progress of the process. Examining the studies in the literature on this subject, it is evident that preschool teachers generally exhibit a similar tendency in the physical arrangement of the learning environment (Kaçan, 2021; Koçyiğit, 2015), with the theme of safety prominently featured. While teachers employ methods such as giving, leaving incomplete, and creating surprising/unexpected situations to a limited extent within the scope of physical arrangements, it is apparent that they do not use these methods in harmony with the gains observed in other aspects. Consequently, although teachers' awareness of physical arrangements and their utilization of various methods can be considered positive, it is a negative finding that these practices lack purposefulness and planning.

Although teachers did not take purposeful steps in environmental arrangements, it was observed that they included instructive clues in their classroom activities, especially frequently using physical and verbal cues. This result was accepted as one of the positive outcomes of the study. Regarding family involvement, which is crucial in the naturalistic teaching approach, it was observed that teachers interpreted family involvement under two main headings: the supportive effect of the family and the challenging effect of the family. It was stated that both effects were impactful on children, educational activities, and professional motivation. Teachers who sought to increase interaction to carry out remedial activities aimed to ensure the cooperation of administration, family, and school in this regard.

It is recommended to follow the child's leadership and interest, use routines, activities, and transitions as teaching environments, use activities, objects, or toys as reinforcers, and teach generalization in different environments, situations, and with different individuals (Diken, 2013). When examining how the teachers participating in the study applied the naturalistic teaching approach, it was observed that while they gave the child a leadership role, used routines and transition areas, assigned responsibilities in the classroom, and included peer interaction, they did not mention using activities, objects, or toys as reinforcers, teaching generalization, and implementing it in different environments, situations, and with different individuals. Similar practices were repeated in different environments. The fact that some methods were repeated while others were not used at all was seen to be due to the teachers' tendency to repeat practices that yielded successful results, practices they had tried before and felt adequate, instead of planning based on the needs of the child.

Since an artificial learning environment is not designed in the naturalistic teaching approach, it is important to use the child's other environments outside the school as a learning environment (Kurt, 2011). Additionally, it is known that the support of the family of the child with special needs to the teacher in all

educational activities positively affects the educational process (Çakmak, 2010). Family participation is of decisive importance not only in naturalistic teaching activities but also in special education in general (Tutuk, 2020). In the naturalistic teaching process, it is crucial for the child to generalize knowledge to different environments, people, and situations, creating opportunities for this (Kurt, 2011; Pretti-Frontczak & Bricker, 2004). In this respect, it was interpreted as a positive result that teachers shared the information they mentioned during the day with the family, suggested practices at home, and included the family in the process by following the progress in this regard.

For the transition to the evaluation phase, the practitioner should ensure that he/she performs a sufficient number of trials during the day and maintains consistency in the application (McDonnell et al., 2008). This feature was analyzed under the theme of "frequency" in the study. It was observed that the teachers who participated in the study were inadequate in recognizing and capturing natural opportunities, and some teachers did not include the naturalistic teaching approach in the flow at all. On the other hand, it was determined that the teachers who stated that they frequently used it repeated similar methods. In general, the naturalistic teaching approach includes practical applications based on capturing teaching opportunities (Snyder et al., 2015). In this respect, teachers' inability to distinguish many opportunities in the flow is a negative finding that closely affects the process.

The evaluation step, which is the umbrella step of the naturalistic teaching approach, is the last step that includes the preliminary steps and is affected by the quality of these steps. While evaluating, the teacher has the opportunity to evaluate his/her own educational performance as well as the effect of the practice on the child. Although it is recommended that another expert observes and evaluates the process at this stage (McDonnell et al., 2008), a healthy evaluation can be made by determining clear criteria during planning. It is noteworthy that the integrity mentioned in the evaluation phase is not included in the findings. It was determined in the application findings that teachers had difficulties in determining the educational needs of children, making appropriate planning, and recording these data at the point of implementing the naturalistic teaching approach. It was observed that the teachers did not use a special form or document in this regard and, based on their own observations, tried to teach the behaviors they wanted the child to reinforce embedded in the daily flow. It was observed that they determined the acquisition of this behavior by looking at the child's spontaneous repetition (without instructions) and used this situation as an evaluation criterion at the same time. Therefore, not selecting the acquisitions oriented towards the needs of the child during the implementation, not using the opportunities for this situation in the flow, and the uncertainty of the success criteria caused the evaluation phase to be inadequate. When the studies conducted with teachers on the quality of educational activities in inclusive classrooms are examined, it is seen that teachers have difficulties in identifying the educational needs of children, recording these data, and planning future instructional activities (Sucuoğlu, Bakkaloğlu, Karasu, Demir, & Akalın, 2014).

Although naturalistic teaching is based on educational activities planned in the process and embedded in the natural flow, it is not an accidental process (Snyder et al., 2015). In this respect, it is very important to know the characteristics and needs of the child and to act in a planned manner during the implementation process. Although the preschool teachers participating in the study adopt the naturalistic teaching approach and explain its multidimensional support for the child through their own professional experiences, it is seen that they have significant problems at the point of implementation due to a lack of prior knowledge.

Recommendations

An important finding of the study is that teachers with extensive experience working with children with special needs do not consciously apply the naturalistic teaching approach but frequently integrate it into their daily routines. Therefore, informing teachers about this aspect will contribute significantly to incorporating naturalistic teaching into activities aligned with best practices. This emphasizes the need for professional

development opportunities, including in-service training. Additionally, during undergraduate education, practical courses could enhance the awareness of pre-service teachers who are yet to gain field experience.

In all educational activities, a successful process involves various components, including teachers, school management, families, and stakeholders in related disciplines. Consequently, the exchange of information among all these components will greatly contribute to the overall process. In this context, it is believed that scientific studies encompassing not only children with special needs, their families, and teachers but also other individuals in roles such as practitioners, administrators, and stakeholders will be crucial. Such studies can play a vital role in fostering innovative approaches to special education and raising awareness on this important issue.

REFERENCES

- Allen, K. D., & Cowan, R. J. (2008). 11. Naturalistic Teaching. Effective practices for children with autism: educational and behaviour support interventions that work, 213.
- Başaran Y. (2017). Sampling Theory in Social Sciences. *Journal of academic social research*, 5(47), 480-495.
- Chiara, L., Schuster, J. W., Bell, J. K., & Wolery, M. (1995). Small-group massed-trial and individually-distributed-trial instruction with preschoolers. *Journal of Early Intervention*, 19(3), 203-217.
- Chmiliar, I. (2010). Multiple-case designs. In A. J. Mills, G. Eurepas and E. Wiebe (Eds.), *Encyclopedia of case study research*, (pp 582-583). USA: SAGE Publications.
- Clifford, J. R., Macy, M. G., Albi, L. D., Bricker, D. D., & Rahn, N. L. (2005). A model of clinical supervision for preservice professionals in early intervention and early childhood special education. *Topics in early childhood special education*, 25(3), 167-176.
- Çakmak Ö. Ç. (2010). Family involvement in preschool education institutions. *Bolu Abant İzzet Baysal University Journal of Institute of Social Sciences*, 10(1), 1-18.
- Daugherty, S., Grisham-Brown, J., & Hemmeter, M. L. (2001). The effects of embedded skill instruction on the acquisition of target and nontarget skills in preschoolers with developmental delays. *Topics in Early Childhood Special Education*, 21(4), 213-221.
- Diken, İ. H. (2013). Naturalistic teaching in pre-school inclusion environments. *Inclusion in pre-school: What, when, where, why, how, who*, (pp 264-313). Educating book
- Fox, L., & Hanline, M. F. (1993). A preliminary evaluation of learning within developmentally appropriate early childhood settings. *Topics in Early Childhood Special Education*, 13(3), 308-327.
- Grisham-Brown, J., Pretti-Frontczak, K., Hawkins, S. R., & Winchell, B. N. (2009). Addressing early learning standards for all children within blended preschool classrooms. *Topics in Early Childhood Special Education*, 29(3), 131-142.
- Grisham-Brown, J., Schuster, J. W., Hemmeter, M. L., & Collins, B. C. (2000). Using an embedding strategy to teach preschoolers with significant disabilities. *Journal of behavioural education*, 10(2), 139-162.
- İyigün, S. Ç., & Tortop, H. S. (2018). Innovative practices in special education innovative and innovative technological tool designs for visually impaired individuals and their effect on life satisfaction. *Journal of Gifted Education and Creativity*, 5(2), 31-43.
- Jackson, S., Pretti-Frontczak, K., Harjusola-Webb, S., Grisham-Brown, J., & Romani, J. M. (2009). Response to intervention: Implications for early childhood professionals.
- Jameson, J. M., McDonnell, J., Johnson, J. W., Riesen, T., & Polychronis, S. (2007). A comparison of one-to-one embedded instruction in the general education classroom and one-to-one massed practice instruction in the special education classroom. *Education and Treatment of Children*, 23-44.
- Kaçan, M. O., Dedeoğlu, N., Karayol, S., & Kimzan, İ. (2021). Investigation of Learning Centres in Preschool Classrooms. *Muğla Sıtkı Koçman University Journal of Faculty of Education*, 8(2), 436-451.
- Kılıç, M., & Erim, A. (2022). Early Literacy Intervention in Children with Communication Disorders: A Traditional Review. *Türkiye Klinikleri J Health Science*, 7(4), 1226-34.
- Koçyiğit, S. (2015). Teacher-guide teacher and parent views on mainstreaming education practices in kindergarten classrooms. *International Journal of Turkish Literature Culture Education (TEKE)*, 4(1), 391-415.


- Kohler, F. W., Strain, P. S., Hoyson, M., & Jamieson, B. (1997). Merging naturalistic teaching and peer-based strategies to address the IEP objectives of preschoolers with autism: An examination of structural and child behaviour outcomes. *Focus on Autism and Other Developmental Disabilities*, 12(4), 196-206.
- Kurt, O., & Tekin-Iftar, E. (2008). A comparison of constant time delay and simultaneous prompting within embedded instruction on teaching leisure skills to children with autism. *Topics in Early Childhood Special Education*, 28(1), 53-64.
- Macy, M. G., & Bricker, D. D. (2007). Embedding individualised social goals into routine activities in inclusive early childhood classrooms. *Early Child Development and Care*, 177(2), 107-120.
- McBride, B. J., & Schwartz, I. S. (2003). Effects of teaching early interventionists to use discrete trials during ongoing classroom activities. *Topics in Early Childhood Special Education*, 23(1), 5-17.
- National Autism Centre. (2015). National autism centre's national standards report. Randolph, Massachusetts: National Autism Centre.
- National Professional Development Centre on Autism Spectrum Disorders. (2014). Naturalistic intervention. evidence-based practices. Retrieved from <http://autismpdc.fpg.unc.edu/content/naturalistic-intervention>.
- Ninlawan, G. (2015). Factors which affect teachers' professional development in teaching innovation and educational technology in the 21st century under the bureau of special education, office of the basic education commission. *Procedia-Social and Behavioural Sciences*, 197, 1732-1735.
- Noonan, M. J., & McCormick, L. (2006). *Young Children with Disabilities in Natural Environments: Methods and Procedures*. Brookes Publishing Company. PO Box 10624, Baltimore, MD 21285.
- Odluyurt, S. (2011). The Effects of Constant Time Delay Embedded into Teaching Activities for Teaching the Names of Clothes for Preschool Children with Developmental Disabilities. *Educational Sciences: Theory and Practice*, 11(3), 1457-1460.
- Odluyurt, S., & Batu, E. S. (2010). Teaching preparation for inclusion skills to children with developmental disabilities.
- Özen, A., & Ergenekon, Y. (2011). Activity-Based Intervention Practices in Special Education. *Educational Sciences: Theory and Practice*, 11(1), 359-362.
- Özen, A., Ergenekon, Y., Kürkçüoğlu, B. Ü., & Genç, D. (2013). Determining the teaching practices of preschool teachers with mainstreaming students in their classrooms.
- Pretti-Frontczak, K., & Bricker, D. (2000). Enhancing the quality of individualised education plan (IEP) goals and objectives. *Journal of early intervention*, 23(2), 92-105.
- Pretti-Frontczak, K., & Bricker, D. (2004). *An activity-based approach to early intervention*. Brookes Publishing Company. PO Box 10624, Baltimore, MD 21285.
- Rakap, S. (2017). Naturalistic teaching approaches in supporting inclusive education practices in preschool period. *Ankara University Faculty of Educational Sciences Journal of Special Education*, 18(03), 471-492.
- Rakap, S., & Rakap, S. (2014). Parent-implemented naturalistic language interventions for young children with disabilities: A systematic review of single-subject experimental research studies. *Educational Research Review*, 13, 35-51.


- Snyder, P. A., Rakap, S., Hemmeter, M. L., McLaughlin, T. W., Sandall, S., & McLean, M. E. (2015). Naturalistic instructional approaches in early learning: A systematic review. *Journal of Early Intervention, 37(1)*, 69-97.
- Snyder, P. A., Rakap, S., Hemmeter, M. L., McLaughlin, T. W., Sandall, S., & McLean, M. E. (2015). Naturalistic instructional approaches in early learning: A systematic review. *Journal of Early Intervention, 37(1)*, 69-97.
- Sucuoğlu, B., Bakkaloğlu, H., İşcen Karasu, F., Demir, Ş., & Akalın, S. (2014). Preschool teachers' level of knowledge about inclusion. *Educational Sciences in Theory and Practice, 14(4)*, 1467-1485.
- Tutuk, H. C. (2020). *Family participation in the support service process in the pre-school period in a special special education and rehabilitation centre: A child with hearing loss and his family* [doctoral dissertation], Anadolu University, Eskişehir.
- Wolery, M., Anthony, L., & Heckathorn, J. (1998). Transition-based teaching: Effects on transitions, teachers' behaviour, and children's learning. *Journal of Early Intervention, 21(2)*, 117-131.


The Effect of Augmented Reality Applications on Students' Mathematics Achievement: A Meta-Analysis Study

Research Article

Filiz ELMALI¹, Oguzhan OZDEMIR², Hatice CITAK³

¹Firat University, Faculty of Education, Department of Educational Educational Science, Elazığ, Türkiye  0000-0002-5060-7383

²Firat University, Faculty of Education, Department of Educational Basic Education, Elazığ, Türkiye  0000-0002-5310-6605

³Firat University, Faculty of Education, Department of Educational Basic Education, Elazığ, Türkiye  0009-0006-3430-8929

To cite this article: Elmali, F., Ozdemir, O., & Citak, H. (2023). The effect of augmented reality applications on students' mathematics achievement: A meta-analysis study. *International Online Journal of Educational Sciences*, 15(5), 987-995.

ARTICLE INFO

Article History:

Received: 12.08.2023

Available online:
19.12.2023

ABSTRACT

Augmented Reality (AR) applications, which provide the opportunity to see the real world together with virtual objects, are widely used in education as in many other fields. In the literature, it is seen that different results are obtained in different studies examining the effects of AR applications on students' academic achievement in various fields. In this particular study, the effect of using AR applications on students' academic achievement in mathematics was examined using the meta-analysis method, which is defined as bringing together numerical data obtained from many independent studies. A total of 14 studies conducted between 2000 and 2023 were included in the research. The results show that AR applications have a great impact on students' academic achievement.

© 2023 IOJES. All rights reserved

Keywords:

Mathematics, Augmented Reality, academic achievement, meta-analysis

Introduction

Developments in technology affect every area of human life. With these developments, a variety of applications have begun to become part of human life, from the simplest areas to the most complex areas. One of these applications is Augmented Reality (AR) applications, which is an extension of virtual reality that allows an individual to experience a semi-real environment based on simulation (Bujak et al., 2013). The AR applications enable the interaction of real and digital objects (Azuma, 1997; Billinghurst, 2002; Chinar & Akgün, 2015). Today, we observe the increasing use of AG applications in education. Due to its abstract structure, mathematics is one of the difficult areas for students to understand. Abstract concepts of

¹Corresponding author's address: Firat Üniversitesi
e-mail: filizvarol@gmail.com
DOI: <https://doi.org/10.15345/iojes.2023.05.007>

mathematics must therefore be embodied in order for students to learn mathematics. The literature suggests the use of AR applications in teaching and learning mathematics (Alves vd., 2017; Bujak et al., 2013; Coimbra vd, 2015; Ince, 2023; Schnabel & Kvan, 2003; Schutera & al., 2021). The aim of this study is to examine the overall impact of the use of AR practices in mathematics courses on students' academic achievements through meta-analysis.

The existing meta-analysis studies focusing on the effect of AR on academic achievement (Batdı & Talan, 2019; Dikmen & Bahadır, 2021; Küçük Avcı, 2018; Özdemir et al., 2018) reported a moderate effect on academic achievement. The main difference among these studies is their moderator variables. Küçük Avcı (2018) examined the effectiveness of 3D virtual environments and augmented reality applications on academic achievement. The study found that 3D virtual environments and AR applications have a moderate impact, while AR technology had a greater impact on academic achievement compared to 3D digital environments. In another study, the learning area, the grade level, the device used to display AR applications, and the sample size were chosen as moderator variables (Özdemir et al., 2018). The results revealed that while the device in which AR applications were displayed made a significant difference, the learning area, sample size, and grade level were not effective variables. Specifically, in terms of sample size, groups with large sample size were moderately affected by AR while groups with small sample size were affected at minimal level. A study conducted by Batdı and Talan (2019) examined grade level and the duration of AR-based implementation as moderator variables and reported a moderate and positive effect of AR on students' academic achievement. Dikmen and Bahadır (2021), in their meta-analysis study, considered the grade level, course, the year in which the implementation was held, and the publication year as a moderator variable. The researchers revealed that AR practices have a wide-ranging impact on students' academic achievements. Although the level of impact varied significantly depending on the course in which the AR was used, similar variation was not observed for the other moderator variables. In their meta-analysis study, Kalemkus and Kalemkus (2021) examined the impact of the use of AR applications on students' academic achievement in science education. They found that the use of AR applications had a moderate impact on students' academic achievement in science lessons.

The discussed meta-analysis studies examined the effect of AR applications on students' academic achievement for various courses. However, the researchers of the present study did not found any meta-analysis study focusing on the effect of AR on students' academic achievement only in mathematics. Therefore, this study fills this gap in the literature. The following research question for this particular study is proposed:

RQ: What is the overall effect of augmented reality applications on students' academic achievement in mathematics?

Method

In this study meta-analysis study, the main goal was to examine the studies focusing on AR applications in teaching and learning mathematics. Studies published from January 2000 to September 2023 were identified from the DOAJ, Web of Science, Scopus, and Council of Higher Education Thesis Center. These databases were chosen because they are frequently used in the education field and provide electronic access to all studies. The keywords were "augmented reality AND mathematics." The first search was conducted on July 10 2023 and the last one was conducted on September 30 2023. A total of 137 studies were yielded based on the keywords.

Criteria for inclusion and exclusion

The inclusion and exclusion criteria are provided below:

1. Studies published between 2000 and 2023 were chosen because of the increase in the use of AR applications in education in the 2000s.

2. Dissertations/thesis, which were also published as article, were dropped from the list and only the related article were included.
3. Full texts of articles should be available through the aforementioned databases.
4. The studies should be designed by using quantitative research models.
5. The studies should be experimentally designed in order to calculate the effect size.
6. The studies should include control and experimental groups.
7. The studies should include descriptive numerical data (i.e., sample size, average, and standard deviation) for both control and experimental groups.

Procedures

The first search was conducted by using the keywords, which yielded 137 articles in total. Those articles were examined by the researchers individually and the ones that did not meet the inclusion and exclusion criteria were excluded from the list, which left 14 articles. The descriptive information about those articles are provided in Table 1.

Table 1. Descriptive information about the studies

Variables		f
School levels	Early childhood	0
	Elementary school	3
	Middle school	10
	High school	1
Publication year	2020 and earlier	4
	2021 and after	10
Publication type	Thesis/dissertation	4
	Article	10
Subject area	Mathematics	5
	Geometry	9
Sample size	1-30	1
	31-60	6
	61-90	4
	91<	3
Duration of implementation	1-5 weeks	10
	6-10 weeks	4

Among those articles, two of them included more than one variable. Therefore, they were considered separate articles, which means that the analysis of the current study was conducted by using data from 18 studies. The information about those articles are below.

- Hwang et al. (2023), this study examined the effect of AR applications on students' academic achievement in four different mathematical concepts. Therefore, the data was coded as four different studies.
- Bhagat et al. (2021), this study used two different experimental groups and obtained data related to students' mathematical achievement for both groups. Therefore, the data was coded as two different studies.

For this particular study, students' academic achievement in mathematics was considered as dependent variable while the use of AR was considered as independent variable. The data obtained in this study were analyzed using the Comprehensive Meta-Analysis (CMA) package program. The statistical data was first processed in the Microsoft Excel 2010 Office program before the use of the CMA program. In order to

determine effect sizes, Hedge’s g was used. For the interpretation, an effect size of the following range of criteria proposed by Cohen (1988) were taken into account (Table 2).

Table 2. Categorization of effect size

-0.15-0.15	Very low
0.15 -0.40	Low
0.40 -0.75	Moderate
0.75 -1.10	High
1.10 -1.45	Very high
1.45<	Perfect

Findings

This section presents the findings of the meta-analysis on the use of AR applications in mathematics classes. The problem of the research is “What is the overall effect of augmented reality applications on students’ academic achievement in mathematics?” In order to answer this question, analyzes were conducted on the studies included in the study. Effect sizes of the studies were calculated using Hedges' g value, homogeneity test was performed, and random effects model was used.

Calculation of the Effect Sizes

In order to obtain the overall effect size in meta-analysis studies, the effect size of each study needs to be calculated. Table 3 provides the effect sizes and the other statistics for all 18 studies.

Table 3. Descriptive statistics of the eligible studies

Studies	Statistics in the Studies						
	Hedges’g	Standard error	Variance	Lower limit	Upper limit	Z Score	P Value
Akkuş-2021	1,933	0,369	0,136	1,209	2,656	5,238	0,000
Canbaz-2023	0,790	0,265	0,070	0,271	1,309	2,983	0,003
Çetintav ve Yılmaz-2023	0,987	0,329	0,108	0,342	1,632	3,000	0,003
1-Hwang vd.-2023	-0,077	0,279	0,078	-0,623	0,469	-0,277	0,782
2-Hwang vd.-2023	0,375	0,281	0,079	-0,175	0,926	1,336	0,181
3-Hwang vd.-2023	1,052	0,298	0,089	0,469	1,635	3,535	0,000
4-Hwang vd.-2023	0,261	0,280	0,078	-0,287	0,809	0,934	0,350
Cai vd.-2020	0,530	0,244	0,060	0,051	1,008	2,169	0,030
Tosik Gün and Atasoy_2017	0,373	0,222	0,049	-0,063	0,808	1,678	0,093
Bilgin and Hızircı_2022	1,065	0,282	0,079	0,513	1,617	3,782	0,000
Palancı_2023	0,596	0,210	0,044	0,182	1,006	2,826	0,005
Akın-2022	1,817	0,326	0,106	1,178	2,456	5,571	0,000
Aldalalah-2019	0,663	0,220	0,048	0,232	1,093	3,017	0,003
Koparan vd.-2023	1,791	0,238	0,057	0,324	2,228	7,522	0,000
Poçan vd.-2022	0,695	0,239	0,057	0,227	1,113	2,912	0,004
Del Cerro Velázquez ve Mendez-2021	0,539	0,289	0,084	-0,028	1,106	1,862	0,063
1-Bhagat vd.-2021	1,118	0,504	0,254	0,200	2,176	2,356	0,018
2-Bhagat vd.-2021	0,405	0,444	0,197	-0,464	1,275	0,914	0,361
Total	0,811	0,127	0,016	0,563	1,060	6,390	0,000

As seen in Table 3, 18 data from 14 studies involving 1,034 participants were examined in order to determine the effect of AR applications on students' academic achievement in mathematics. The standardized effect size values range from -0,077 to 1,933 and the overall effect size was calculated as 0,811. Among the studies, twelve of these data were statistically significant ($p < 0.05$), while six of them did not show a significant difference ($p > 0.05$).

Homogeneity Test Results of the Studies

In order to determine the effect model to be used in the interpretation phase of meta-analysis studies, it is examined whether the studies included in the analysis have a homogeneous distribution (Şen and Yıldırım, 2020). When there is a homogeneous distribution in the study, a fixed effects model is used. In cases where the distribution is not homogeneous, the distribution is considered heterogeneous and the random effects model is used in the analysis (Ellis, 2010). For this purpose, I^2 , p , and Q values were examined (Table 4)

Table 4. Homogeneity test results

Q Value	Df(Q)	p Value	I^2
62,788	17	0,000	72,925

As seen in the table, I^2 was high (72,925) and p was significant. In addition, the Q value was 62.788. It is higher than the value of 27.585, which corresponds to 17 degrees of freedom in the chi-square table. The homogeneity test revealed that there was a significant difference between the effect sizes of the studies examining the effects of AR applications on students' mathematics achievement ($Q = 62.788$; $p = 0.00$). Accordingly, it was concluded that the data did not show a homogeneous distribution and therefore was heterogeneous.

Random Effects Analysis

In this study, effect size, standard error, lower and upper limit values, z score and p value were examined according to the random effects model.

Table 5. Random effects analysis results

Studies	Effect Size	Standard Error	Variance	Lower limit	Upper limit	Z Score	p Value
Random Effects Model	0,811	0,127	0,016	0,563	1,060	6,390	0,000

As seen in the table, the data of 14 studies included in the meta-analysis were analyzed based on the random effects model. The standard error of 0.127 and the upper limit of the 95% confidence interval were calculated as 1.060 and the lower limit was 0.563, and the effect size value was determined as 0.811. Z value was 6.390 and p value was 0.000 ($p < 0.05$) and was found to be statistically significant.

Discussion and Conclusion

The study aims to identify the effect of the use of AG applications on students' academic achievement in mathematics. To this end, the following research question was proposed: "What is the overall effect of augmented reality applications on students' academic achievement in mathematics?" A total of 14 studies were included in this meta-analysis study. In order to decide the effect model, homogeneity test was conducted. The result revealed that the data set had heterogeneous characteristics ($Q = 62.788$, $p = .00$). Therefore, random-effects model was used. In order to calculate general effect sizes within the scope of meta-analysis, the data of 14 studies were analyzed separately and the Hedges' g value of each study was calculated.

To calculate the overall effect size of the studies, the effect size of 14 studies was taken as basis and as a result, the overall effect size of the study was calculated as $d = 0.811$. It was determined that the overall effect

size had a large effect size according to Cohen's (1988) classification. In other words, the use of AR applications in mathematics courses had a statistically significant effect on students' academic achievement. This finding is supported by the other studies focusing on the effects of AR applications on students' academic achievement in mathematics (Arvanitaki & Zaranis, 2020; Palancı, 2023; Sun & Chen, 2019, 2020; Yu, Liao & Wu, 2016) as well as in other academic areas (Akkuş, 2021; Altıok, 2020; Canbaz, 2023; Cai et al., 2020; Chang & Liu, 2013; Coşkun, 2019; Demirel, 2019; Ersoy et al., 2016; Gümbür, 2019; Hsiao et al., 2016; Gün, 2014; Küçük, 2015; Küçük et al., 2014; Küçük et al., 2016; Özdemir & Özçakır, 2019; Özçakır, 2017; Solak & Çakır, 2016).

In this study, the overall effect of AR applications on students' academic achievement in mathematics is discussed. Future studies may use various moderator variables (i.e., attitudes, motivation, and anxiety). This study also did not include any demographic variables as moderator variable (i.e., publication year, grade level, education level). Therefore, these variables may be included in future studies. In terms of education level, it is observed that while there is no study conducted at early childhood level, the number of studies using AR applications in mathematics courses at high school level is low. More research is needed for these education levels. Another limitation of the current study is the four databases that the eligible articles were reached through. Other databases can be searched for more comprehensive data analysis. Since the use of AR applications in education is increasing, more meta-analysis studies can be conducted by adding new study findings in the coming years. The results obtained from this particular study can be compared and discussed with the results of the new studies.

REFERENCES

- Akın, Ö. (2022). Artırılmış Gerçeklik Uygulamaları ile Düzenlenmiş Etkinliklerin 4. Sınıf Öğrencilerinin Matematik Dersi Akademik Başarılarına Etkisi.
- Akkuş, A. (2021). Matematik Eğitiminde Mobil Cihazlarda Yer Alan Artırılmış Gerçeklik Uygulamalarının Ortaokul 8. Sınıf Öğrencilerinin Akademik Başarı Ve Motivasyonlarına Etkisi.
- Aldalalah, O., Ababneh, Z. W. M., Bawaneh, A. K., & Alzubi, W. M. M. (2019). Effect of Augmented Reality and Simulation on the Achievement of Mathematics and Visual Thinking Among Students. *International Journal of Emerging Technologies in Learning*, 14(18), 164–185. <https://doi.org/10.3991/ijet.v14i18.10748>
- Altıok, S. (2020). Artırılmış Gerçeklik Destekli Simetri Öğretiminin İlkokul Öğrencilerinin Akademik Başarılarına Etkileri ve Öğrenci Görüşleri. *Eğitim Teknolojisi Kuram ve Uygulama*, 10(1), 177–200.
- Alves, B., Dias, D. R. C., Borges, S. d. S., Durelli, V. H. S., Bressan, P. A., Martins, V. F., & de Paiva Guimarães, M. (2017). On capitalizing on augmented reality to impart solid geometry concepts: An experimental study. *Universal Access in Human-Computer Interaction. Designing Novel Interactions*. 105-117. https://doi.org/10.1007/978-3-319-58703-5_8
- Arvanitaki, M., & Zaranis, N. (2020). The use of ICT in Teaching Geometry In Primary School. *Education and Information Technologies*, 25(6), 5003-5016. <https://doi.org/10.1007/s10639-020-10210>
- Azuma, R. (1997). A Survey of Virtual Reality. *Presence: Teleoperators and Virtual Environments*, 6(4), 355-385.
- Batdı, V., & Talan, T. (2019). Augmented Reality Applications: A Meta-Analysis and Thematic Analysis. *Turkish Journal of Education*, 8(4), 276–297. <https://doi.org/10.19128/turje.581424>
- Bhagat, K. K., Yang, F. Y., Cheng, C. H., Zhang, Y., & Liou, W. K. (2021). Tracking The Process and Motivation of Math Learning With Augmented Reality. *Educational Technology Research and Development*, 69(6), 3153–3178. <https://doi.org/10.1007/s11423-021-10066-9>
- Bilgin, E. A., & Hızarcı, S. (2022). Artırılmış Gerçeklik Destekli Mobil Öğretimin Lise Öğrencilerinin İstatistiğe Yönelik Başarılarına ve Teknolojiye Yönelik Tutumlarına Etkisinin İncelenmesi. *Turkish Studies-Educational Sciences*, Volume 17(Volume 17 Issue 1), 23–47. <https://doi.org/10.7827/turkishstudies.52138>
- Billinghamurst, M. (2002). Augmented Reality in Education. *New Horizons for Learning*.
- Bujak, K. R., Radu, I., Catrambone, R., MacIntyre, B., Zheng, R., & Golubski, G. (2013). A psychological perspective on augmented reality in the mathematics classroom. *Computers and Education*, 68, 536–544. <https://doi.org/10.1016/j.compedu.2013.02.017>
- Cai, S., Liu, E., Shen, Y., Liu, C., Li, S., & Shen, Y. (2020). Probability learning in mathematics using augmented reality: impact on student's learning gains and attitudes. *Interactive Learning Environments*, 28(5), 560–573. <https://doi.org/10.1080/10494820.2019.1696839>
- Canbaz, B. (2023). Mobil Artırılmış Gerçeklik Teknolojisi İle Yapılan Matematik Öğretiminin Ortaokul Öğrencilerinin Tutumlarına Ve Akademik Başarılarına Etkisi.
- Chang, Y. H. & Liu, J. (2013). Applying an AR Technique to Enhance Situated Heritage Learning in a Ubiquitous Learning Environment. *TOJET: The Turkish Online Journal of Educational Technology*, 12(3), 21-32.
- Cohen, J. (1988). *Statistical Power Analysis For The Behavioral Sciences*. New York: Academic Pres.
- Cohen, L., & Manion, L. (2001). *Research Methods İn Education* (5th ed.). New York: Rotledge Falmer.

- Coimbra, M. T., Cardoso, T., & Mateus, A. (2015). Augmented reality: An enhancer for higher education students in math's learning?. *Procedia Computer Science*, 67, 332-339. <https://doi.org/10.1016/j.procs.2015.09.277>
- Çetintav, G., & Yılmaz, R. (2023). The Effect of Augmented Reality Technology on Middle School Students' Mathematic Academic Achievement, Self-Regulated Learning Skills, and Motivation. *Journal of Educational Computing Research*. <https://doi.org/10.1177/07356331231176022>
- Çınar, D., & Akgün, Ö. E. (2015). Ders Kitabı Tasarımında Artırılmış Gerçeklik Kullanımı: Bir İngilizce Ders Kitabı Bölümü Örneği. *Sakarya Üniversitesi*, 98-103.
- Del Cerro Velázquez, F., & Méndez, G. M. (2021). Application In Augmented Reality For Learning Mathematical Functions: A Study For The Development Of Spatial Intelligence In Secondary Education Students. *Mathematics*, 9(4), 1-19. <https://doi.org/10.3390/math9040369>
- Dikmen, M., & Bahadır, F. (2021). Artırılmış Gerçekliğin Öğrencilerin Akademik Başarıları Üzerindeki Etkisinin Meta Analizi. *EKEV AKADEMİ DERGİSİ*, 25(85), 283-300.
- Diñer, S. (2014). Eğitim Bilimlerinde Uygulamalı Meta-Analiz (1. Baskı). Ankara: Pegem Akademi.
- Ellis, P. D. (2010). The Essential Guide to Effect Sizes. Statistical Power, Meta-Analysis, and The Interpretation of Research Result. New York: Cambridge University Press.
- Ersoy H., Duman, E. ve Öncü, S. (2016). Artırılmış Gerçeklik ile Motivasyon ve Başarı: Deneysel Bir Çalışma. *Journal of Instructional Technologies & Teacher Education*, 5(1), 39-44.
- Gün, E. (2014). Effects of Augmented Reality Applications on Students' Spatial Abilities, (Unpublished Master Thesis), Gazi Üniversitesi, Ankara.
- Hsiao, H. S., Chang, C. S., Lin, C. Y., & Wang, Y. Z. (2016). Weather observers: a manipulative augmented reality system for weather simulations at home, in the classroom, and at a museum. *Interactive Learning Environments*, 24(1), 205-223.
- Hwang, W. Y., Nurtantyana, R., Purba, S. W. D., Hariyanti, U., & Suprpto. (2023). Augmented Reality with Authentic GeometryGo App to Help Geometry Learning and Assessments. *IEEE Transactions on Learning Technologies*, PP, 1-11. <https://doi.org/10.1109/TLT.2023.3251398>
- İnce, Ö. (2023). Artırılmış Gerçeklik İle Düzenlenen Öğretim Tasarımının 6.Sınıf Geometrik Cisimler Konusunun Öğretiminde Uygulanması.
- Kalemkuş, J., & Kalemkuş, F. (2022) Fen Eğitiminde Artırılmış Gerçeklik Uygulamalarının Kullanımının Öğrencinin Akademik Başarısına Etkisi: Meta Analiz İncelemesi, Etkileşimli Öğrenme Ortamları, DOI: 10.1080/10494820.2022.2027458
- Koparan, T., Dinar, H., Koparan, E. T., & Haldan, Z. S. (2023). Integrating augmented reality into mathematics teaching and learning and examining its effectiveness. *Thinking Skills and Creativity*, 47(January), 101245. <https://doi.org/10.1016/j.tsc.2023.101245>
- Küçük Avcı, Ş. (2018). Üçboyutlu Sanal Ortamlar Ve ArtırılmışGerçeklik Uygulamalarının Öğrenme BaşarılarıÜzerindekiEtkisi: Bir MetaAnaliz Çalışması.
- Küçük, S. (2015). Effects of Learning Anatomy Via Mobile Augmented Reality on Medical Students' Academic Achievement, Cognitive Load, And Views Toward Implementation. Unpublished doctoral dissertation, Atatürk University, Erzurum.
- Küçük, S., Yılmaz, R. M., & Göktaş, Y. (2014). İngilizce Öğreniminde Artırılmış Gerçeklik: Öğrencilerin Başarı,


Tutum ve Bilişsel Yük Düzeyleri. *Eğitim ve Bilim*, 39(176), 393-404.

- Küçük, S., Kapakin, S., & Göktaş, Y. (2016). Learning Anatomy via Mobile Augmented Reality: Effects on Achievement and Cognitive Load. *Anatomical Sciences Education*, 9(5), 411-421.
- Özçakır, B. (2017). Fostering Spatial Abilities of Seventh Graders through Augmented Reality Environment in Mathematics Education: A Design Study, Orta Doğu Teknik Üniversitesi, Ankara.
- Özdemir, D., & Özçakır, B. (2019). An Analysis of the Effects Of Augmented Reality Activities İn Teaching Fractions on 5th Grade Students' Math Achievement and Attitudes. *Adıyaman Üniversitesi Eğitim Bilimleri Dergisi*, 9(1), 21– 41. <https://doi.org/10.17984/adyuebd.495731>
- Özdemir, M., Şahin, C., Arcagök, S., & Demir, M. K. (2018). Öğrenme Sürecinde Artırılmış Gerçeklik Uygulamalarının Etkililiği: Bir Meta-Analiz Çalışması. *Eğitim Araştırmaları - Eurasian Journal of Educational Research*, 2018(74), 165–186. <https://doi.org/10.14689/ejer.2018.74.9>
- Palancı, A. (2023). Ortaokulda Artırılmış Gerçeklik Destekli Matematik Öğreniminin Başarı, Kalıcılık, Motivasyon Ve Kaygıya Etkisi. 2023.
- Poçan, S., Altay, B., & Yaşaroğlu, C. (2022). The Effects of Mobile Technology on Learning Performance and Motivation in Mathematics Education. *Education and Information Technologies*, 28(1), 683–712. <https://doi.org/10.1007/s10639-022-11166-6>
- Schnabel, M. A., Kvan, T. (2003). Spatial understanding in immersive virtual environments. *International Journal of Architectural Computing*, 1(4), 435-448.
doi: 10.1260/147807703773633455
- Schutera, S., Schnierle, M., Wu, M., Pertz, T., Seybold, J., Bauer, P., Teutscher, D., Raedle, M., Heß-Mohr, N., Röck, S., & Krause, M. J. (2021). On the Potential of Augmented Reality for Mathematics Teaching with the Application CleARmaths. *Education Sciences*, 11(8). <https://doi.org/10.3390/educsci11080368>
- Solak, E., & Çakır, R. (2016). Investigating the Role of Augmented Reality Technology in the Language Classroom. *Croatian Journal of Education*, 18(4), 1067-1085.
- Sun, K. T., & Chen, M. (2019). Utilizing free augmented reality app for learning geometry at elementary school in Taiwan: Take volumetric measurement of compound body for example. *International Journal of Distance Education Technologies*, 17, 36-53. <https://doi.org/10.4018/IJDET.2019100103>
- Sun, K. T., & Chen, M. H. (2020). Utilizing MAR for remedial teaching of compound-cubesurface area at elementary school in Taiwan. *International Journal of Information and Communication Technology Education (IJICTE)*, 16(2), 18-35. <http://doi.org/10.4018/IJICTE.2020040102>
- Şen, S. & Yıldırım, İ. (2020). CMA ile Meta-Analiz Uygulamaları. Anı yayıncılık
- Tosik Gün, E., & Atasoy, B. (2017). Artırılmış Gerçeklik Uygulamalarının İlköğretim Öğrencilerinin Uzamsal Yeteneklerine ve Akademik Başarılarına Etkisi. *Eğitim ve Bilim*, 42, 31–51. <https://tinyurl.com/2p86vb6b>
- Yu, C. H., Liao, Y. T., & Wu, C. C. (2016). Using augmented reality to learn the enumeration strategies of cubes [Paper presentation]. 2016 IEEE International Conference on Teaching, Assessment, and Learning for Engineering (TALE). <https://doi.org/10.1109/TALE.2016.7851832>

Commercialized History and Media in Türkiye: Prediction of University Students' Popular History Proneness

Research Article

Mehmet ELBAN¹

¹Bayburt University, Faculty of Education, Department of Educational Science, Elazığ, Türkiye  0000-0002-2764-3968

To cite this article: Elban, M. (2023). Commercialized history and media in Türkiye: Prediction of university students' popular history proneness. *International Online Journal of Educational Sciences*, 15(5), 996-1017.

ARTICLE INFO

Article History:

Received: 31.08.2023

Available online:
18.12.2023

ABSTRACT

Popular history products are increasingly and successfully used as a means to brand entertainment media. However, there is a significant gap in empirical researches which considers variables that affect popular history consumption. The current study builds on social identity theory, theory of curiosity, and parasocial interaction theory aims to identify the relationships amongst popular history consumption in written, visual, and social media, nationalism, conservatism, nostalgia, and curiosity. The current research is predictive correlational research. In terms of time, it is a cross-sectional study. Study 1 indicates that the PHPS scale may become an important instrument in future research. Study 2 indicates that curiosity, nostalgia proneness, conservatism, and nationalism were the main predictors of popular history consumption in the media. Also, the research revealed that nationalism was shown to be an important mediator between conservatism and popular history consumption in media. In this way, a model has been proposed to comprehend popular history consumption, which constitutes a crucial component of the media and culture industry.

© 2023 IOJES. All rights reserved

Keywords:

Popular history proneness, history education, media, nostalgia, nationalism-conservatism, curiosity and exploration.

Introduction

Popular history found new domains with the diversification of mass media in the second half of the 20th century. The old domains evolved into new forms, e.g. popular history magazines and books, TV programmes and series, movies, novels, documentaries and websites (Bozkurt & Bayındır, 2015; Haydn, 2015; Ata, 2000; Alaca, 2017). Another result of this diversification was the emergence of television and cinema as the culture industry's outstanding components. The demand for these visual industries gradually increased. They also heralded the popular history's golden age by providing it with the new domains to flourish (Konuk, 2017). The media has been the source of the need for a sense of history (Ma, 2001). Thus, the masses consume popular history to satisfy their emotional needs (Korte & Paletschek, 2014). In such an environment, the

¹Corresponding author's address: Bayburt Üniversitesi
Telephone: +905066861919
e-mail: melban111@gmail.com
DOI: <https://doi.org/10.15345/iojes.2023.05.008>

historical culture has spread to almost every corner of the world. History has been popularized in the world. History programs on television have become increasingly popular (Çencen & Şimşek, 2015; Bell & Gray, 2007).

Interest in history and its popularisation started in the 1980s and continued in the following decades in an upward trend (Korte & Paletschek, 2014). An example of this phenomenon is the increment in the numbers of TV programs which dealt with historical themes in Europe (Bell & Gray, 2007). While the TV series "Tudors" appealed to audiences all over the world, "The Magnificent Century" caught the attention of Turkish audiences (Konuk, 2017).

The trend towards historical movies and TV series started with the TV series "The Magnificent Century" as a popular history production in Türkiye. The number of historical serials is increasing day by day (Güngör, 2019). "Muhteşem Yüzyıl" (i.e., "The Magnificent Century" in English) series reached more than 500 million viewers in 70 different countries, and the "Resurrection Ertuğrul" series reached approximately 1 billion viewers in 71 different countries (Karahana, 2018; Ustuk, 2019). These historical TV series draw inspiration from historical events and characters, crafting a fictionalized narrative (for accounts regarding historical fiction, see Saxton, 2020).

Despite such great interest, we still lack empirical studies and models dealing with popular history proneness. Studies on the concept of popular history were examined in the context of historical, historiography, culture (De Groot, 2016; Possamai, 2002), memory (Pozefsky, 2008; Şakrak, 2017), nostalgia and political propaganda (Çevik, 2019; Carney, 2018; Carney, 2019), education (Thorp, 2015), heritage, and identity (Wolff, 2020). As can be seen, these studies include certain dimensions.

Nostalgia proneness, which helps us to understand the consumption of individuals regarding the past, has been examined in the context of autobiographical past rather than the past of the nation. Few studies on historical films (Natterer, 2015) have failed to resolve the ambiguity of what kind of nostalgia is influential in the consumption of products related to the nation's past.

The effect of identities (nationalist, conservative) on popular history consumption in relation to nostalgia has generally been limited to review studies (Aditama, Rachmanti & Soekarba, 2019; Cetin-Erus & Erus, 2020; Chew, 2007; Boym, 2001). The nationalism and conservatism that account for popular history consumption have not yet been used in experimental studies (Beriş, 2010; Aydos, 2013; Carney, 2018; Carney, 2019). However, curiosity, which has a positive effect on popular history consumption, was not included in previous studies on the subject as a variable.

In addition to contributing to the elimination of the said uncertainty (which type of nostalgia is more effective in popular history consumption?), the current research contributes to the literature by examining identity (nationalism, conservatism, and nostalgia), curiosity, and popular history consumption with all their sub-dimensions. Moreover, it provides a more holistic understanding of the subject by developing a measurement tool that covers the consumption of popular history with all its dimensions (popular history consumption in written, visual and social media). More specifically, the current research is the first systematic attempt to empirically examine the relationships between identity, curiosity, and consumption of popular history.

Literature Review

The most used variable in explaining the interest in products reflecting the past is nostalgia. Nostalgia makes an important contribution to the explanations regarding the consumption of the products presented with the re-representation of the past (Carney, 2019). It is explained by the tendency of nostalgia in the consumption of products that appeal to the biographical past, especially in marketing and media studies (Chen, Yeh & Huan, 2014; Muehling & Sprott, 2004; Bambauer-Sachse & Gierl, 2009; Muehling & Pascal, 2012;

Marchegiani & Phau, 2011; Natterer, 2014). In some very few studies, personal and historical nostalgia has been found to be effective on historical films (Natterer, 2015). Explanations on popular history consumption with identity and nostalgia are based on Social Identity Theory (Sierra and McQuitty, 2007). Furthermore, positive correlations have been identified between historical nostalgia and purchase intention (Fariz & Putra, 2020). Some studies have drawn attention to the relationships between TV series and nostalgia, heritage, identity, and the history of places (Mahoney, 2022; Kim et al. 2019; Metaveevini, 2019; Lekngam, 2019). According to the studies conducted on the subject, Turkish historical TV series (Brileva, 2023; Karahan, 2018; Ustuk, 2019; Özalpman & Sarikakis, 2018; Kesirli Unur, 2020) as well as historical TV series from other countries (Fiorentino et al., 2021), have garnered significant attention both at national and global levels.

The identity (nationalism, conservatism) dimension contributed significantly to the explanations of popular history consumption. Accordingly, nostalgia proneness accompanying nationalist and conservative identities positively affects the consumption of nation histories (Xue & Almeida, 2011; Kalinina & Menke, 2016; Romanovska, 2020). Some studies have revealed that historical TV series serve political purposes (Carney, 2019; Mullin, 2019; Ahmed & Panetta, 2023). On the other hand, some studies have focused on the debates surrounding factual inaccuracies in historical TV series (McCann, 2019). Furthermore, historical TV series have been examined in terms of the roles of female characters, gender stereotypes, and post-feminist media culture (Donstrup, 2019; Lozano, 2020; Primorac, 2018)

However, some review studies have indirectly shown us that curiosity can be effective in popular history consumption. Accordingly, popular history products positively affect the consumption of curious readers, followers, and audiences by offering mysterious, interesting, and interesting environments (Donnelly, 2014; Bell & Gray, 2007; Glaser, 2015; Korte & Paletschek, 2014).

Theoretical Background and Research Hypotheses

In the current study, some theories were used to explain popular history consumption. The first theory on which current research is based is "Social Identity Theory". "Social Identity Theory" is an individual's identification with a group of similar individuals (in-group). In-group influences the behavior and preferences of the individual. In addition, in this definition, the individual sees his group (in-group) as superior to other groups (out-group) (Tajfel and Turner 1985; Tajfel, 1978; Tajfel, 1981). Social Identity Theory provides an effective projection for understanding consumption of popular history, which includes elements of nostalgia, nationalist identity, and conservative identity (Sierra and McQuitty, 2007). In this context, we can say that individuals with nationalist and conservative identities will be more interested in popular history products that nostalgically present the golden ages of these identities.

Another theory on which current research is based is Berlyne's "A theory of human curiosity". It is possible to mention several definitions of curiosity. "The urge to explore and discover" (Fitzgerald, 1999) and "the desire for acquiring new information" (Renner, 2006, p.305) are the prominent elements highlighted in these definitions of curiosity. From a theoretical perspective, curiosity is accounted for through drive-based and "information-gap" theories (Loewenstein, 1994; Berlyne, 1954, 1960). Furthermore, different types of curiosity can be discussed, such as epistemic, social, and entrepreneurial (Litman & Spielberg, 2003; Jeraj & Maric, 2013; Renner, 2006). However, further research is needed to operationalize and analyze the concept of curiosity effectively (McNary, 2023). Turning to the relationship between curiosity and the current study, we observe that popular history products provide exploratory environments. At this point, Berlyne's theory of curiosity suggests that curiosity is a prerequisite for exploratory behavior (Berlyne, 1954-1960). However, theoretically, there are two necessary conditions for perceptual and epistemic curiosity. The first of these is diversive exploratory behavior. "This state occurs in an under-stimulated state (e.g., boredom, wanting entertainment, or seeking a new experience)." Second condition is specific exploratory behavior. "This state occurs in an over-stimulated state when faced with inadequate information." (as cited in McNary, 2023).

Popular history TV series and films provide individuals with entertainment (diverse exploratory behavior) and specific knowledge about their ancestors or the past (specific exploratory behavior). Popular history products with mystery, adventure and interesting content attract the attention of audience, readers and followers with a high level of curiosity. Thus, individuals with a high level of curiosity will be more willing to explore the exploratory environments of popular history products. One way to explain the consumption of popular history in written, visual and social media is "Parasocial Interaction Theory". This theory refers to the symbolic relationship that the audience establishes with the media characters (Horton and Wohl, 1956). Based on this theory, we can say that nationalist-conservative individuals in Türkiye establish a symbolic relationship with the nationalist-conservative characters in historical films and tv series, and they will be more interested in these popular historical products. The theoretical background on which the present research is based is given in Figure 1.

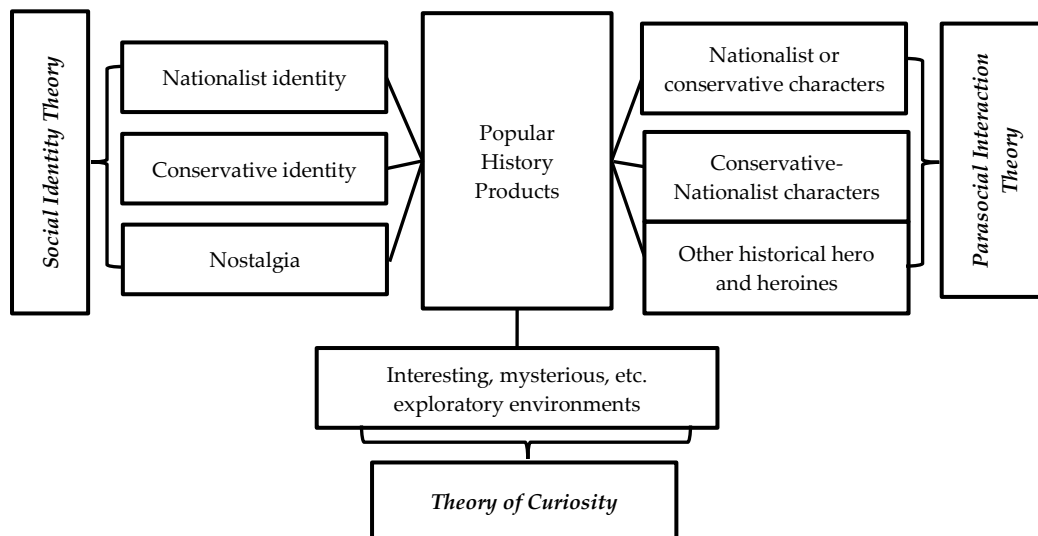


Figure 1. Theoretical background on popular history consumption

Also, a real photograph is presented in Figure 2 to support our theoretical background.



Figure 2. Curious audiences watching historical tv serials in nostalgic Turkish warrior wear "Alp".

Screens grabs from the webpage of the trthaber.com (Note: The editorial license of this photo has been purchased by the author from the Anatolian Agency)

Figure 2. shows us that curious audiences (Theory of Curiosity) are watching nationalist and conservative historical heroes (Social Identity Theory). They have interacted with the historical heroes in such a way that they watch the TV series (Parasocial Interaction Theory) by wearing old Turkish warrior wear.

Nostalgia

Nostalgia has many definitions. Srivastava et al. (2023) conducted a thematic analysis of definitions of nostalgia. According to this thematic analysis, nostalgia means “a yearning to recapture the positive emotional state of an idealized past through fond memories that are characterized by their ambivalent nature, though predominantly positive” (p.621). Even though there exists a singular definition for nostalgia, some scholars suggest utilisation of the concept’s dual definition based on personal and historical nostalgia (Marchegiani & Phau, 2010; Xue & Almeida, 2011; Yalçın & Elmas, 2017). In some studies, the concept of vicarious nostalgia is used instead of historical nostalgia (Stern, 1992; Merchant and Rose, 2013). It can be seen that there are different types of nostalgia (Baker & Kennedy, 1994; Stern, 1992). Furthermore, nostalgia is associated with the social identity (Sierra & McQuitty, 2007; Fariz & Putra, 2020; Chadborn & Reysen, 2018) and parasocial interaction theories (Myrick & Willoughby, 2019).

One of the more inclusive and commercialised qualities of popular history contents is the presentation of national histories as nostalgia and cultural heritage (Haydn, 2015). Also, nostalgia is one of the main tools of the cultural industry (Smith & Campbell, 2017). The television industry provides products with the themes of cultural heritage, nostalgia, national and other types of identities through popular history (De Baets, 2011; De Groot, 2016; Korte & Paletschek, 2014).

Nostalgic presentation of consumption-oriented history utilises roots and continuity (Taşkaya, 2013). It meets the needs for the continuation of the traditions and the values of the past (Xue & Almeida, 2011; Kalinina & Menke, 2016; Romanovska, 2020). Consequently, nostalgia becomes an important tool in constructing national memory and identity for the individuals who long for their common past and wish to establish connections with history (Kalinina & Menke, 2016).

A relationship exists between the past that consumers cannot directly experience and virtual/historical nostalgia. Through novels, historical writings and films, individuals get the chance to feel the distant past they have not experienced (Holak, et al., 2007). Audience vicariously participate in fictional worlds created by historical movies and TV series (Stern, 1992). Also, nostalgia proneness positively affects fantasies about past eras (Merchant & Rose, 2013). Thus, it was predicted that nostalgia would have positively significant effects on popular history proneness.

Hypothesis 1. Personal nostalgia proneness is positively related to popular history proneness.

Hypothesis 2. Interpersonal nostalgia proneness is positively related to popular history proneness.

Hypothesis 3. Virtual nostalgia proneness is positively related to popular history proneness.

Hypothesis 4. Cultural nostalgia is positively related to popular history proneness.

Nationalism and conservatism

As a feeling of aspiration to the golden past, nostalgia is a crucial element of conservative thought in Türkiye (Beriş, 2010; Yalçın & Elmas, 2017; Carney, 2019). Meanwhile, popular history products deal also with themes evoking nationalist sentiments (Vinterek, 2015). The essence of integrated and systematic nationalism and conservatism is the mystical romance centred on the soul (Beriş, 2010; Acar, 2018). Accordingly, popular history products dealing with national nostalgia, in a sense, appeal to nationalist and conservative identities simultaneously. Therefore, it is expected that individuals with nationalism and conservative identities are expected to consume popular history products.

Hypothesis 5. Nationalism is positively related to popular history proneness.

Hypothesis 6. Conservatism is positively related to popular history proneness.

Hypothesis 7. Conservatism is positively related to popular history proneness through nationalism.

Hypothesis 8. Conservatism is positively related to nationalism.

Curiosity and Exploration

Another quality of popular history products is that they appeal to curious audiences. For example, historical films are indispensable for enthusiasts due to their exciting and fascinating contents (Donnelly, 2014). It is argued that history is dealt with as a detective story in TV programs (Bell & Gray, 2007). In this way, popular history consumers are taken on a voyage in the fictional stories presented in popular history products (Glaser, 2015). Therefore, it can be argued that popular history meets the adventure needs of audiences (Korte & Paletschek, 2014). Thus, it was predicted that curiosity and exploration would have positively significant effects on popular history proneness.

Hypothesis 9. Curiosity and exploration is positively related popular history proneness.

Departing from the relevant literature, this study attempts to reveal the connections between popular history consumption and the university students' proneness such as conservatism, nationalism, nostalgia, curiosity and exploration. The conceptual model is presented in Figure 3.

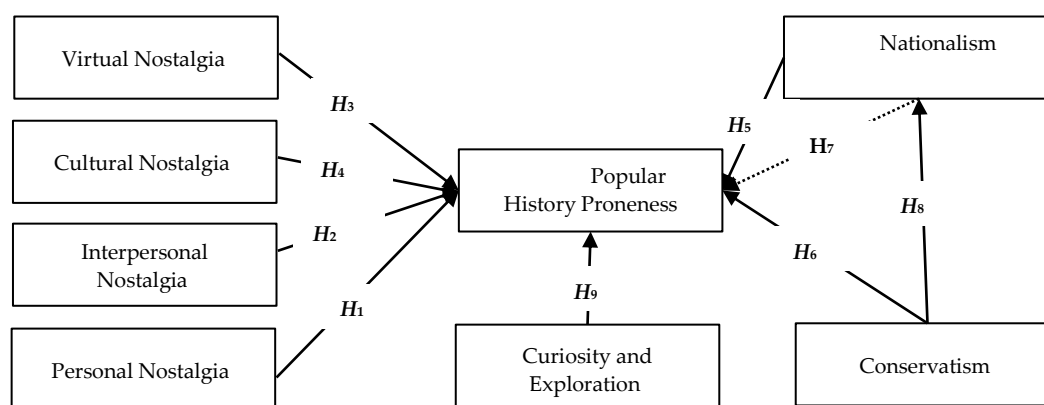


Figure 3. Conceptual (Hypothetical) model

Topics of Popular History and Consumption Platforms of Popular History

Traditional contents of popular history products include national histories, victorious commanders, military successes, wars, national heroes, great men and their biographies (Özcan, 2011; Haydn, 2015; De Groot, 2016). Newer elements have also joined the traditional ingredients of history recently. These are controversial topics, marginal histories, revisionist histories, rumours, conspiracy theories, and claims to reveal hidden facts (De Groot, 2016; Mencet & Ergin, 2018). Popular history platforms are movies and TV series, internet and social media, print products (News, magazines and novels). At the same time, popular historians have been a source in the production of popular history (Berger, 2014; De Groot, 2016; Poe, 2000; Mencet & Ergin, 2018; Korte & Paletschek, 2014; Bell & Gray, 2007; Konuk, 2017; Haydn, 2015; Lecker de Almeida & Bianchi, 2017).

Research Model

This study utilises predictive correlational research as a research model (Aksu, et al., 2017). In addition, this research is a cross-sectional study in terms of time. Cross-sectional studies are a type of research design that involves collecting relevant information (data) at a specific time. These studies aim to gather data from diverse participants to gain insights into a particular phenomenon or population at that specific moment (Kesmodel, 2018).

Study 1: Developing popular history proneness scale (PHPS)

The researcher has developed the Popular History Proneness Scale (PHPS) used in this study.

Population and Sample

The study sample consists of 304 university students in Türkiye, selected with the convenience sampling technique for EFA. Of the participants, 120 were male (39%), and 184 were female (61%). The ages of the participants vary between 18 and 25 (mean age: 20.92).

Transactions

The study drew on the three scholars' suggestions who have theoretical knowledge to ensure the scope and appearance validity of the PHPS. Complying with the recommendations received, one item from the internet and social media dimension, and two items from the reading and research dimension have been removed. After evaluating the scope and appearance validity, the final version of the scale contained 13-item Reading and Research, 6-item Internet and Social Media, 10-item nationalist-romantic TV series and movies, and 6-items Popular Historian dimensions.

Exploratory factor analysis (EFA)

Exploratory factor analysis of PHPS has been conducted employing the Principal Axis Factoring method. For the analysis, the Kaiser-Meyer-Olkin value has been found 0.906 and Bartlett's test significant ($p < 0.00$). The scale consists of thirty-five items. However, seven items have been removed from the scale as their total correlations were lower than 0.45. Items not contained by any factor or which overlap was eliminated and the exploratory factor analysis was reconducted. The final model consists of sixteen items in Likert-type and four sub-dimensions. Sub-dimensions are presented in Table 1.

Table 1. Variance ratios explained by the Sub-Dimensions of popular history proneness scale

Dimensions	Eigenvalue	Variance(%)	Cumulative Variance (%)
Popular History Proneness for reading and research	5.85	36.58	36.58
Popular History Proneness on the internet and social media	1.63	10.18	46.77
Popular History Proneness for watching nationalist-romantic TV series and cinema	1.13	7.11	53.88
Popular history proneness for popular historians	1.10	6.90	60.78

The variance ratios given in Table 1. are as follows: the first factor with an eigenvalue of 5.85 explains 36.58% of variance, the second factor with an eigenvalue of 1.63 explains 10.18% of variance, the third factor with an eigenvalue of 1.13 explains 7.11% of variance, and the fourth factor with an eigenvalue of 1.10 explains 6.90% of variance. The total sum of variance explained amounted to 60.78%. This result suggests that the factor structure of the scale is strong (Seçer, 2015).

Confirmatory factor analysis

After conducting EFA analysis, confirmatory factor analysis (CFA) was applied to the group of 343 data. First-order factor analysis is presented in Figure 4.

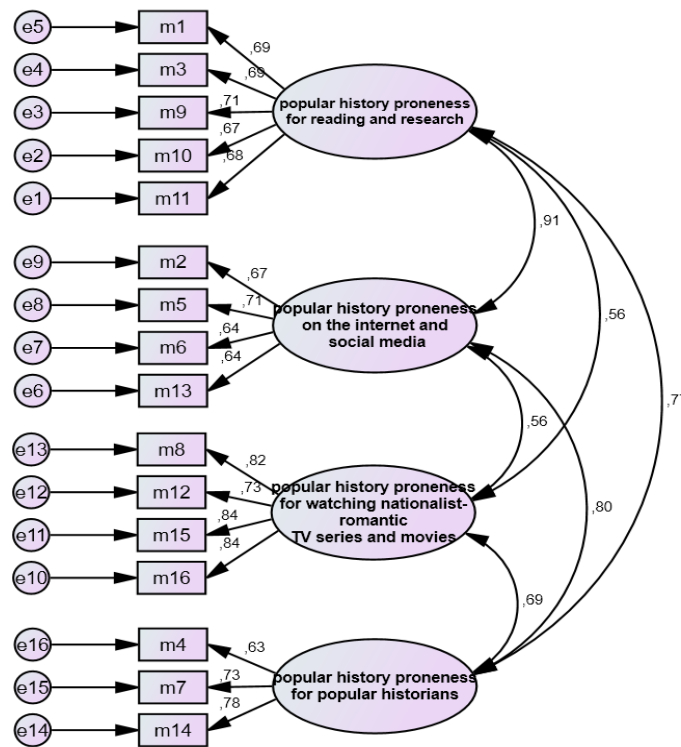


Figure 4. First-order factor analysis of the PHPS

As can be seen in Figure 3., goodness of fit values obtained as a result of the first-order confirmatory factor analysis have revealed that the proposed four-factor model is acceptable and fits the data $\chi^2 [98, N=343] = 245.727$; $p < 0.001$; $\chi^2/sd = 2.51$; $RMSEA = 0.07$; $SRMR = 0.05$ $GFI = 0.92$; $AGFI = 0.88$; $IFI = 0.94$; $NFI = 0.91$; $NNFI = 0.93$).

Besides, applying a second-order confirmatory factor analysis in scale construction studies is recommended in the literature (Seçer, 2015; Gürbüz, 2019). Second-order factor analysis is presented in Figure 5.

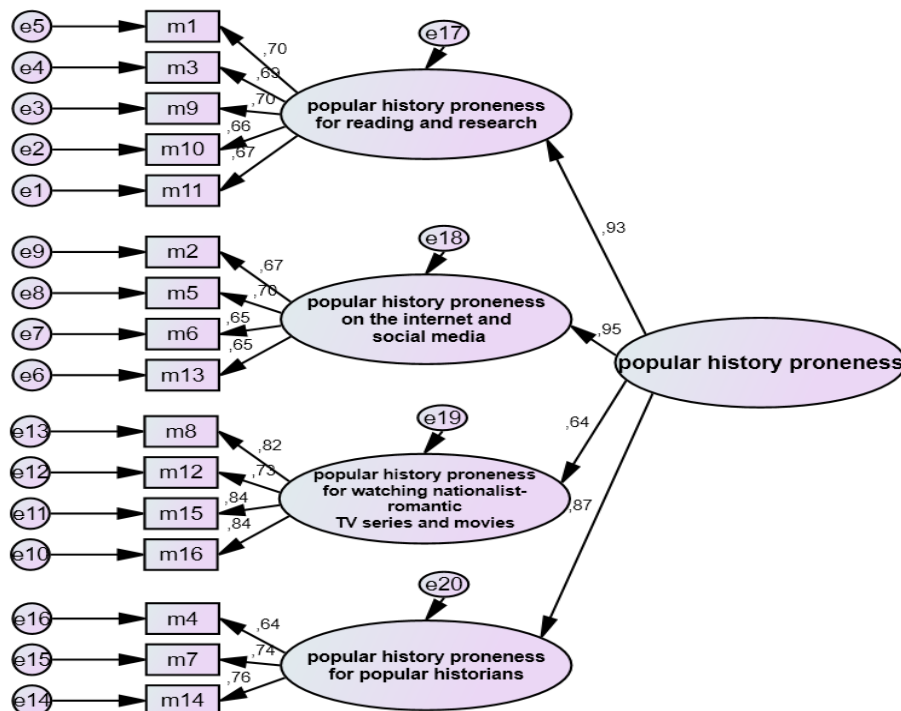


Figure 5. Second-order factor analysis of the PHPS

The second-order factor analysis values in Figure 4. show that the goodness of fit values are at an acceptable level and fit the data (χ^2 [100, N=343] = 267.965; $p < 0.001$; $\chi^2/sd = 2.68$; RMSEA=0.07; SRMR=0.05; CFI=0.93; GFI=0.91; AGFI=0.87; IFI=0.93; NFI=0.90; NNFI= 0.92). As both models' goodness of fit values are acceptable, first and second order models belonging to PHPS can be employed.

For whole PHPS, the Cronbach's alpha is ($\alpha=0.81$), while the Spearman-Brown two-half reliability coefficient ($\alpha=0.86$). Moreover, the test-retest coefficient of the PTES performed with a two-weeks interval is ($\alpha=0.89$). For the scale's sub-dimension "Reading and Research", the internal consistency coefficient has been detected as ($\alpha=0.81$); the split-half reliability coefficient ($\alpha=0.78$); and the test-retest coefficient ($\alpha=0.85$). Regarding the internet and social media sub-dimension, the internal consistency coefficient is determined as ($\alpha=0.76$); split-half reliability coefficient ($\alpha=0.77$); and the test-retest reliability coefficients ($\alpha=0.71$). On the other hand, for the nationalist-romantic TV series and movies sub-dimension, the internal consistency coefficient is determined as ($\alpha=0.88$); split-half reliability coefficient ($\alpha=0.91$); and the test-retest coefficient ($\alpha=0.74$). Finally, for the popular historians sub-dimension, the internal consistency coefficient is determined as ($\alpha=0.75$); the split-half reliability coefficient ($\alpha=0.70$); and the test-retest reliability coefficient ($\alpha=0.78$). Departing from the fact that different reliability coefficients have been obtained, the study suggests that the PHPS has proved sufficient reliability (Seçer, 2015; Kartal & Bardakçı, 2019).

Convergent validity and discriminant validity

In the dimension of Nationalist-Romantic TV Series and Movies and Popular Historians, AVE values belonging to PHPS are above 0.50 (0.654; 0.511), while being very close to 0.50 in Reading and Research and Internet and Social Media dimension (0.470; 0.444). Nevertheless, as suggested, all CR values exceed 0.70 and AVE values. Therefore, it can be observed that the PHPS meets the CR values complying with convergent validity and approximates the expected values in AVE on a large scale. Indeed, Fornell and Larcker (1981) argues that convergent validity is still sufficient when the AVE is less than 0.5 and the CR is higher than 0.6 (as cited in Shah, Larson and Denton III, 2019). All AVE values belonging to the factors are greater than the square of the correlation coefficient among factors (AVE= 0.44 > 0.08; AVE= 0.65 > 0.04; AVE= 0.65 > 0.03; AVE= 0.51 > 0.06; AVE= 0.51 > 0.06; AVE= 0.51 > 0.05). Finally, the study's findings show that PHPS has obtained both convergent and discriminant validity (Kartal & Bardakçı, 2019).

PHPS Criterion Validity

The correlations between the PHPS and History Lesson Attitude Scale (HLAS) (Safran, 2006), which is considered the most related to PHPS, have been analysed to examine the criterion-related validity. While the HLAS's total score with PHPS has been determined as ($r=0.52$, $p < 0.01$), its scores with PHPS sub-dimensions have been detected as follows: ($r=0.44$, $p < 0.01$) with the reading and research sub-dimension, ($r=0.28$, $p < 0.01$) with the internet and social media sub-dimension, ($r=0.41$, $p < 0.01$) with the nationalist-romantic TV series and movies sub-dimension, and finally ($r=0.59$, $p < 0.01$) with the popular historians sub-dimension, proving the existence of significant positive relationships among them.

Study 2: Prediction of the Popular History Proneness

Population and Sample

Since the current study is cross-sectional, the research data is also cross-sectional. The research population consists of 378 university students. The current investigation adhered to the guidelines outlined in the Declaration of Helsinki and obtained approval from the ethics committee of Bayburt University (The committee's reference number: 01.29.2021, E-79126184-050.99-3830). The study has utilised the convenience sampling technique during the data collection. The data of 35 participants were not evaluated since they did not meet the assumption of multivariate normal distribution. Thus, the final data set has included 343

participants. Regarding the gender ratio, while 270 (79%) of the participants are female, 73 (21%) of them consisted of male students. The ages of the participants vary between 18 and 26 (mean age: 20.64).

Data collection tools

Popular history proneness scale (PHPS)

Information about the scale developed by the researcher is given above.

Curiosity and exploration inventory-II (CEI-II)

The Curiosity and Exploration Inventory-II (CEI-II), developed by Kashdan et al., (2009) and adapted to Turkish culture by Acun, Kapıkıran & Kabasakal (2013), is used to measure the curiosity and exploration levels of the students participating in the study.

The index of nostalgia proneness

The scale was developed by Havlena & Holak (2000) and is utilised to measure the participants' nostalgia proneness in this study. The scale was adapted to Turkish culture by Özhan and Altuğ (2017). The score that the individuals obtain from the scale shows their level of nostalgia proneness.

Identity Level Scale (ILS)

It was designed by the researcher to determine students' levels of conservatism and nationalism.

Analysis of the data

The sample size met the requirements of the SEM. Because, 343 valid questionnaires were utilized (Aksu et al., 2017). The research data confirm the univariate normality assumption (Skewness: -0.627 and 0.285; kurtosis -1.171 and 0.564) (Tabachnick and Fidell, 2019; Seçer, 2015). Multivariate normality assumption is confirmed by research data (CR: .19<10) (Gürbüz, 2019). The correlation coefficients between independent variables was less than 0.7 (Pallant, 2016). Bootstrapping 5000 resampling technique was used during the mediation analysis conducted in the study (MacKinnon, Lockwood & Williams, 2004).

Findings

Measurement model

The study initially tests a measurement model in which the variables are modelled together before continuing with the structural equation model. Goodness of fit values obtained from the measurement model (χ^2 [25, N= 343] = 61.55; $p < 0.001$; $\chi^2/df = 2.46$; RMSEA=0.07; SRMR= 0.04; CFI=0.97; GFI=0.97; AGFI=0.92; IFI=0.97; NFI=0.95; NNFI=0.93) have revealed that the measurement model was fit and acceptable.

Structural model

Insignificant paths have been detected and removed from the model in the first analysis phase (Gürbüz, 2019). The insignificant paths are the direct effects of variables such as conservatism ($\beta=0.03$, $p > 0.05$), interpersonal nostalgia ($\beta=0.07$, $p > 0.05$), and cultural nostalgia ($\beta=0.02$, $p > 0.05$) on popular history proneness. The model that has been retested after the exclusion of the insignificant paths are presented in Figure 6.

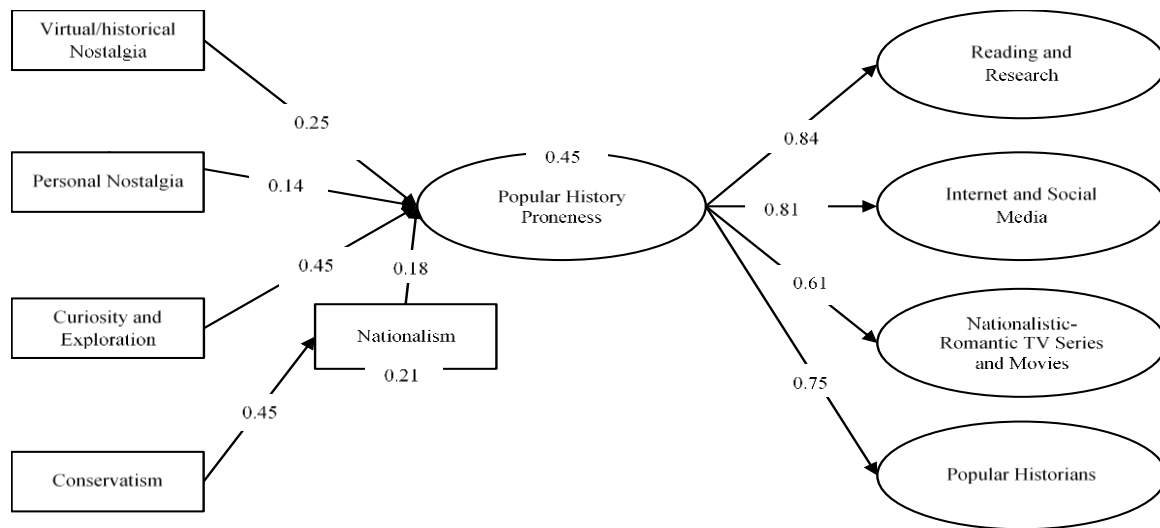


Figure 6. The Path diagram regarding the prediction of popular history proneness

Figure 6. shows the path diagram for the final model. Goodness of fit values obtained from the final model have revealed that the final model was fit and acceptable ($\chi^2 [22, N= 343] = 66.227$; $p < 0.001$; $\chi^2/df = 3.01$; $RMSEA = 0.07$; $SRM = 0.05$; $CFI = 0.96$; $GFI = 0.96$; $AGFI = 0.92$; $IFI = 0.96$; $NFI = 0.94$; $NNFI = 0.93$). In the obtained structural model, no insignificant path has been found. Table 2. presents the coefficient estimates regarding the model.

Table 2. Path analysis estimates for the proposed model

H	Effect	Structural Relation	Direction	Path Coefficient β	p	Result
H ₅	Direct effect	NAT → PHP	Positive	0.181	**	Significant
H ₈	Direct effect	CON → NAT	Positive	0.455	**	Significant
H ₇	Indirect effect	CON → PHP	Positive	0.082	*	Significant
H ₁	Direct effect	PN → PHP	Positive	0.142	*	Significant
H ₃	Direct effect	VN → PHP	Positive	0.255	**	Significant
H ₉	Direct effect	CE → PHP	Positive	0.446	**	Significant

** $p < 0.001$, * $p < 0.01$; PHP, popular history proneness; NAT, nationalism; CON, conservatism; PN, personal nostalgia; VN, virtual nostalgia; CE, curiosity and exploration.

The direct and indirect effect values are given in Table 2. Nationalism ($\beta = 0.18$, $p < 0.001$), personal nostalgia ($\beta = 0.14$, $p < 0.01$), virtual nostalgia ($\beta = 0.25$, $p < 0.001$) and curiosity and exploration ($\beta = 0.45$, $p < 0.001$) suggest a direct positive effect on popular history proneness. Furthermore, it is detected that conservatism ($\beta = 0.45$, $p < 0.001$) directly affects nationalism in a positive manner. Besides, the variables of nationalism, personal nostalgia, virtual nostalgia, curiosity and exploration explain 45% of the total change on the popular history proneness variable ($R^2 = 0.45$). The results of the bootstrapping analysis showing the significance of the indirect effects in the model are presented in Table 3.

Table 3. The Bootstrapping Analysis Results on Indirect Effects of Conservatism

Independent Variable	Mediator Variable	Dependent Variable	Standardised indirect effect (β)	%95 Confidence Interval		
				Lower Confidence Limit	Upper Confidence Limit	Confidence
Conservatism	Nationalism	Popular History Proneness	0.082	0.036	0.133	

As can be seen in Table 3., the lower and upper confidence interval values obtained with the bootstrapping analysis through the percentile method (percentile bootstrapping confidence intervals) do not

contain the zero value. Therefore, it can be argued that the indirect effect of conservatism on popular history proneness through the variable of nationalism is significant ($\beta = .082$, 95% CI [.036, .133]) (Gürbüz, 2019).

Discussion and Conclusion

The employed model has suggested that interpersonal nostalgia does not affect popular history proneness. This result makes sense when considering that interpersonal nostalgia mostly expresses the longing for an individual's past social environment. The results are significant when interpersonal nostalgia is conceived in relation, not to the ancestors' past, but individuals' past with their contacts (Güzel & Okan, 2016). The developed model displayed no effect of cultural nostalgia on popular history proneness. The results seem reasonable when cultural nostalgia is conceived as a generation's longing for their time's musical trends and clothing fashion (Keskin & Memiş, 2011, p.195).

If the weakest significant effect of personal nostalgia is left out, it can be argued that virtual/historical nostalgia is the sole genre that affects popular history proneness among nostalgia types (see Figure 5). Indeed, studies have found that nostalgia effects on consumers' behaviours, purchase intentions (Chen, Yeh & Huan, 2014; Fariz & Putra, 2020), attitudes toward advertisements, and products (Muehling & Sprott, 2004; Bambauer-Sachse & Gierl, 2009).

Studies on the subject support the empirical results of the research. For example, studies have found positive effects of both personal and historical nostalgia on attitude, buying intention, affective response, mood after consumption, and enhancing consumers' involvement with advertising (Natterer, 2015; Muehling & Pascal, 2012). Studies in the field of marketing show that personal nostalgia is superior to historical nostalgia (Marchegiani & Phau, 2011; Muehling & Pascal, 2012; Natterer, 2014). In the context of the film, both types of nostalgia are effective (Natterer, 2015). Current research has shown that historical nostalgia is more effective than personal nostalgia in the context of popular history consumption. Also, historical nostalgia/vicarious nostalgia is important for the success of historical contents (Lim, 2019). Because with vicarious nostalgia, consumers' vicarious participation in a historical era that is narrated in historical films, television series and novels are provided (Stern, 1992).

While a direct effect of nostalgia and nationalism on popular history proneness has been detected, conservatism has had merely an indirect effect on the concept through nationalism. The fact that popular history products present national histories that polish nationalist sentiments (Haydn, 2015; Bozkurt & Bayındır, 2015) makes the nationalism variable's effect on popular history proneness significant for the study. Furthermore, the nationalist and religious characteristics of history series produced in Türkiye endorse the mentioned identities (Güngör, 2019; Erman, 2016). On the other hand, that popular historical products appeal to nationalist-conservative identities is a general trend. Indeed, it is a given that political trends and ideologies affect historiography (Yazıcı & Yıldırım, 2018), which themselves nurture national identities. Also, cinema in Türkiye is a reflection of national identity (nationalist-conservative) (Aditama, Rachmanti & Soekarba, 2019; Cetin-Erus & Erus, 2020).

Nevertheless, revisionist historiography, prevalent on the internet and social media, cannot go beyond insulting, gossip and discrimination (Hanioglu, 2017). Even though the internet and social media provide the youth with easily reachable and entertaining information opportunities, this does not come by no means without any side-effects (Okumuş, 2019). Consequently, historical content on social media may be misleading and unreliable. The legends that ill-informed eyes cannot catch may spread in this platform (Poe, 2000; Çelik, & Elbasan, 2018). Giving media literacy lessons to students and teachers has been proposed to avoid this problem (Okumuş, 2019). Another proposal is to help students advance their historical awareness to make them wary of how history is used for political, economic and social purposes (McDaniel, 2015). Also, the

advancement of the history students and teachers' media-literacy skills would help prevent the harmful use of popular history.

Rising popular cultural nationalism is reflected in movies and television series. This situation is observed in countries where popular cultural nationalism is on the rise (Jing, 2006). For example, after the historical TV series, the fashion for old Turkish warrior clothes started in Türkiye (Kaymaz, 2018). Similarly, it is emphasized that the effects of political and cultural nationalism in the re-emergence of the qipao dress (Chew, 2007). Because, "Vicarious nostalgia represents a yearning for traditional, conservative, and community values of bygone eras" (Merchant & Ford 2008, p.17). Besides, the result obtained in the research is also meaningful in terms of the concept of restorative nostalgia that Boym (2001) stated. Indeed, "Restorative nostalgia is at the core of recent national and religious revivals"

Conservatism and nationalism substantially rely on history in identity construction. While the religious past is the highlighted element of conservative circles' affinity with history, the nationalist-conservative circles put the weight on the ancestors' victories and heroism (Aydos, 2013). In this respect, conservatism and nationalism variables' positive effect on popular history proneness that flourish on the national and moral values and heroic narratives is theoretically significant (Beriş, 2010). In other words, exciting popular history products attract individuals longing for the shared past and the heroism in their national history, helping them feel their identity.

The great demand of Turkish popular history products in the Balkans, the Middle East and Central Asia can be explained by the common history (Ottoman Empire history for the Balkans and the Middle East, more pre-Islamic Turkish history for Central Asia). Because, "Shared history also draws countries together in cultural-linguistic markets" (La Pastina & Straubhaar, 2005). To the same extent, cultural proximity and historical ties are other important factors (Cabric et al., 2013; Balaban, 2015; Zadrožna, 2017). The romantic presentation of Turkish history also includes the evocation of nostalgia (Roy, 2015).

The model developed in this study displays that curiosity and exploration have the most potent effect on popular history proneness. Put it another way; it is the feeling of curiosity and exploration that most affect popular history proneness. This effect can be explained by the interesting and entertaining contents of popular history products that attract individuals (Mencet & Ergin, 2018). In fact, imaginative adventure is constructed in vicarious nostalgic historical productions (Stern, 1992). In this way, curious consumers are indirectly involved in this adventure. Because the experience of watching entertainment or TV series satisfies the need for curiosity (Arslan, 2013; Batıgün & Sunal, 2017; Wagner, et al., 2021). As stated previously the TV series depict the Ottoman past in a glorious, romantic way (Zadrožna, 2017). Audiences watching TV series depicting the Ottoman past in a glorious and romantic way explained the reason for watching it with her curiosity about historical events (Kasap et al., 2018). If historical narratives are to be presented by commercial media, then popular curiosity and nostalgia come together (Jing, 2006). The previous studies show that history series significantly enhance viewers' interest (Faiz, & Avcı, 2020). This argument seems valid as the popular history products' main goal is to trigger the reader's excitement and curiosity (Glaser, 2015). Therefore, it can be argued that the individuals' curiosity and exploration impulses generate their interest in popular history products. From an educational perspective, the utilisation of movies is also recommended in history teaching. Pupils from different study levels and teachers have expressed that employment of historical movies and series in history teaching would make history lessons fun; that it contributes to the learning of historical places/architecture enhancing the historical understanding; that it provides effective and permanent learning and concretisation; and that it helped their ability to perceive time and chronology improve (Handa, 2010; Donnelly, 2014; Öztaş, 2015; Gezici & Demir, 2018). However, certain studies have also emphasised the necessity of special education related to the subject during utilising movies in history teaching (Demircioğlu, 2007; Donnelly, 2014). This is because the fictional feature of movies and TV series may go unnoticed by

viewers or students, consequently leaving the questions regarding their accuracy untouched. The myths circulated, the misconception of history, dependence on the popular history products in history education, violence and obscenity render special education on popular history more crucial than ever (Handa, 2010; Gezici, & Demir, 2018). On the other hand, popular history products can be utilised in classes as supplementary materials under teacher control to vivify the academic teaching (Bozkurt, & Bayındır, 2015). For example, history lessons can be made more palatable to children by adopting historical novels to their level (Ata, 2000).

According to the concept of similarity in Parasocial Theory, the individual wants to interact more with people who have similar attitudes and values in their interpersonal interactions (Byrne & Nelson 1965; Batıgün & Sunal, 2017; Aytulun & Sunal, 2020). From this point of view, conservative nationalist audiences in Türkiye interact with conservative nationalist historical heroes in popular history movies and the TV series.

Limitations and suggestions for future research

There are some limitations to the current research. First, the results of the research are limited to Türkiye and more specifically to university students. Therefore, the research is insufficient to explain the worldwide interest in TV series that tell Turkish history. Considering the theories and variables in the current research, studies with samples outside of Türkiye will make a great contribution to the relevant literature. In addition, historical curiosity scale (Passmore, 1987), which reflects the field of special curiosity, can be developed and used as a new variable. Finally, the use of national nostalgia (Smeekes, 2014), which reflects a special field, as a variable will contribute to this field.

Appendix

Popular history proneness scale (PHPS) and Personal Information Form (PIF)

1. I enjoy reading the biographies of great men and women in history.
2. I follow discussions on history on social media.
3. I plan to read the books dealing with the victories of my ancestors.
4. I enjoy listening to historians who tell about exemplary events in history.
5. I try to find historians' remarks who allegedly unveil the hidden facts of history on the internet.
6. I follow social media contents that deal with the heroism of my ancestors.
7. I would like to see historians on TV who talk about interesting subjects more often.
8. I like to watch history movies and TV series that tell about my ancestors' exemplary lives.
9. I recommend books dealing with controversial issues in history to my friends.
10. I read the life stories of successful politicians in history.
11. I investigate what the historian I like has to say about a controversial topic in history.
12. I recommend the TV series that deals with the history of my ancestors to friends.
13. I research unique history topics on social media.
14. I enjoy watching historians who excite me with what they tell on TV.
15. History TV series depicting the heroism of my ancestors excites me.
16. I would like more movies and series to be produced about my ancestors' great victories in history.

Note: Psychometric tests of the scale have been conducted in Turkish.

How much do you identify yourself as conservative?

How much do you identify yourself as nationalist?

never (1) scarcely (2) a little (3) somewhat (4) notably (5) much (6) too much (7)

Ethics Committee Approval:

The ethics committee of Bayburt University approved the current study (The committee's reference number: 01.29.2021, E-79126184-050.99-3830).

REFERENCES

- Acar, H. (2018). Muhafazakâr milliyetçilik anlayışı [Conservative-nationalism understanding]. H. Acar (Eds.). In *Milliyetçilik tipolojileri* [Nationalism typologies]. (pp. 205-220). Nobel.
- Acun, N., Kapıkıran, Ş. ve Kabasakal, Z. (2013). Merak ve keşfetme ölçeği II: Açımlayıcı ve doğrulayıcı faktör analizleri ve güvenilirlik çalışması [Trait Curiosity and Exploration Inventory-II: Exploratory and Confirmatory Factor Analysis and Its Reliability]. *Türk Psikoloji Yazıları*, 16(31), 74-85.
- Aditama, A., Rachmanti, N. B., & Soekarba, S. R. (2019). The practice of secularism in religious censorship in Turkish film (1939-1990). *International Review of Humanities Studies*, 4(1), 201-211.
- Ahmed, Y. M., & Panetta, C. (2023). Rejecting the Ottomans, Revisiting the Mamluks: Historical Drama and Identity in Post-2013 Egypt. *Middle East Journal of Culture and Communication*, 16(2), 173-191.
- Aksu, G., Eser, M. T., & Güzeller, C. O. (2017). *Açımlayıcı ve doğrulayıcı faktör analizi ile yapısal eşitlik modeli uygulamaları* [Structural equation model applications with exploratory and confirmatory factor analysis]. Detay.
- Alaca, E. (2017). The discourse on Turkish identity in historical films: the case of 'Kara Murat'. *European Journal of Education Studies*, 3(11), 418-433.
- Arslan, Ö. (2013). *TV dizilerinde yer alan karakterler ile kurulan parasosyal etkileşim: Bağlanma biçimleri ve yalnızlık açısından bir inceleme* [Parasocial interaction established with TV series characters: An analysis in terms of attachment styles and loneliness]. (Unpublished Master Thesis), Ankara University, Ankara.
- Ata, B. (2000). Tarih öğretiminde bir araç olarak; tarihi romanlar [Historical novels as a tool in history teaching]. *Türk Yurdu*, 20(153-154), 158-165.
- Aydos, S. (2013). Muhafazakâr milliyetçi muhayyilede kanuni: Muhteşem Yüzyıl'a yönelik tepkilere dair bir okuma [Suleyman the Magnificent in the imagination of conservative nationalist: A Reading on reactions to Muhteşem Yüzyıl]. *History Studies*, 5(1), 1-16.
- Aytulun, G., & Sunal, A. B. (2020). Medya karakterleriyle kurulan parasosyal etkileşim [Parasocial Interaction with Media Characters]. *Current Approaches in Psychiatry*, 12(4), 494-506. 10.18863/pgy.688117
- Baker, S. and Kennedy, P. (1994). Death by nostalgia: A diagnosis of context-specific cases. *Advances in Consumer Research*, 21, 169-174.
- Balaban, A. (2015). The Impacts of Turkish TV serials broadcasted in Albania on Albanian and Turkish relations. *European Journal of Social Science Education and Research*, 2(4), 473-495.
- Bambauer-Sachse, S., & Gierl, H. (2009). Effects of nostalgic advertising through emotions and the intensity of the evoked mental images. *Advances in Consumer Research*, 36, 391-398.
- Batıgün, A.D, & Sunal, A.B. (2017). Parasocial Interaction with The Characters in TV serials: A study on marriage satisfaction, psychological symptoms and other socio-demographic variables. *Turkish Journal of Psychology*, 32(79),52-62.
- Bell, E., & Gray, A. (2007). History on television: charisma, narrative and knowledge. *European Journal of Cultural Studies*, 10(1), 113-133.
- Berger, S. (2014). Professional and popular historians. B. Korte ve S. Paletschek (Eds.). In *Popular history now and then* (pp. 13-29). Transcript Verlag.
- Beriş, H. E. (2010). Nostalji, muhafazakârlık ve Türkiye [Nostalgia, conservatism and Türkiye]. *Muhafazakâr Düşünce*. 7(25-26), 47-74.
- Berlyne, D. E. (1954). A theory of human curiosity. *British Journal of Psychology. General Section*, 45(3), 180-191.
- Berlyne, D. E. (1960). *Conflic, arousal, and curiosity*. New York: McGraw-Hill
- Boym, S. (2001). Nostalgi. <http://monumenttotransformation.org/atlas-of-transformation/html/n/nostalgia/nostalgia-svetlana-boym.html>

- Bozkurt, N., & Bayındır, N. (2015). Öğretmen adaylarının tarih eğitiminde popüler olan tarih yapımları hakkındaki görüşleri [Opinions of prospective teachers about popular history movies]. *Uluslararası Sosyal ve Eğitim Bilimleri Dergisi*, 2(4), 205-215.
- Brileva, D. (2023). Embedding Crimea in Russia(n Empire): Russian views on Crimea in the series 'Kurt Seyit and Shura/Alexandra.' *International Communication Gazette*, 85(3-4), 307-324. <https://doi.org/10.1177/17480485231152871>
- Byrne, D., & Nelson, D. (1965). Attraction as a linear function of proportion of positive reinforcements. *Journal of Personality and Social Psychology*, 1(6), 659-663.
- Cabric, N., Nedelkovska, Demoli, D., & Hamzic, A. (2013). Turks Bewitch The Balkans With Their Addictive Soaps <https://balkaninsight.com/2013/05/01/turks-bewitch-the-balkans-with-their-addictive-soaps/>
- Carney, J. (2018). Resur (e) recting a spectacular hero: Diriliş Ertuğrul, necropolitics, and popular culture in Turkey. *Review of Middle East Studies*, 52(1), 93-114.
- Carney, J. (2019). ResurReaction: Competing Visions of Turkey's (proto) Ottoman Past in Magnificent Century and Resurrection Ertuğrul. *Middle East Critique*, 28(2), 101-120.
- Çelik, H., & Elbasan, D. (2018). Sosyal bilgiler öğretmenlerinin sosyal medyadaki tarihle ilgili paylaşımlara ilişkin görüşleri [Social studies teachers' views about social media shares related history]. *Turkish History Education Journal*, 7(2), 251-270. <https://doi.org/10.17497/tuhed.429949>.
- Çencen, N., & Şimşek, A. (2015). Usta tarihçilerin bakış açısı ile "Diriliş Dizisi" ["Dirilis" by the perspective of expert historians]. *Journal of Human Sciences*, 12(2), 1377-1396. <https://doi.org/10.14687/ijhs.v12i2.3435>.
- Cetin-Erus, Z., & Erus, B. (2020). The rise of domestic popular film production with new audience and changing industry structure: The case of popular cinema in Turkey. *European Journal of Communication*, 35(6), 565-579.
- Çevik, S. B. (2019). Turkish historical television series: public broadcasting of neo-Ottoman illusions. *Southeast European and Black Sea Studies*, 19(2), 227-242.
- Chadborn, D., & Reysen, S. (2018). Moved by the masses: A social identity perspective on inspiration. *Current Psychology*, 37, 625-631.
- Chen, H. B., Yeh, S. S., & Huan, T. C. (2014). Nostalgic emotion, experiential value, brand image, and consumption intentions of customers of nostalgic-themed restaurants. *Journal of Business Research*, 67(3), 354-360.. <https://doi.org/10.1016/j.jbusres.2013.01.003>
- Chew, M. (2007). Contemporary re-emergence of the Qipao: political nationalism, cultural production and popular consumption of a traditional Chinese dress. *The China Quarterly*, 189, 144-161.
- De Baets, A. (2011). Censorship and history since 1945. A. Schneider ve D. Woolf (Eds.). In *the Oxford history of historical writing: Volume 5: Historical writing since 1945* (pp.52-73). Oxford University Press.
- De Groot, J. (2016). *Consuming history: Historians and heritage in contemporary popular culture*. London and New York: Routledge.
- Demircioğlu, İ. H. (2007). Tarih öğretiminde filmlerin yeri ve önemi [the role and significance of films in the Teaching of History]. *Bilig*, 42, 77-93. <http://bilig.yesevi.edu.tr/yonetim/icerik/makaleler/2836-published.pdf>
- Donnelly, D. (2014). Using feature films in teaching historical understanding: Research and practice. *Agora*, 49(1), 4-12.
- Donstrup, M. (2019). Gender and power in television fiction: an ideological textual analysis of a historical TV Series. *Doxa Comunicación*, 28, 97-109.
- Erman, S. (2016). *Bir propaganda aracı olarak tarihi diziler: "Diriliş Ertuğrul" ve "Filinta" örneği* [Historical TV series as a propaganda tool: "Diriliş Ertuğrul" and "Filinta" example]. Marmara Üniversitesi: Unpublished master thesis.

- Faiz, M., & Avcı, E. K. (2020). Popüler kültür unsuru olarak tarihi dizilere ilişkin sosyal bilgiler öğretmenlerinin görüşleri [Opinions of social studies teachers on historical sequences as an element of popular culture]. *Trakya Eğitim Dergisi*, 10(3), 744-763. <https://doi.org/10.24315/tred.621006>.
- Fariz, M., & Putra, R. E. (2020). Rasa yang dulu pernah ada: pengaruh nostalgia personal dan historis terhadap keinginan membeli eskrim viennetta. *Jurnal Manajemen Universitas Bung Hatta*, 15(2), 1-13.
- Fiorentino, D., Manzoli, G., Martinat, M., & Santese, A. (2021). History and Historiography Facing the Challenge of TV Series. *RICERCHE DI STORIA POLITICA*, 24(3), 331-341. <https://doi.org/10.1412/102148>
- Fitzgerald, F. T. (1999). Curiosity. *Annals of Internal Medicine*, 130(1), 70-72. <https://doi.org/10.7326/0003-4819-130-1-199901050-00015>.
- Gezici, M., & Demir, S. B. (2018). Tarihi dizi ve filmlerin sosyal bilgiler dersine yansımaları [The reflection of historical TV series and films on social studies].. *Turkish History Education Journal*. 7(2), 392-413. <https://dergipark.org.tr/tr/download/article-file/548341>
- Glaser, M. (2015). Popular knowledge communication in history magazines from a receptional psychology point of view. S. Popp, J.Schumann ve M. Hannig (Eds.). In *Commercialised history: Popular history magazines in Europe* (pp.165-193). Peter Lang Publishing.
- Güngör, B. (2019). *Popüler tarih dizileri ışığında Türk tarihinin medyada yansıtılma biçimi: "Diriliş Ertuğrul" dizisi örneği* [The reflection of Turkish history in the media in the light of popular history series: 'Diriliş Ertuğrul' example]. Atatürk üniversitesi: Unpublished master thesis.
- Gürbüz, S. (2019). *AMOS ile yapısal eşitlik modellemesi* [Structural equation modeling with AMOS]. Seçkin.
- Güzel, E., & Okan, E. Y. (2016). Nostaljiye genç bakış: Nostalji içerikli reklamların postmodern bireyler üzerindeki etkisi [Nostalgia from the younger generation perspective: The impact of nostalgia advertising on postmodern individuals]. *Business and Economics Research Journal*, 7(3), 137.
- Handa, R. (2010). Using popular film in the architectural history classroom. *Journal of the Society of Architectural Historians*, 69(3), 311-319. <https://doi.org/10.1525/jsah.2010.69.3.311>.
- Hanioğlu, Ş. (2017). *Hakaret revizyonist tarihçilik değildir* [Insult is not revisionist historiography]. *Sabah* <https://www.sabah.com.tr/yazarlar/hanioglu/2017/05/14/hakaret-revizyonist-tarhchilik-degidir> Accessed 15 May 2020.
- Havlena, W.J., & Holak, S.L. (2000). "Nostalgia and nostalgia-proneness: Classification and Measurement". Unpublished working paper.
- Haydn, T. (2015). History magazines in the UK. S. Popp, J.Schumann ve M. Hannig (Eds.). In *Commercialised history: Popular history magazines in Europe* (pp.275-293). Peter Lang Publishing.
- Holak, S. L., Matveev, A. V., & Havlena, W. J. (2007). Nostalgia in post-socialist Russia: Exploring applications to advertising strategy. *Journal of Business Research*, 60(6), 649-655. <https://doi.org/10.1016/j.jbusres.2007.06.013>.
- Horton, D., & Wohl, R.R. (1956). Mass communication and para-social interaction. *Psychiatry*, 19,215-229.
- Jeraj, M., & Maric, M. (2013). Relation between entrepreneurial curiosity and entrepreneurial self-efficacy: A multi-country empirical validation. *The Organ*, 46(6), 264-273. <https://doi.org/10.2478/orga-2013-0027>.
- Jing, W. (2006). Nostalgia as content creativity: Cultural industries and popular sentiment. *International Journal of Cultural Studies*, 9(3), 359-368. <https://doi.org/10.1177/1367877906066881>
- Kalinina, E., & Menke, M. (2016). Negotiating the past in hyperconnected memory cultures: Post-Soviet nostalgia and national identity in Russian online communities. *International Journal of Media & Cultural Politics*, 12(1), 59-74. https://doi.org/10.1386/macp.12.1.59_1.
- Karahan, Ö. (2018). 'Diriliş: Ertuğrul'u 4 kıtada 1 milyar insan izliyor ['Resurrection: Ertuğrul is watched by 1 billion people on 4 continents]. *Sabah* <https://www.sabah.com.tr/magazin/2018/10/26/dirilis-ertugrulu-4-kitada-1-milyar-insan-izliyor>
- Kartal, M., & Bardakçı, S. (2019). *Tutum ölçekleri* [Attitude scales]. Akademisyen.

- Kasap, E. Z., Ağzitemiz, F., Kızıl, N., & Yıldırım, A. (2018). Understanding the nature of the relationship established with Turkish TV serial characters. *R&S-Research Studies Anatolia Journal*, 1(2), 237-247.
- Kashdan, T. B., Gallagher, M. W., Silvia, P. J., Winterstein, B. P., Breen, W. E., Terhar, D.T., & Steger, M. F. (2009). The curiosity and exploration inventory-II: Development, factor structure, and psychometrics. *Journal of Research in Personality*, 43, 987-998. <https://doi.org/10.1016/j.jrp.2009.04.011>.
- Kaymaz, H. (2018). Sünnet düğünlerinde 'Alp kıyafeti' modası. <https://www.aa.com.tr/tr/yasam/sunnet-dugunlerinde-alp-kiyafeti-modasi-/1126452>
- Kesirli Unur, A. (2020). In the midst of the global and the local: Neo-Ottoman detectives of Filinta. *Critical Studies in Television*, 15(4), 357-372.
- Keskin, H. D., & Memiş, S. (2011). Retro pazarlama ve pazarlamada uygulanmasına yönelik bazı örnekler. *Süleyman Demirel Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, 16(3), 191-202.
- Kesmodel, U. S. (2018). Cross-sectional studies—what are they good for?. *Acta Obstetrica et Gynecologica Scandinavica*, 97(4), 388-393.
- Kim, S., Kim, S., & King, B. (2019). Nostalgia film tourism and its potential for destination development. *Journal of Travel & Tourism Marketing*, 36(2), 236–252. <https://doi.org/10.1080/10548408.2018.1527272>.
- Konuk, O. (2017). Popüler kültür marketi ve “tarih” rafı [Popular culture market and 'history' shelf], *Üsküdar*, 5, 91-94.
- Korte, B., & Paletschek, S. (2014). Popular history now and then: An introduction. B. Korte ve S. Paletschek (Eds.). In *Popular history now and then* (pp. 7-12). Transcript Verlag.
- La Pastina, A. C., & Straubhaar, J. D. (2005). Multiple proximities between television genres and audiences: The schism between telenovelas' global distribution and local consumption. *International Communication Gazette*, 67(3), 271–288.9
- Lecker de Almeida, G., & Bianchi, G. (2017). Historians out and about: historical practice in contemporary Brazil. *Revue Passés Futurs*, 2.
- Lekngam, S. (2019). *The discursive construction of nostalgic Thai identity through Thai television programmes* (Doctoral dissertation, Newcastle University).
- Lim, A. Y. (2019). Effects of narrative identity and historical nostalgia and inducing factors on historical contents evaluation. *The Journal of Industrial Distribution & Business*, 10(9), 25-36. <http://dx.doi.org/10.13106/ijidb.2019.vol10.no9.25>
- Litman, J. A., & Spielberger, C. D. (2003). Measuring epistemic curiosity and its diversive and specific components. *Journal of Personality Assessment*, 80(1), 75-86. https://doi.org/10.1207/S15327752JPA8001_16.
- Loewenstein, G. F. (1994). The psychology of curiosity: A review and reinterpretation. *Psychological Bulletin*, 116(1), 75– 98.
- Lozano, S. (2020). Looking back: Gender stereotypes and archetypes in Spanish his-torical series (2011 – 2018). *Comunicación y Medios*, 41, 67-79, doi: 10.5354/0719-1529.2020.54276
- Ma, J. (2001). Re-advertising Hong Kong: Nostalgia industry and popular history. *Positions: East Asia Cultures Critique*, 9(1), 131-159.
- MacKinnon, D. P., Lockwood, C. M., & Williams, J. (2004). Confidence limits for the indirect effect: Distribution of the product and resampling methods. *Multivariate Behavioral Research*, 39(1), 99-128. https://doi.org/10.1207/s15327906mbr3901_4.
- Mahoney, C. (2022). History and Place in Television Drama: Liverpool in Cilla and Boys From the Blackstuff. *Critical Studies in Television*, 17(4), 397-414.
- Marchegiani, C., & Phau, I. (2010). Away from “unified nostalgia”: Conceptual differences of personal and historical nostalgia appeals in advertising. *Journal of Promotion Management*, 16(1-2), 80-95. <https://doi.org/10.1080/10496490903572991>.

- Marchegiani, C., & Phau, I. (2011). Development and validation of the personal nostalgia scale. *Journal of Marketing Communications*, 19, 1–22.
- McCann, B. (2019). History, truth and (mis) representation in Versailles (2015-2018). *Australian Journal of French Studies*, 56(2), 141-155.
- McDaniel, K. N. (2015). Commemorating the christmas truce: A critical thinking approach for popular history. *The History Teacher*, 49(1), 89-100. <https://www.jstor.org/stable/24810501> Accessed 11 May 2022.
- McNary, L. (2023). Curiosity: A conceptual re-analysis for improved measurement. *Current Psychology*, 1-12.
- Mencet, M. S., & Ergin, K. (2018). Popüler tarihin dijital boyutu: Youtube'daki tarih kanallarının incelenmesi [The digital dimension of popular history: A study on history channels in Youtube]. *Akdeniz Üniversitesi İletişim Fakültesi Dergisi*. (29. Özel Sayısı), 327-340.
- Merchant, A., & Rose, G. M. (2013). Effects of advertising-evoked vicarious nostalgia on brand heritage. *Journal of Business Research*, 66(12), 2619-2625. <https://doi.org/10.1016/j.jbusres.2012.05.021>
- Merchant, A., and J. Ford. (2008). Nostalgia and giving to charity: A conceptual framework for discussion and research. *International Journal of Nonprofit and Voluntary Sector Marketing*, 13(1), 13–30. 10.1002/nvsm.300
- Metaveevinij, V. (2019). Consuming modernity and nostalgia: A case study of cross-border representations and fandom of Thailand-Myanmar transnational cinema. *Plaridel*, 16(2), 1-23.
- Muehling, D. D., & Pascal, V. J. (2012). An involvement explanation for nostalgia advertising effects. *Journal of Promotion Management*, 18(1), 100-118.
- Muehling, D., and Sprout, D. (2004). The Power of reflection: An empirical examination of nostalgia advertising effects. *Journal of Advertising* 33(3), 25–35. <https://doi.org/10.1080/00913367.2004.10639165>
- Mullin, R. (2019). 'You think you know a story...': Reframing the Tudors on Television in the Twenty-First Century. *Adaptation*, 12(2), 89-104.
- Myrick, J. G., & Willoughby, J. F. (2019). The role of media-induced nostalgia after a celebrity death in shaping audiences' social sharing and prosocial behavior. *Journal of Health Communication*, 24(5), 461-468.
- Natterer, K. (2014). How and why to measure personal and historical nostalgic responses through entertainment media. *International Journal on Media Management*, 16(3-4), 161-180. <https://doi.org/10.1080/14241277.2014.989567>.
- Natterer, K. (2015). Nostalgia as the Future for Branding Entertainment Media? The Consumption of Personal and Historical Nostalgic Films and Its Effects. In: *Handbook of Media Branding*, Siebert, G., Förster, K., Chan-Olmsted, S.M. & Ots, M. (Eds), pp. 199-214.
- Okumuş, O. (2019). Tarih öğretiminde sosyal medya ortamlarının kullanımına ilişkin tarih öğretmenlerinin görüşleri [History teachers' opinions about the use of social media in teaching of history]. *Turkish History Education Journal*, 8(2), 499-535. <https://doi.org/10.17497/tuhed.607642>.
- Özalpman, D., & Sarikakis, K. (2018). The politics of pleasure in global drama: A case study of the TV series, *The Magnificent Century* (Muhteşem Yüzyıl). *Global Media and Communication*, 14(3), 249-264.
- Özcan, A. (2011). *Türkiye'de popüler tarihçilik 1908-1960* [Popular historiography in Turkey 1908-1960]. Türk Tarih Kurumu.
- Özhan, Ş., & Altuğ, N. (2017). The adaptation of nostalgia proneness scale into Turkish, reliability and validity Study. *Sosyal Bilimler Araştırma Dergisi*, 6(3), 53-66.
- Öztaş, S. (2015). Tarih öğretiminde tarihî film ve tarihî dizilerin kullanılmasına ilişkin tarih bölümü öğrencilerinin görüşleri (Kırklareli Üniversitesi örneği) [Department of history students' opinions on the use of historical movies and historical series in teaching history (Kırklareli University Example)]. *Turkish History Education Journal*, 4(2), 1-37. <https://dergipark.org.tr/tr/download/article-file/164057> Accessed 17 May 2022.
- Pallant, J. (2016). *SPSS kullanma klavuzu-SPSS ile adım adım veri analizi* [SPSS survival manual: A step by step guide to data analysis using IBM SPSS]. (S. Balcı, & B. Ahi, Trans.). Anı Yayıncılık.
- Passmore, J. (1987). Narratives and events. *History and Theory*. 26(4), 68-74.


- Poe, M. (2000). The future of the past: Academic and popular history in the age of the internet: The practice of history. *Historically Speaking*, 1(2), 12-14. <https://doi.org/10.1353/hsp.2000.0009>
- Possamai, A. (2002). Cultural consumption of history and popular culture in alternative spiritualities. *Journal of Consumer Culture*, 2(2), 197-218.
- Pozefsky, P. (2008). Russian gangster films as popular history: genre, ideology and memory in Pavel Lungin's Tycoon. *Studies in Russian and Soviet Cinema*, 2(3), 299-325.
- Primorac, A. (2018). Mother, Wife, Queen: Neo-Victorianism, Postfeminism and the Representation of the Irish Famine in ITV's TV Series Victoria (2017). *Književna smotra: Časopis za sovjetsku književnost*, 50(4), 45-52.
- Renner, B. (2006). Curiosity about people: The development of a social curiosity measure in adults. *Journal of Personality Assessment*, 83(3), 305-316.
- Romanovska, A. (2020). Nostalgia and national Identity: Idea of revisiting the past in Latvian Fiction. *Respectus Philologicus*, 37(42), 127-136. <http://dx.doi.org/10.15388/RESPECTUS.2020.37.42.44>.
- Roy, O. (2015). "Conclusions." In *The Revival of Islam in the Balkans. From Identity to Religiosity*, Eds. by Arolda Elbasani and Olivier Roy, 242-251. Palgrave
- Safran, M. (2006). *Tarih eğitimi: Makale ve bildiriler*. Gazi Kitabevi.
- Şakrak, B. E. (2017). Re-construction of realms of memory through television series case study: Muhteşem Yüzyıl: Kösem. H. Arslan, M. A. İçbay & C. Ruggiero (Eds.) In *Communication & Media Researches*, (pp. 85-94). IASSR
- Saxton, L. (2020). A true story: defining accuracy and authenticity in historical fiction. *Rethinking History*, 24(2), 127-144.
- Seçer, İ. (2015). *Psikolojik test geliştirme ve uyarlama süreci* [Psychological test development and adaptation process]. Anı yayınları.
- Shah, E. D., Larson, L. R., & Denton III, L. L. (2019). Animation and consumer perceptions of DTC pharmaceutical advertisement. *Journal of Consumer Affairs*, 53(4), 1456-1477. <https://doi.org/10.1111/joca.12249>.
- Sierra, J. J., & McQuitty, S. (2007). Attitudes and emotions as determinants of nostalgia purchases: an application of social identity theory. *Journal of Marketing Theory and Practice*, 15(2), 99-112.
- Smeeke, A. N. (2014). *The presence of the past. Historical rooting of national identity and current group dynamics*. Utrecht University.
- Smith, L., & Campbell, G. (2017). 'Nostalgia for the future': memory, nostalgia and the politics of class. *International Journal of Heritage Studies*, 23(7), 612-627.
- Srivastava, E., Sivakumaran, B., Maheswarappa, S. S., & Paul, J. (2023). Nostalgia: A review, propositions, and future research agenda. *Journal of Advertising*, 52(4), 613-632.
- Stern, B. (1992). Historical and personal nostalgia in advertising text: The Fin de Siècle Effect. *Journal of Advertising*, 21(4), 11-22.
- Tabachnick, B.G., & Fidell, L.S. (2019). *Çok değişkenli istatistiklerin kullanımı* [Using of multivariate statistics]. (M. Baloğlu, Trans. Eds.). Nobel.
- Tajfel, H. (1978). *Differentiation between social groups*. New York: Academic Press.
- Tajfel, H. (1981). *Human groups and social categories*. Cambridge: Cambridge University Press.
- Tajfel, H., & Turner, J. C. (1985). The social identity theory of group behavior. In *Psychology of intergroup relations*, edited by Stephen Worchel and William G. Austin, (pp.7-24). Chicago: Burnham.
- Taşkaya, M. (2013). Reklamda nostaljik unsurlar: Kimlik vaadi ve anlamın tüketimi [Nostalgic elements in advertising: Promise of the identity and the consumption of meaning. *ETHOS: Felsefe ve Toplumsal Bilimlerde Diyaloglar*, 6(1), 1-37.
- Thorp, R. (2015). Popular history magazines and history education. *Historical Encounters: A Journal of Historical Consciousness, Historical Cultures, And History Education*, 2(1), 102-112.


- Ustuk, H. (2019). *Turkish TV series attract audience from 146 countries*. <https://www.aa.com.tr/en/culture/turkish-tv-series-attract-audience-from-146-countries/1643829>
- Vinterek, M. (2015). The use of powerful men, naked women and war to sell. Popular history magazines in Sweden. S. Popp, J.Schumann & M. Hannig (Eds.). In *Commercialised history: Popular history magazines in Europe* (pp.295–318). Peter Lang Publishing.
- Wagner, M. C., Boczkowski, P. J., & Mitchelstein, E. (2021). Affect, curiosity, and positionality in context: watching television entertainment in Argentina and the United States. *International Journal of Communication*, 15, 668–687.
- Wolff, B. (2020). Restoring the glory of Serampore. Colonial heritage, popular history and identity during rapid urban development in West Bengal. *International Journal of Heritage Studies*, 27(8), 777-791
- Xue, H., & Almeida, P. C. (2011). Nostalgia and Its Value to Design Strategy: Some fundamental considerations. In *Proceedings of the Tsinghua-DMI international design management symposium*. Simposio llevado a cabo en Tsinghua University, Hong Kong.
- Yalçın, Ö., & Elmas, P. (2017). Kişisel ve simüle nostaljinin varoluşsal işlevi üzerine bir çalışma [A Study on the existential function of personal and simulated nostalgia]. *Türk Psikoloji Yazıları*, 20(40), 76-85.
- Yazıcı, F., & Yıldırım, T. (2018). History teaching as a nation-building tool in the early republican period in Turkey (1923–1938). *Paedagogica Historica*. 54(4), 433-446.
- Zadrožna, A. (2017). Reconstructing the past in a post-Ottoman village: Turkishness in a transnational context. *Nationalities Papers*, 45(4), 524-539.

Analyzing the Effects of Mobile Devices on Student Achievement: A Wide-ranging Meta-analysis

Research Article

Ceyla ODABAS¹, Recep KAHRAMANOGLU²

¹Gaziantep University, School of Foreign Languages, Gaziantep, Türkiye  0000-0002-0821-4332

²Gaziantep University, Nizip Education Faculty, Gaziantep, Türkiye  0000-0001-6670-8165

To cite this article: Odabas, C., & Kahramanoglu, R. (2023). Analyzing the effects of mobile devices on student achievement: A wide-ranging meta-analysis. *International Online Journal of Educational Sciences*, 15(5), 1018-1034.

ARTICLE INFO

Article History:

Received: 12.09.2023

Available online:
26.12.2023

ABSTRACT

This meta-analysis study aimed to examine the influence of integrating mobile devices on students' academic achievement. The literature review encompassed a comprehensive collection of 344 research studies published between 2000 and 2022, from which 50 were selected for inclusion in the meta-analysis. These selected studies utilized pre-test/post-test control group experimental and quasi-experimental designs, involving a total of 4,223 participants. The moderator variables considered in this study included the sample group, school subjects, year of the studies, culture, and the types of technology employed. The findings derived from the random effects model indicated a small positive effect size of 0.28 for mobile technologies on student achievement. However, the results of the moderator analysis did not provide support for hypotheses H2 and H3, which proposed sample group and school subject play a moderating role in academic achievement. On the other hand, hypotheses H4, H5, and H6, which posited that publication year of the research, type of mobile technology, and culture respectively, act as moderators in the effect size of mobile devices on academic achievement, were supported by the study.

© 2023 IOJES. All rights reserved

Keywords:

Mobile devices, Meta-analysis, Mobile learning, Students' achievement, Educational technology

Introduction

Over the past quarter-century, the field of education has witnessed the integration of mobile technologies. These technological advancements have empowered individuals to possess their own personal computing devices with remarkable processing capabilities, such as smartphones, laptops, tablet PCs, and cell phones. Mobile devices have garnered considerable attention owing to their potent computational abilities and ever-evolving functionalities. The progressions in social media and internet technologies have rendered mobile devices indispensable in our everyday lives. With the swift evolution of wireless communication and

¹Corresponding author's address: Gaziantep Üniversitesi
Telephone: +905322804086
e-mail: recepkahramanoglu@gmail.com
DOI: <https://doi.org/10.15345/iojes.2023.05.009>

mobile technologies, mobile learning has assumed an increasingly pivotal role (Chu, Hwang, Tsai & Tseng, 2010).

Related literature

Using Mobile Device in Education

A handheld computing device, commonly referred to as a mobile device or handheld computer, is a compact apparatus that typically incorporates a touch screen, wireless connectivity, and, in certain cases, a miniature keyboard (Viswanathan, 2015). There is a growing body of evidence suggesting that mobile devices, including mobile phones, tablets, portable multimedia players (PMPs), and similar devices, are increasingly utilized in educational settings worldwide (Churchill, Fox, & King, 2016). The considerable computational capabilities and portability of these devices, along with their wireless communication functionalities and context-aware tools, position them as a formidable educational resource with substantial potential in both traditional classroom environments and informal learning contexts.

The notion of "mobile" in the context of mobile learning is currently understood differently than it was in the past, and a new understanding of mobile context has emerged in society (Traxler, 2007). Furthermore, the concept of "learning" is also evolving. The focus in various answers to the question "What is mobile learning?" is on the mobility of technology, learners, and information. (Pachler, Cook, Bachmair, & Kress, 2010). Although various interpretations of mobile learning exist, a widely acknowledged definition states that it involves the utilization of mobile technologies to enhance the learning process. Similarly, ubiquitous learning, as commonly defined, refers to the ability to engage in learning activities regardless of time and location (Hwang, Tsai, & Yang, 2008). Despite the varying viewpoints presented in these definitions, they converge on the idea that mobile devices have a significant impact on learning endeavors, regardless of whether they take place in the field or within traditional classroom settings (Chen et al., 2009). Mobile learning provides an opportunity to establish connections between classroom and out-of-class learning. Consequently, schools are responsible for providing mobile devices to students or developing suitable tools and content for the devices they already possess (Sharples, 2013). Personal and contextual technologies enrich lifelong learning and enhance the learning experience.

The Impact of Mobile Devices

A plethora of studies consistently underscore the potential merits of mobile devices in augmenting students' knowledge and cultivating their motivation to actively engage in learning endeavors (Huang et al., 2009; Hwang et al., 2010). However, scholars have also acknowledged the challenges entailed in effectively supporting and guiding learners within educational settings that integrate real-world and digital-world learning resources (Su and Cheng, 2013). Despite these findings, there remains a lack of widespread consensus regarding the advantages and disadvantages of incorporating mobile technologies in education. According to Chu (2014), there may exist potential adverse effects of mobile learning on students' cognitive load when engaging with mobile devices in real-world scenarios. Educators have underscored the significance of "authentic learning activities" that enable students to grapple with real-world problems (Hwang et al., 2010).

In the realm of research pertaining to mobile technology in education, Frohberg, Goth, and Schwabe (2009) conducted an extensive investigation encompassing 102 mobile learning projects. Their findings revealed that the predominant share of mobile learning activities took place across diverse settings, spanning physical contexts such as classrooms, museums, and workplaces. Similarly, Wong and Looi (2011) conducted a meticulous analysis of 54 articles that focused on the utilization of mobile technologies to facilitate seamless learning. Remarkably, all 54 articles encompassed ten distinct characteristics, including both formal and informal learning approaches, personalized and social learning modalities, and learning experiences that encompassed a range of durations and locations. Furthermore, Hwang and Tsai (2011) embarked on a

comprehensive literature review of mobile learning, scrutinizing 154 articles published in six journals spanning the period from 2001 to 2010. Their findings exhibited a noteworthy surge in the adoption of mobile learning, particularly beginning from 2008. Additionally, the researchers observed a concentration of mobile learning investigations within higher education settings, with disciplines such as language, arts, engineering, and computer science emerging as the most frequently explored domains.

In recent years, an abundance of research has presented compelling evidence highlighting the positive influence of mobile devices on student learning. Common practices such as accessing Learning Management Systems (LMS) to retrieve and download learning materials, engaging in knowledge and resource exchange with peers, and communicating with teachers have been found to enhance student motivation and engagement (Balakrishnan & Gan, 2016). As a result, the increasing demand and widespread adoption of mobile devices in educational contexts have given rise to a vital area of investigation for researchers (Aharony, 2014).

Meta-analytic Perspective on the Impact of Mobile Devices on Education

Numerous systematic reviews focusing on mobile learning have centered on examining the effects of mobile devices on learning outcomes and student achievement (Hung & Zhang, 2012; Hwang & Tsai, 2011; Wu et al., 2012; Sung, Chang & Yang, 2015; Sung, Chang & Liu, 2016; Tingir et al., 2017; Kates, Wu & Coryn, 2018; Talan, 2020; Karchner, Trautner, Willeke & Schwinger, 2022; Güler, Bütüner, Danişman, & Gürsoy, 2022). Sung, Chang & Liu (2016) conducted a meta-analysis and research synthesis of 110 experimental and quasi-experimental journal articles published between 1993 and 2013. The authors reported a moderate overall effect size (mean effect size of 0.523) for the implementation of mobile devices in education. Moderator variables, such as hardware-software combinations, intervention durations, user ages, implementation settings, teaching methods, and subject domains, were thoroughly examined. In a separate meta-analytical study, Tingir et al. (2017) investigated the impact of mobile devices on student achievement in science, mathematics, and reading across grades K-12. Analyzing 14 peer-reviewed research articles published between 2010 and 2014, the researchers found that incorporating mobile devices into the instructional process yielded higher academic achievement scores across all subject areas, surpassing the outcomes achieved through traditional teaching methods. Importantly, the examination of moderator variables indicated that the use of mobile devices in reading instruction exhibited a significantly stronger effect compared to its implementation in mathematics instruction. Karchner, Trautner, Willeke, and Schwinger (2022) performed a meta-analysis of 59 experimental or quasi-experimental research designs published between 1998 and 2021, investigating the association between handheld device usage and learning-related factors, as well as academic achievement. The findings of the meta-analysis revealed moderate to high effect sizes for both learning-related factors and academic achievement. Similarly, Talan (2020) conducted a meta-analysis of 104 studies conducted between 2009 and 2019 that met the inclusion criteria. The moderator analysis suggested that the impact of mobile learning on student performance did not vary based on education level or intervention duration, but did exhibit variations based on subject matter.

Importance of Research and Research Hypotheses

The conduction of meta-analyses to scrutinize the influence of mobile devices on student achievement assumes paramount importance in providing researchers with valuable insights and guiding future investigations in this domain. Furthermore, it is imperative to explore the contemporary effects of mobile devices on student achievement in key educational subject areas to enhance the learning environments for students. The research will fill this gap in the field as it deals with the subject with a broad perspective and pluralistic moderators. Therefore, the objective of this study is to undertake a comprehensive meta-analysis to thoroughly examine the impacts of mobile devices on student achievement.

Recently, the focus of the literature is integrating mobile devices with teaching and learning on academic achievement in different disciplines and subjects: geometry (Parry & Steck, 2015), art (Lai & Hwang, 2015), biology (Yılmaz & Sanalan, 2015), clinical nursing (Wu et al., 2011; Lin & Yin, 2016, Kim & Park, 2019), architecture design (Sung et al., 2014), Culture (Hwang & Chang, 2011; Chu, 2014), English Language (Kondo et al., 2012; Hsu et al., 2013; Hsu, Hwang & Chang, 2013; Sun, Chang & Chen, 2015; Shadiey et al., 2015; Hung, Young & Lin, 2015; Cho, Lee, Joo & Becker, 2018; Chen, Chen, Jia & An, 2020; Garzon, Lee, Joo & Becker, 2023), Geometry (Parry & Steck, 2015; Sung, Chang & Yang, 2015), Geosciences (Wu, Hwang & Tsai, 2013), instructional design/technology course (Martin and Ertzberger, 2013), Language (O'Dwyer, Russell, Bebell, & Tucker-Seeley, 2005; Thornton & Houser, 2005; Jere-Folotiya et al., 2014), mathematics (Carry, 2012; Jere-Folotiya and at all, 2014; Hwang, Shadiey, Tseng & Huang, 2015; Schacter and Jo, 2016), literacy (Kim et al., 2011), Physics (İnce et al., 2015; Nikou & Economides, 2016), Programming Languages (Kert, 2011) and science (Huppert, Lomask, & Lazarowitz, 2002; Kara, 2008; Lai et al., 2009; Chu et al., 2010; Hwang, Wu & Ke, 2011; Su, & Cheng, 2013; Yang et al., 2013; Hung et al., 2014; Chen, Hwang & Tsai, 2014; Chiang, Yang & Hwang, 2014;Huang & Chiu,2015).

Several distinct variables, in conjunction with the findings derived from prior researches, were employed to examine the hypotheses posited in this study:

H₁ Integrating mobile devices in teaching and learning process have a positive effect on student achievement.

H₂ Sample group is a moderator for the positive effect of integrating mobile devices in teaching and learning process on student achievement.

H₃ School subject is a moderator for the positive effect of integrating mobile devices in teaching and learning process on student achievement.

H₄ The year of the studies is a moderator for the positive effect of integrating mobile devices in teaching and learning process on student achievement.

H₅ Type of mobile technology applied is a moderator for the positive effect of integrating mobile devices in teaching and learning process on student achievement.

H₆ Culture is a moderator for the positive effect of integrating mobile devices in teaching and learning process on student achievement.

Method

Research Design

In this study, the effect of mobile technologies on students' achievement was tested with a meta-analysis design.

Review Strategy and Criteria for Inclusion/Exclusion

In order to determine the research studies suitable for inclusion in the meta-analysis, a thorough literature review was conducted utilizing the Proquest, Science-Direct, and Ebsco databases. The review was conducted using various terms including "Ipad," "mobile assisted," "mobile based," "mobile device," "mobile learning," "mobile phone," "mobile technology," "smartphone," "tablet," "Iphone," "student achievement," and "student success" that were included in the titles of the studies. The cut-off date for the research studies included in this analysis was identified as May 2022.

The inclusion criteria for the meta-analysis are described in detail in this study. Numerous strategies were employed to identify appropriate research studies for inclusion in the meta-analysis. First, a pool of 344

research studies published between 2000 and 2022 that contained the aforementioned terms in their titles was established. Upon review of the abstracts of these studies, all were deemed suitable for inclusion in the study.

In the second stage, a detailed examination of all research studies in the pool was conducted. The search included prominent journals in the field of educational technology, such as the *British Journal of Educational Technology*, *Computers & Education*, *Educational Technology & Society*, *Educational Technology Research and Development*, *Computers in the Schools*, *Journal of Information Technology Education*, *Computers in Human Behavior*, *Research and Practice in Technology Enhanced Learning*, *The Turkish Online Journal of Educational Technology*, *The Curriculum Journal*, *International Journal of Science Education*, *Interacting with Computers*, *International journal of instructional media*, *ReCall*, *Journal of Computer Assisted Learning*, and *Technology, Pedagogy and Education*.

In the third stage, the research studies were screened according to the research method. Experimental and quasi-experimental studies were included, as the researchers aimed to combine effect values from different designs for a large sample size. Pre-test/post-test control group experimental or quasi-experimental designs were deemed more appropriate for the meta-analysis.

Following a comprehensive assessment, a total of 50 research studies were considered suitable for inclusion in the analysis, whereas 294 studies did not meet the criteria. The descriptive statistics for the 50 research studies included in the analysis are presented in Table 1.

Table 1. Characteristics of the studies included in the meta-analysis

Variables	1	2	3	4	5	6	7	Total
Publication year	2000-2005	2006-2016	2017-2021	2022-				-
	<i>n</i> 5	23	20	2				50
	% 10	46	40	4				100
Sample group/unit	University	High school	Elementary school	Primary school	Pre-school			-
	<i>n</i> 12	6	26	5	1			50
	% 24	12	52	10	2			100
Sample Group	USA	Greece	Japan	Mexico	Taiwan	Turkey	Zambia	-
	<i>n</i> 5	2	2	2	31	4	4	50
Country	% 10	4	4	4	62	8	8	100

The inclusion criteria for the research studies in the analysis study were delineated as follows:

- a) Study designs were either pre-test/post-test control group experimental or quasi-experimental
- b) Utilization of mobile technology as the key variable. The experimental group underwent an intervention involving the use of mobile devices, while the control group engaged in traditional learning methods or utilized alternative PC technologies for comparison purposes.
- c) Enough data were reported to be able to calculate effect sizes (\bar{X} , SD in each group or \bar{X} , *t*, *F*, or χ^2 values in each group).
 - a) Included in this meta-analysis were sourced from peer-reviewed journals to ensure the validity, and reliability of the manuscripts. The decision to exclude certain research studies from the meta-analysis was based on specific reasons:
 - b) Only qualitative research (Having no quantitative data)
 - c) Not having enough data was reported to be able to calculate effect sizes.

- d) Not focusing on student achievement
- e) Not focusing on mobile technologies
- f) The study was excluded if both the experimental and control groups utilized mobile device interventions, and only the teaching methods were compared.

Coding Process

The coding process employed in this study served as a crucial data organization technique aimed at identifying clear and relevant data for subsequent analysis. To accomplish this objective, a coding form was devised prior to conducting the statistical analysis, and the coding procedure was executed based on this predetermined form. The primary aim of the coding process was to establish a specific coding system that facilitated a comprehensive overview of the research studies under scrutiny, ensuring the inclusion of all pertinent characteristics of each individual study. The coding form devised for this study encompassed various categories, which comprised: (i) references pertaining to the research, (ii) information concerning the sample, (iii) the composition of the sample group, (iv) the school subject(s) involved, (v) the research design employed, (vi) the type of mobile technology utilized, (vii) the year of the study, and (viii) the country of origin (for the purpose of cultural comparison). By employing this comprehensive coding form, the researchers aimed to capture and account for all significant aspects of the research studies, ensuring a meticulous and comprehensive analysis.

Statistical Processes

The meta-analysis was conducted using the *Comprehensive Meta-Analysis* program, employing a random effect model. The effect size was calculated based on mean (\bar{X}) and standard deviation (SD) values, with the mean difference between the experimental and control groups' pre-test and post-test scores as the numerator, and the pooled standard deviation (PSD) as the denominator, as outlined by Rosenthal (1991). For studies in which data were reported as mean values (\bar{X}), t-test or F-test statistics, or chi-square (χ^2) values for each group, the calculation of effect size was performed using the formulas used by Lipsey & Wilson (2001). Since all studies included in this review adopted either experimental designs (involving randomly selected samples) or quasi-experimental designs (consisting of non-randomly selected participants), with pre-test and post-test measurements, the computation of effect sizes involved comparing the experimental group, which utilized mobile devices or other PC technologies to support the learning process, with a control group that did not employ mobile technologies. In cases where there were multiple control groups in a single study (eg. one experiment, 2 control groups), each experiment-control comparison was included in the data file if there were averages and standard deviations for each control group. Additionally, if a study compared different courses, such as science and mathematics, between the experimental and control groups, each course was treated as a separate group during the analysis of data.

Moderator Variables

In order to ascertain the statistical significance of variations among the moderators in the study, only Qb values were employed as the primary measure. This study identified five moderator variables that were hypothesized to influence the average effect size. The initial moderator variable under consideration was the composition of the sample group and its impact on the integration of mobile technologies with teaching and learning in relation to student achievement. The remaining moderator variables were *school subject*, *the year of the studies*, *the type of mobile technology used*, and *cultural factors*.

Publication Bias

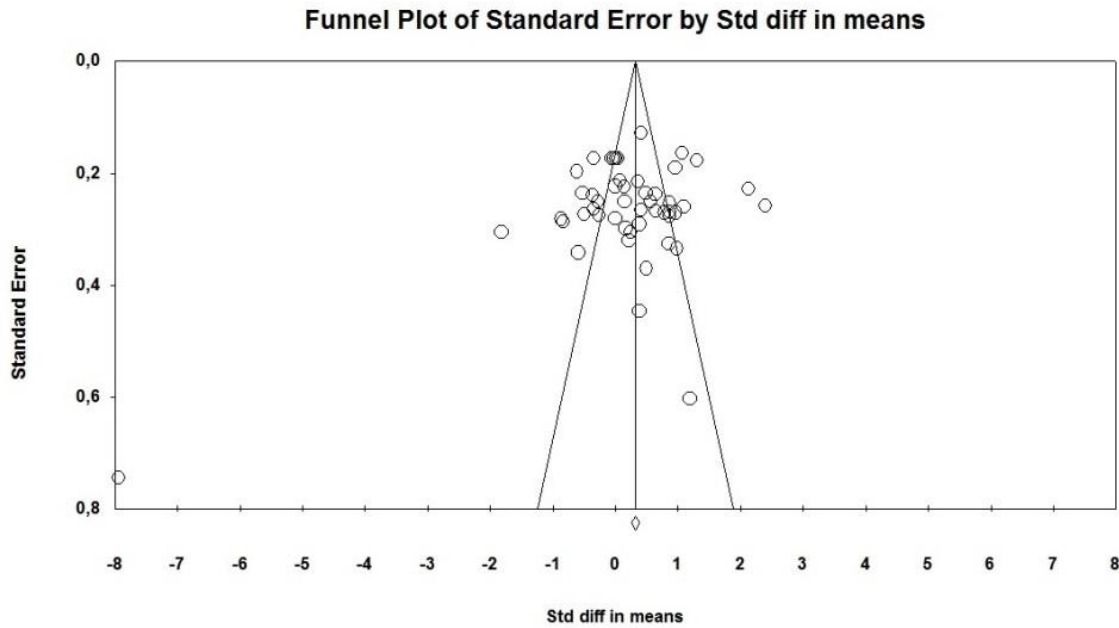


Figure 1. Effect size funnel for publication bias

Figure 1 displays a funnel plot illustrating the included studies in the meta-analysis. Notably, Figure 1 provides indications of potential publication bias influencing the research studies incorporated in the meta-analysis. An evident asymmetry in the funnel plot would be anticipated if there were a presence of publication bias. The clustering of data points primarily on one side, particularly at the lower end of the funnel, raises the possibility of publication bias in the examined research studies. However, it is crucial to note that in the current study, none of the 50 data points analyzed in the meta-analysis provided conclusive evidence of biased publication practices.

Although the funnel plot did not reveal any evidence of publication bias, Table 2 presents the results of the trim and fill test by Duval and Tweedie to determine the impact of potential publication bias on the effect sizes obtained through the random-effects meta-analysis. According to Table 2, there is no significant difference between the observed effect sizes and the imputed effect sizes derived to adjust for potential publication bias. The symmetry of the studies on either side of the center line is indicative of the absence of bias. Furthermore, since no missing studies are evident on either side of the center line, the discrepancy between the observed and imputed effect sizes is zero.

Table 2. Duval and Tweedie’s trim and fill test results

	Excluded Studies	Point Estimate	CI (Confidence Interval)		Q
			Lower Limit	Upper Limit	
Observed values		0.31	0.24	0.38	648.23
Corrected values	0	0.31	0.24	0.38	648.23

Findings

Table 3 displays the results of the meta-analysis mobile devices with teaching and learning effect on student achievement. The findings supported hypothesis H₁ which formulated that integrating mobile devices with teaching and learning there is a positive effect on student achievement. The effect size of mobile devices on student achievement was calculated as 0.28, which shows that using mobile technologies has a small effect (see Cohen, 1988) on students’ academic achievement.

The findings from the moderator analysis did not substantiate hypothesis H2, which posited that the sample group acts as a moderator in relation to academic achievement. Despite the moderator analysis indicating a lack of statistically significant differences in effect sizes across sample groups ($Qb=3.82, p>0.05$), the impact of mobile devices on academic achievement was observed to be medium for university students [$g=0.66$] and small for high school students [$g=0.26$]. Conversely, no significant effects of mobile devices on achievement were observed for preschool, primary school, and elementary school students, as indicated by the results.

Based on the results, the moderator analysis did not provide support for hypothesis H3, which proposed that the school subject acts as a moderator in the effect size of mobile devices on academic achievement. Although the moderator analysis revealed that the differences between the effect sizes across school subjects were not statistically significant ($Qb=15.38, p>0.05$), the impact of mobile devices on academic achievement was observed to be medium for science [$g=0.53$], and large for art [$g=2.40$] and physics [$g=0.86$]. Conversely, no significant effects of mobile devices on achievement were found for architecture design, biology, clinical, culture, English, geometry, geoscience, literacy, mathematics, and programming, as indicated by the results.

The study provided empirical support for hypothesis H4, which proposed that the publication year of the research moderates the effect size of mobile devices on academic achievement. The moderator analysis revealed statistically significant variations in effect sizes across different publication years ($Qb=10.95, p<0.05$). Specifically, the results demonstrated that mobile devices had a medium effect on academic achievement in studies published between 2017 and 2021 [$g=0.62$]. Furthermore, studies published between 2000 and 2005 showed a large effect of mobile devices on academic achievement [$g=0.91$]. However, no significant effects were found in studies published between 2006 and 2016, as well as around 2022 ($p>0.05$).

The moderator analysis supported hypothesis H5 which formulated that the type of mobile technology (Hardware) plays a moderator role in the effect size of mobile technologies on academic achievement. According to the moderator analysis, the effect size differences among the different mobile technology types used in research design (treatment and control groups) are statistically significant ($Qb=63.32, p<0.05$). It was found that if mobile device used in treatment group across non-mobile device used treatment group has small effect on students' academic achievement [$g=0.32$]. In addition that iPhone and non-iPhone [$g=1.70$], smart phone/non-smart phone [$g=-1.29$], smart phone/real world contexts [$g=6.33$] experimental studies have large effect on students' academic achievement. On the other hand, no significant effect of using iPad/CBI, iPod/CBI, iPad/non iPad, Tablet/non Tablet, mobile dev. (high self-efficacy)/mobile dev. (low self-efficacy), iPad mini/non iPad mini, mobile dev. / real world context, mobile dev. ev/paper based ev, mobile device/CBI, multi touch Tabletop-/ Tablet Pc, other internet capable mobile pho./non mobile device group comparisons ($p>0.05$).

The results presented in the table did not offer evidence to support hypothesis H6, which proposed that culture acts as a moderator in the effect size of mobile devices on academic achievement. The moderator analysis indicated that there were no statistically significant differences in effect sizes among the countries/cultures examined ($Qb=0.62, p>0.05$). Nevertheless, it should be highlighted that the effect of mobile devices on academic achievement demonstrated statistical significance in publications associated with vertical-collectivist countries [$g=0.25$], including those in Asia, South America, and Africa ($p<0.05$). Consequently, this study suggests that vertical-collectivist culture assumes a moderating role in the effect size of mobile devices on academic achievement.

Table 3. Findings of the mobile technologies with teaching and learning effect on student achievement: Results of meta-analysis

Variable	k	N	Effect size (g)	CI (confidence interval)		Q	Q ^b
				Lower Limit	Upper Limit		
Mobile Technology	50	4223	.28*	.04	.53	648.23*	
Moderator [Sample group]							3.82
Preschool	1	227	1.06	-.67	2.79		
Primary School	5	873	.03	-.74	.81		
Elementary School	26	1718	.14	-.21	.49		
High School	6	434	.26*	-.46	.98		
University	12	971	.66*	.14	1.18		
Moderator [School Subject]							15.38
Architecture Design	1	51	.00	-1.86	1.86		
Art	1	103	2.40*	.55	4.25		
Biology	1	249	0.41	-1.38	2.12		
Clinical (Nurse)	2	84	-.09	-1.42	1.24		
Culture	2	125	.34	-.97	1.65		
English Language	6	373	.48	-.26	1.24		
English (Listening)	3	196	-.22	-1.29	.84		
English (Reading)	1	88	.35	-1.47	2.18		
English (Vocabulary)	2	108	-.85	-2.17	.46		
Geometry	1	108	-.61	-2.43	1.21		
Geosciences	1	58	-.34	-2.20	1.50		
Inst. design/technology	2	145	-.44	-1.74	.85		
Language (Orthography)	1	202	-.05	-1.86	1.76		
Language (Spelling)	1	202	-.34	-2.16	1.46		
Language (Vocabulary)	1	201	.04	-1.77	1.85		
Literacy	2	160	.07	-1.22	1.36		
Mathematics	4	585	.36	-.56	1.28		
Physics	3	208	.86*	-.21	1.93		
Programming	1	40	.97	-.91	2.87		
Science	14	937	.53*	.02	1.04		
Moderator [Publication year of the research]							10.95*
2000-2005	5	495	.91*	.14	1.68		
2006-2016	23	1520	-.13	-.49	.22		
2017-2021	20	2120	.62*	.24	1.00		
2022-	2	44	.20	-1.01	1.42		
Moderator [Hardware used]							63.32*
iPad-CBI	1	71	-.36	-1.91	1.18		
iPod-CBI	1	74	-.52	-2.07	1.02		
iPad- non iPad	2	342	-.30	-1.37	.77		
Tablet- non Tablet	8	1318	.32	-.21	.87		
Iphone - non-Iphone	2	274	1.70*	.62	2.78		
Mobile dev.-non mob.dev.	24	1649	.32*	.00	.64		
Smart phone-non smart phone	4	225	-1.29*	-2.13	-.45		
Smart pho.-real world contexts	1	65	6.33*	4.43	8.23		
mobile dev.(high self-efficacy)-	1	41	.22	-1.38	1.82		
mobile dev.(low self-efficacy)	1	41	.22	-1.38	1.82		
iPad/mini-non iPad/mini	1	58	.40	-1.16	1.97		
mobile dev. -real world context	1	64	-.27	-1.83	1.27		

mobile dev. ev-paper based ev	1	43	.24	-1.35	1.83	
mobile device - CBI	1	45	.16	-1.42	1.75	
Multi touch tabletop-Tablet Pc	1	22	.38	-1.33	2.10	
Other internet capable mobile	1	132	.95	-.56	2.48	
Pho. –non mobile device						
Moderator [Culture]						.62
Vertical-Collectivist	39	2980	.25*	-.02	.53	
Horizontal-Individualistic	11	1243	.40	-.11	.92	

* $p < .05$

Discussion and Conclusion

This meta-analysis study sought to examine the influence of integrating mobile devices into teaching and learning on the academic achievement of students. A thorough review of the literature identified a total of 344 research studies, from which 50 were chosen for inclusion in the meta-analysis. The selected studies employed pre-test/post-test control group experimental and quasi-experimental designs, encompassing a sample size of 4,223 participants. By utilizing a random effects model, the results revealed a modest yet favorable impact of mobile technologies on student achievement. The effect size associated with mobile technologies in relation to student achievement was determined to be 0.28.

Numerous systematic reviews focused on mobile technologies have prominently emphasized the investigation of mobile devices' effects on learning outcomes and students' academic achievement (Hung & Zhang, 2012; Hwang & Tsai, 2011; Wu et al., 2012; Sung, Chang & Liu, 2016; Tingir et al., 2017). In Sung, Chang, and Liu's (2016) meta-analysis exploring the impact of mobile technology on student achievement, a moderate mean effect size of 0.52 was reported for the integration of mobile devices in educational settings. Furthermore, Tingir et al. (2017) discovered that the incorporation of mobile devices in instruction yielded higher achievement scores compared to traditional teaching methods across diverse subject domains ($g=0.48$) for students in grades K-12. Their study exhibited a broader effect size compared to our meta-analysis ($g=0.28$), which may be attributed to our investigation encompassing various educational levels. Moreover, our meta-analysis exclusively incorporated pre-test/post-test control group experimental and quasi-experimental studies, distinguishing it from the approach adopted by Cheung and Slavin (2013) in their meta-analysis on the effect of technology on student achievement, which reported a smaller effect size ($g=0.15$) in comparison to our study. Additionally, Li and Ma (2010), in their meta-analysis examining the effect of computer technologies on student achievement, reported a higher effect size ($g=0.28$) than the studies conducted by Cheung and Slavin (2013). Interestingly, the effect size we identified in our study aligns with the findings of Li and Ma (2010). The comparatively smaller effect size observed in our investigation may suggest the limitations of mobile devices relative to other educational technologies in terms of their impact on student achievement.

Based on the findings of the moderator analysis, the hypothesis proposing that the sample group acts as a moderator in academic achievement did not receive support. This finding aligns with the conclusions of Tingir et al. (2017), who also reported no significant differences among grade levels, including elementary, middle, and high school. In despite of this result the effect of mobile technologies on academic achievement was medium for university and small for high school. According to Sung, Chang & Liu (2016) young children had a high effect size on learning achievement ($g=.63$), while secondary schools ($g=.45$) had medium effect sizes. The possible reason may be that their environments provide more mobile opportunities for high school and university students. Moderator analysis results showed the school subject did not a moderator role in the effect size of the mobile technologies on academic achievement. This result shows similar to Sung, Chang & Liu (2016) stated that there was no significant effect size was obtained for using mobile devices for domain-

general abilities. In our moderator results, the effect of mobile technologies on academic achievement was medium for science, large for art and physics. According Sung, Chang & Liu (2016) science had medium effect sizes ($g = .56$) on achievement.

The impact of mobile devices on academic achievement is subject to moderation by the publication year of the research. The findings reveal a moderate effect of mobile technologies on academic achievement in studies published between 2017 and 2021. Additionally, studies published between 2000 and 2005 demonstrated a substantial effect. Hwang and Tsai (2011) observed a significant growth in research on mobile and ubiquitous learning between 2005 and 2010. Moreover, higher education students were the most frequently studied population, followed by elementary school and high school students. When a novel learning technology emerges, educational technology articles often focus on its efficacy. Notably, the increase in research on mobile learning in 2011 and 2015 signifies a significant stride towards the implementation of this technology in schools. The rise in mobile learning research enables researchers to conduct educational studies with more efficient designs and impactful content. However, it is worth noting that students have become proficient users of mobile technology.

The type of mobile technology (Hardware) plays a moderator role in the effect size of mobile technologies on academic achievement. It was found that if mobile device used in treatment group across non-mobile device used treatment group has small effect on students' academic achievement. In addition, that iPhone and non-iPhone, smart phone/non-smart phone, smart phone/real world contexts experimental studies have large effect on students' academic achievement. Sung, Chang & Liu (2016) found that handheld devices were associated with a medium effect size ($g = 0.59$), whereas laptops were associated with a low effect size ($g = 0.30$) in terms of their impact on academic achievement. Mobile devices, being personal devices, offer additional features such as cellular phone functionality, wireless connectivity, and the ability to write using special pens. In addition, many smartphone companies have started manufacturing more advanced devices with wider screens and the same features available in larger mobile devices. As a result, smartphones are now capable of functioning not only as cellular phones but also as versatile mobile devices (Huang et al., 2010).

Mobile technology possesses characteristics such as portability, ease of distribution, affordability, and the potential to serve as valuable educational resources in pedagogical contexts. In the realm of mobile learning, students engage with authentic contexts through the utilization of various multimedia elements, including sounds, videos, animations, pictures, and text, all of which are made available through mobile devices. In comparison to traditional instructional methods, mobile learning scenarios offer learners increased utility as they navigate and engage with learning materials within the digital realm. Mobile technologies empower students to effortlessly create and share content, even while on the go. Mobile learning transcends the confines of traditional learning environments, allowing learners to seamlessly integrate their educational activities into their daily lives, at their preferred time, location, and manner. One notable advantage of mobile learning is its capacity to facilitate uninterrupted and continuous learning experiences (Kim et al., 2011).

The results of the moderator analysis indicate that there are no statistically significant differences in the effect sizes of mobile devices on academic achievement among the examined countries and cultures. However, the effect of mobile devices on academic achievement was found to be statistically significant in publications associated with vertical-collectivist countries, such as those found in Asia, South America, and Africa ($g = 0.25$). This research suggests that vertical-collectivist culture plays a role in moderating the impact of mobile devices on academic achievement. The acceptance and implementation of new technologies can be likened to the process of adopting an innovation. Rogers (2003) emphasizes the importance of studying how individuals and communities adapt to innovations and the acceptance process across different individuals. Upon reviewing the studies included in the meta-analysis, it is evident that a significant portion of them were conducted in countries with a vertical-collectivist cultural orientation, including Taiwan. Table 1 illustrates

that Taiwan is the leading country in terms of publications on mobile learning, followed by the United States. Hung and Zhang (2012) also noted the dominant presence of the USA and Taiwan in publications concerning the interactivity of mobile learning. These countries may be at the forefront of investing in educational technology. For instance, the FATİH project in Turkey represents one of the notable initiatives aimed at promoting effective technology use by teachers and students through the integration of technology in education.

Limitations

There are some limitations in this meta-analysis study. Only five moderators were able to use the variable, as the research explicitly stated some of its variables from the studies. Research study pool limited 344 research studies published between 2000 and 2022. Study designs were limited as pre-test/post-test control group experimental or quasi-experimental studies. The reason for choosing this design is the effective and valid design for sees effect of mobile technologies in educational research. But some researches eliminated for not having enough data for calculate effect sizes (\bar{X} , SD in each group or \bar{X} , t , F , or χ^2 values in each group). In our data analysis, certain potential variables had to be excluded from consideration. Consequently, we recommend that researchers provide explicit reporting of data that could elucidate the significant effect of mobile devices on student achievement. It is also important for researchers to document detailed explanations of the implementation process to enhance the understanding of how mobile devices are utilized in educational contexts.

REFERENCES

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

- Aharony, N. (2014). Library and information science students' perceptions of m-learning. *Journal of librarianship and information science*, 46(1), 48-61.
- *Alkhezzi, F., & Al-Dousari, W. (2016). The impact of mobile learning on ESP learners' performance. *Journal of Educators Online*, 13(2), 73 - 101.
- Balakrishnan, V., & Gan, C. L. (2016). Mobile technology and interactive lectures: The key adoption factors. In Daniel Churchill, Jie Lu, Thomas Chiu & B. Fox (Eds.), *Mobile Learning Design* (pp. 111-126): Springer.
- *Carr, J. M. (2012). Does math achievement h'APP'en when iPads and game-based learning are incorporated into fifth-grade mathematics instruction. *Journal of Information Technology Education: Research*, 11(1), 269-286.
- *Chan, Y. F., Narasuman, S., & Selamat, N. (2022). Mediating Effects of Mobile Phone Use on the Relationship between Mobile Addiction and Academic Behavior. *International Journal of Instruction*, 15(3), 483-502.
- *Chang, C., Chang, C. K., & Shih, J. L. (2016). Motivational strategies in a mobile inquiry-based language learning setting. *System*, 59, 100 - 115.
- *Chen, C. H., Hwang, G. J., & Tsai, C. H. (2014). A progressive prompting approach to conducting context-aware learning activities for natural science courses. *Interacting with Computers*, 26 (4), 348-359.
- Chen, C. H., Hwang, G. J., Yang, T. C., Chen, S. H. & Huang, S. Y. (2009). Analysis of a ubiquitous performance support system for teachers. *Innovations in Education and Teaching International*, 46(4), 421-433.
- *Chen, C. M., Chen, L. C., & Yang, S. M. (2019). An English vocabulary learning app with self-regulated learning mechanism to improve learning performance and motivation. *Computer Assisted Language Learning*, 32(3), 237 - 260. <https://doi.org/10.1080/09588221.2018.1485708>
- *Chen, C. H., Huang, C. Y., & Chou, Y. Y. (2019). Effects of augmented reality-based multidimensional concept maps on students' learning achievement, motivation and acceptance. *Universal Access in the Information Society*, 18(2), 257 - 268.
- Cheung, A. C., & Slavin, R. E. (2013). The effectiveness of educational technology applications for enhancing mathematics achievement in K-12 classrooms: A meta-analysis. *Educational Research Review*, 9, 88-113.
- *Chiang, T. H., Yang, S. J., & Hwang, G. J. (2014). An Augmented Reality-based Mobile Learning System to Improve Students' Learning Achievements and Motivations in Natural Science Inquiry Activities. *Educational Technology & Society*, 17(4), 352-365.
- Cho, K., Lee, S., Joo, M. H., & Becker, B. J. (2018). The effects of using mobile devices on student achievement in language learning: A meta-analysis. *Education sciences*, 8(3), 105.
- *Chu, H. C. (2014). Potential negative effects of mobile learning on students' learning achievement and cognitive load-a format assessment perspective. *Educational Technology & Society*, 17(1), 332-344.
- *Chu, H. C., Hwang, G. J., & Tsai, C. C. (2010). A knowledge engineering approach to developing mindtools for context-aware ubiquitous learning. *Computers & Education*, 54(1), 289-297.
- *Chu, H. C., Hwang, G. J., Tsai, C. C., & Tseng, J. C. (2010). A two-tier test approach to developing location-aware mobile learning systems for natural science courses. *Computers & Education*, 55(4), 1618-1627.
- Churchill, D., Fox, B., & King, M. (2016). Framework for designing mobile learning environments. In Daniel Churchill, Jie Lu, Thomas Chiu & B. Fox (Eds.), *Mobile Learning Design* (pp. 3-25): Springer.
- Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences*. Hillside, NJ: Lawrence Erlbaum Associates.
- *Çelik, Ö. & Yavuz, F. (2018). The effect of using mobile applications on literal and contextual vocabulary instruction. *International Journal of Learning and Teaching*, 10(2), 126 - 136. <https://doi.org/10.18844/ijlt.v10i2.3407>
- Frohberg, D., Goth, C., & Schwabe, G. (2009). Mobile learning projects e a critical analysis of the state of the art. *Journal of Computer Assisted Learning*, 25, 307-331.

- Güler, M., Bütüner, S. Ö., Danişman, Ş., & Gürsoy, K. (2022). A meta-analysis of the impact of mobile learning on mathematics achievement. *Education and Information Technologies*, 27, 1725–1745.
- *Hsu, C. K., Hwang, G. J., & Chang, C. K. (2013). A personalized recommendation-based mobile learning approach to improving the reading performance of EFL students. *Computers & Education*, 63, 327-336.
- *Hsu, C. K., Hwang, G. J., Chang, Y. T., & Chang, C. K. (2013). Effects of video caption modes on English listening comprehension and vocabulary acquisition using handheld devices. *Educational Technology & Society*, 16(1), 403-414.
- *Huang, Y. M., & Chiu, P. S. (2015). The effectiveness of a meaningful learning-based evaluation model for context-aware mobile learning. *British Journal of Educational Technology*, 46(2), 437-447.
- Huang, Y. M., Lin, Y. T., & Cheng, S. C. (2010). Effectiveness of a mobile plant learning system in a science curriculum in Taiwanese elementary education. *Computers & Education*, 54(1), 47–58
- Huang, Y.-M., Jeng, Y.-L., & Huang, T.-C. (2009). An educational mobile blogging system for supporting collaborative learning. *Educational Technology & Society*, 12 (2), 163–175.
- *Huppert, J., Lomask, S. M., & Lazarowitz, R. (2002). Computer simulations in the high school: Students' cognitive stages, science process skills and academic achievement in microbiology. *International Journal of Science Education*, 24(8), 803-821.
- *Hung, H. C., Young, S. S. C., & Lin, C. P. (2015). No student left behind: a collaborative and competitive game-based learning environment to reduce the achievement gap of EFL students in Taiwan. *Technology, Pedagogy and Education*, 24(1), 35-49.
- *Hung, I. C., Yang, X. J., Fang, W. C., Hwang, G. J., & Chen, N. S. (2014). A context-aware video prompt approach to improving students' in-field reflection levels. *Computers & Education*, 70, 80-91.
- Hung, J. L., & Zhang, K. (2012). Examining mobile learning trends 2003–2008: A categorical meta-trend analysis using text mining techniques. *Journal of Computing in Higher Education*, 24(1), 1–17.
- *Hwang, G. J., & Chang, H. F. (2011). A formative assessment-based mobile learning approach to improving the learning attitudes and achievements of students. *Computers & Education*, 56(4), 1023-1031.
- *Hwang, G. J., Chang, S. C., Chen, P. Y., & Chen, X. Y. (2018). Effects of integrating an active learning-promoting mechanism into location-based real-world learning environments on students' learning performances and behaviors. *Educational Technology Research and Development*, 66(2), 451 - 474.
- Hwang, G. J., & Tsai, C. C. (2011). Research trends in mobile and ubiquitous learning: A review of publications in selected journals from 2001 to 2010. *British Journal of Educational Technology*, 42(4), E65–E70.
- *Hwang, G. J., Chu, H. C., Lin, Y. S., & Tsai, C. C. (2011). A knowledge acquisition approach to developing Mindtools for organizing and sharing differentiating knowledge in a ubiquitous learning environment. *Computers & Education*, 57(1), 1368-1377.
- Hwang, G. J., Shi, Y. R., & Chu, H. C. (2011). A concept map approach to developing collaborative Mindtools for context-aware ubiquitous learning. *British Journal of Educational Technology*, 42(5), 778-789.
- Hwang, G. J., Tsai, C. C., & Yang, S. J. (2008). Criteria, strategies and research issues of context-aware ubiquitous learning. *Educational Technology & Society*, 11(2), 81-91.
- *Hwang, G. J., Wu, P. H., & Ke, H. R. (2011). An interactive concept map approach to supporting mobile learning activities for natural science courses. *Computers & Education*, 57(4), 2272-2280.
- *Hwang, W. Y., Shadiev, R., Tseng, C. W., & Huang, Y. M. (2015). Exploring Effects of Multi-Touch Tabletop on Collaborative Fraction Learning and the Relationship of Learning Behavior and Interaction with Learning Achievement. *Educational Technology & Society*, 18(4), 459-473.
- *İnce, E., Güneş, Z. Ö., Yaman, Y., Kırbaşlar, F. G., Yolcu, Ö., & Yolcu, E. (2015). The Effectiveness of the IUVIRLAB on Undergraduate Students' Understanding of Some Physics Concepts. *Procedia-Social and Behavioral Sciences*, 195, 1785-1792.

- *Jeno, L. M., Vandvik, V., Eliassen, S., & Grytnes, J. A. (2019). Testing the novelty effect of an m-learning tool on internalization and achievement: A Self-Determination Theory approach. *Computers & Education*, 128, 398 - 413. <https://doi.org/10.1016/j.compedu.2018.10.008>
- *Jere-Folotiya, J., Chansa-Kabali, T., Munachaka, J. C., Sampa, F., Yalukanda, C., Westerholm, J., ... & Lyytinen, H. (2014). The effect of using a mobile literacy game to improve literacy levels of grade one students in Zambian schools. *Educational Technology Research and Development*, 62(4), 417-436.
- Kacetl, J., & Klímová, B. (2019). Use of smartphone applications in English language learning - A challenge for foreign language education. *Education Sciences*, 9(3), 179. <https://doi.org/10.3390/educsci9030179>
- Kärchner, H., Trautner, M., Willeke, S., & Schwinger, M. (2022). How Handheld Use is Connected to Learning-related Factors and Academic Achievement: Meta-analysis and Research Synthesis. *Computers & Education Open*, 100116.
- *Kara, I. (2008). The effect on retention of computer assisted instruction in science education. *Journal of Instructional Psychology*, 35(4), 357-365.
- Kates, A. W., Wu, H., & Coryn, C. L. (2018). The effects of mobile phone use on academic performance: A meta-analysis. *Computers & Education*, 127, 107-112.
- *Kert, S. B. (2011). The use of SMS support in programming education. *TOJET: The Turkish Online Journal of Educational Technology*, 10(2), 268-273.
- *Kim, P., Hagashi, T., Carillo, L., Gonzales, I., Makany, T., Lee, B., & Garate, A. (2011). Socioeconomic strata, mobile technology, and education: A comparative analysis. *Educational Technology Research and Development*, 59(4), 465-486.
- *Kondo, M., Ishikawa, Y., Smith, C., Sakamoto, K., Shimomura, H., & Wada, N. (2012). Mobile assisted language learning in university EFL courses in Japan: Developing attitudes and skills for self-regulated learning. *ReCALL*, 24(02), 169-187.
- *Lai, C. H., Yang, J. C., Chen, F. C., Ho, C. W., & San Liang, J. (2009). Mobile technology supported experiential learning. *International Journal of Instructional Media*, 36(1), 41-54.
- *Lai, C. L., & Hwang, G. J. (2015). An interactive peer-assessment criteria development approach to improving students' art design performance using handheld devices. *Computers & Education*, 85, 149-159.
- Li, Q., & Ma, X. (2010). A meta-analysis of the effects of computer technology on school students' mathematics learning. *Educational Psychology Review*, 22(3), 215-243.
- *Lin, Y. T., & Lin, Y. C. (2016). Effects of mental process integrated nursing training using mobile device on students' cognitive load, learning attitudes, acceptance, and achievements. *Computers in Human Behavior*, 55, 1213-1221.
- Lipsey, M., & Wilson, D. (2001). *Practical meta-analysis*. Thousand Oaks: Sage Publications.
- *Martin, F., & Ertzberger, J. (2013). Here and now mobile learning: An experimental study on the use of mobile technology. *Computers & Education*, 68, 76-85.
- Mergany, N. N., Dafalla, A. E., & Awooda, E. (2021). Effect of mobile learning on academic achievement and attitude of Sudanese dental students: a preliminary study. *BMC medical education*, 21(1), 1-7.
- *Nikou, S. A., & Economides, A. A. (2016). The impact of paper-based, computer-based and mobile-based self-assessment on students' science motivation and achievement. *Computers in Human Behavior*, 55, 1241-1248.
- *O'Dwyer, L., Russell, M., Bebell, D., & Tucker-Seeley, K. R. (2005). Examining the relationship between home and school computer use and students' English/language arts test scores. *The Journal of Technology, Learning and Assessment*, 3(3).
- *O'Neil, H. F., Wainess, R., & Baker, E. L. (2005). Classification of learning outcomes: Evidence from the computer games literature. *The Curriculum Journal*, 16(4), 455-474.
- Pachler, N., Cook, J., Bachmair, B. ve Kress, G. (Ed.). (2010). *Mobile learning: Structures, agency, practices*. Londra: Springer.

- *Perry, D. R., & Steck, A. K. (2015). Increasing student engagement, self-efficacy, and meta-cognitive self-regulation in the high school geometry classroom: Do iPads Help?. *Computers in the Schools*, 32(2), 122-143.
- Rogers, E. M. (2003). *Diffusion of innovations*. New York: Free Press.
- Rosenthal, R. (1991). *Meta-analytic procedures for social research*. Newbury Park, CA: Sage Publications.
- *Schacter, J., & Jo, B. (2016). Improving low-income preschoolers mathematics achievement with Math Shelf, a preschool tablet computer curriculum. *Computers in Human Behavior*, 55, 223-229.
- *Shadiev, R., Hwang, W. Y., Huang, Y. M., & Liu, T. Y. (2015). The impact of supported and annotated mobile learning on achievement and cognitive load. *Educational Technology & Society*, 18(4), 53-69.
- Sharples, M. (2013). Mobile learning: research, practice and challenges. *Distance Education in China*, 3(5), 5-11.
- Su, C. H., & Cheng, C. H. (2013). A mobile game-based insect learning system for improving the learning achievements. *Procedia-Social and Behavioral Sciences*, 103, 42-50.
- *Sun, J. C. Y., Chang, K. Y., & Chen, Y. H. (2015). GPS sensor-based mobile learning for English: an exploratory study on self-efficacy, self-regulation and student achievement. *Research and Practice in Technology Enhanced Learning*, 10(1), 23.
- *Sung, H. Y., Hwang, G. J., Liu, S. Y., & Chiu, I. H. (2014). A prompt-based annotation approach to conducting mobile learning activities for architecture design courses. *Computers & Education*, 76, 80-90.
- Sung, Y. T., Chang, K. E., & Yang, J. M. (2015). How effective are mobile devices for language learning? A meta-analysis. *Educational research review*, 16, 68-84.
- Sung, Y. T., Chang, K. E., & Liu, T. C. (2016). The effects of integrating mobile devices with teaching and learning on students' learning performance: A meta-analysis and research synthesis. *Computers & Education*, 94, 252-275.
- Talan, T. (2020). The effect of mobile learning on learning performance: A meta-analysis study. *Educational Sciences: Theory and Practice*, 20(1), 79-103.
- *Thornton, P., & Houser, C. (2005). Using mobile phones in English education in Japan. *Journal of computer assisted learning*, 21(3), 217-228.
- Tingir, S., Cavlazoglu, B., Caliskan, O., Koklu, O., & Intepe-Tingir, S. (2017). Effects of mobile devices on K-12 students' achievement: a meta-analysis. *Journal of Computer Assisted Learning*. Doi: 10.1111/jcal.12184.
- Traxler, J. (2007). Defining, Discussing and Evaluating Mobile Learning: The moving finger writes and having writ.... *The International Review of Research in Open and Distributed Learning*, 8(2).
- Viswanathan, P. (2015). What is a mobile device? Retrieved from <http://mobiledevices.about.com/od/glossary/g/What-Is-A-Mobile-Device.htm>
- Wong, L. H., & Looi, C. K. (2011). What seems do we remove in mobile assisted seamless learning? A critical review of the literature. *Computers & Education*, 57, 2364-2381.
- *Wu, P. H., Hwang, G. J., & Tsai, W. H. (2013). An expert system-based context-aware ubiquitous learning approach for conducting science learning activities. *Educational Technology & Society*, 16(4), 217-230.
- *Wu, P. H., Hwang, G. J., Tsai, C. C., Chen, Y. C., & Huang, Y. M. (2011). A pilot study on conducting mobile learning activities for clinical nursing courses based on the repertory grid approach. *Nurse Education Today*, 31(8), e8-e15.
- Wu, W. H., Wu, Y. C. J., Chen, C. Y., Kao, H. Y., Lin, C. H., & Huang, S. H. (2012). Review of trends from mobile learning studies: A meta-analysis. *Computers & Education*, 59(2), 817-827.
- *Yalçın, I., Özkurt, B., Özmaden, M., & Yağmur, R. (2020). Effect of smartphone addiction on loneliness levels and academic achievement of z generation. *International Journal of Psychology and Educational Studies*, 7(1), 208-214.

- *Yang, C. C., Hwang, G. J., Hung, C. M., & Tseng, S. S. (2013). An evaluation of the learning effectiveness of concept map-based science book reading via mobile devices. *Educational Technology & Society, 16*(3), 167-178.
- *Yilmaz, Ö., & Sanalan, V. A. (2015). Establishing a multidimensional interaction in science instruction: Usage of mobile technology. *TOJET: The Turkish Online Journal of Educational Technology, 14*(4), 38-52.

Development of the Early Childhood Cognitive Perspective Taking Test (EBAT): A Validity and Reliability Study*

Research Article

Murat TUNCER¹, Durmus ASLAN²

¹Firat University, Faculty of Education, Department of Basic Education, Elazığ, Türkiye  0000-0002-9112-3131

¹Çukurova University, Faculty of Education, Department of Basic Education, Adana, Türkiye  0000-0001-5204-7749

To cite this article: Tuncer, M., & Aslan, D. (2023). Development of the early childhood cognitive perspective taking test (EBAT): A validity and reliability study. *International Online Journal of Educational Sciences*, 15(5), 1035-1054.

ARTICLE INFO

Article History:

Received: 13.09.2023

Available online:
26.12.2023

ABSTRACT

The purpose of this research is to develop a test that measures the cognitive perspective-taking skills of children in early childhood and can be applied directly to children. Cognitive perspective-taking is a type of social skill that refers the ability of an individual to correctly predict what is going through the mind of another person by distinguishing from his/her own thoughts. It is aimed to better understand the cognitive development field by determining the cognitive perspective-taking skill levels of children and thus to contribute to early childhood education. The Early Childhood Cognitive Perspective Taking Test (EBAT) developed in this direction consists of 15 items and 60 pictures. The research group consists of 146 children aged 5-6 years, enrolled in the preschool classes of independent kindergartens and primary schools in the city center of Elazığ in the 2020-2021 academic year. Data collected through one-on-one clinical interviews with children were analyzed in SPSS and TAP programs, and the KR-20 reliability coefficient was found to be .902. Explanatory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA), item-total correlation, and item analysis were performed, as well as taking expert opinions throughout the research process for test validity. As a result of the research, it has been understood that the Early Childhood Cognitive Perspective Taking Test (EBAT) is a valid and reliable test for children aged 5-6 years.

© 2023 IOJES. All rights reserved

Keywords:

Cognitive perspective taking, social skill, test development, early childhood development

Introduction

Since human beings are social beings by nature, they need to interact with other people. Understanding the other person correctly in all kinds of communication established during these interactions is extremely

* This article is derived from Murat Tuncer's Doctoral Thesis entitled "The Effect of Interactive Book Reading Based Activities on the Cognitive Perspective Skills of Five Age Group Children" conducted under the supervision of Durmuş Aslan.

¹ Corresponding author's address: Firat Üniversitesi

Telephone: +905331449909

e-mail: murattuncer62@gmail.com

DOI: <https://doi.org/10.15345/iojes.2023.05.010>

important for the healthy conduct of human relations. However, in order to understand the other person correctly, the individual must be able to recognize the other person's point of view by getting rid of the dominance of his/her own feelings and thoughts. The ability of an individual to understand the world around by adopting the perspectives of others in order to make sense of their thoughts, feelings, and perceptions and thus direct their behaviors is called perspective-taking skill (Cigala, Mori, & Fangareggi, 2015). Studies on the development of perspective-taking skills are rooted in Piaget and Inhelder's (1956) research titled "The Child's Concept of Space". This research, which was conducted to understand children's transition from egocentrism to socio-centrism, later became known worldwide as the "Three Mountains Task". In this experiment, Piaget and Inhelder conducted clinical interviews with 100 children between the ages of 4 and 11 in order to test the visual (perceptual) dimension of perspective taking and examined the level of development of the skill according to age. In the experiment, three distinguishable mountain models of different sizes, a doll and various objects were placed on a table and chairs were placed around it. The children were then taken in turn and asked how they saw the mountains from the doll's position each time the doll's position was changed. In response, the child was shown 10 photographs depicting mountains and objects from different angles and asked to choose the correct one. As a result of the study, Piaget and Inhelder argued that before the age of 7-8, that is, in the preschool period, children are embedded in the influence of egocentrism, so they cannot take a visual perspective (Cole, Samuel, & Eacott, 2022; Cole & Millett, 2019). Although this view was accepted in scientific circles in the early years, it lost its validity in the following years as new research results proved otherwise. New research has revealed that children were not successful due to the difficult structure of Piaget's experiment and that perspective-taking skills can be developed in early childhood if the necessary social environment is provided. However, although many studies have been carried out since Piaget, especially in the international arena, it cannot be said that it has been fully systematized and all its dimensions have been adequately explained.

As is commonly accepted in the studies of the literature, perspective taking skill has three dimensions: visual (perceptual), emotional and cognitive. Cognitive Perspective Taking Skill, which is the subject of this scale development research, constitutes an extremely important one of these dimensions (Cigala, Mori, & Fangareggi, 2015). Cognitive perspective taking refers to a person's ability to represent others' mental states, including emotional states, only cognitively without being emotionally involved (Hein & Singer, 2008). For this reason, this skill, which can also be examined under the concept of cognitive empathy in some studies, can be defined as an intellectual response that enables us to understand and learn the thoughts and feelings of others. According to some researchers, cognitive perspective taking skill is also considered as the basis of emotional perspective taking skills (Eunha & Inho, 2016; Kim & Chung, 2016). For this reason, this skill, which can also be examined under the umbrella of cognitive empathy in some studies, can be defined as an intellectual reaction that allows us to understand and learn the thoughts and feelings of others. Accordingly, children who exhibit cognitive perspective taking skills can take into account how a stimulus is perceived and known by others, imagine how events are experienced by others, and incorporate this into their own individual experiences (Hinnant & O'Brien, 2007). The development of cognitive perspective taking is related to the development of vocabulary, including mental state words (think and know, etc.), syntax and communication skills. Experiences gained through interactions with others and the age factor play an important role in the development of this skill (Hein & Singer, 2008; Kim & Chung, 2016). Researches on cognitive perspective-taking skill are largely conducted on child samples. When conducting research examining skill development, child participants are shown a social interaction, usually depicted by drawing, painting, video or audio recording, and asked to develop a narrative to explain the interactions they observe. Accurate retelling of the social interaction by the child is considered evidence that the child is able to take a cognitive perspective (Trzcinski, 2021). The ability to take a cognitive perspective is an important research

topic when it is considered in terms of facilitating people to understand each other's thoughts correctly in social interactions and thus serving to carry out human relations on a more accurate basis.

However, when we look at the domestic literature, unfortunately it is realized that there are almost no studies (except; Gözün Kahraman, 2012) on this subject in Türkiye. In addition to cognitive perspective-taking skill, even the number of studies on perspective-taking skills in general is quite insufficient (Karoğlu, 2022; Körükçü ve Güngör, 2021; Cantekin, 2020; Coşkun, 2019; Derman ve diğ., 2019; Halavurt, 2019; Yalçın, 2019; Aras, 2018; Emen, 2018; Genal, 2018; Şahin, 2018; Aslan 2017). When we look at the studies conducted abroad, it is seen that various studies have been conducted on perspective taking skills (Cole, Samuel, & Eacott, 2022; Katrein, 2021; Trzcinski, 2021; Mouw ve diğ., 2020; Welsh ve diğ., 2019; Maza, 2019; Martin ve diğ., 2019; Hodges ve diğ., 2018; Sang & Nelson, 2017; Birch ve diğ., 2017), However, it cannot be said that the number of studies investigating the cognitive perspective taking dimension alone is still insufficient (Healey & Grossman, 2018; Woodbridge, 2017; Eunha & Inho, 2016; Dosch ve diğ., 2010; Hein & Singer, 2008). On the other hand, another situation that draws attention in the domestic literature is the low number of social skills tests that can be directly applied to children in Türkiye. When we look at the existing measurement tools, it is seen that tests that can be directly applied to children are mostly developed and used in fields such as psychology and medicine. Studies using direct observation as a data collection technique, data on children in the social sciences can generally be found in interviews with parents and teachers. In the light of this information, it is thought that developing a test which includes pictures will attract the child's attention and contribute to the field in terms of facilitating the collection of data on early childhood in order to access data about the child first-hand and more efficiently. In conclusion, the aim of this study was to develop a valid and reliable test that directly measures the cognitive perspective taking skills of 5-6 year old children in early childhood. The test developed for this purpose was named "Early Childhood Cognitive Perspective Taking Test (EBAT)".

Methodology

This research is a test development study. Tests used as measurement tools refer to the measurement of the maximum/limit competence that an individual whose data are collected can exhibit in the face of a specific task or problem compared to other participants (Erkuş, 2010).

Research Group

The research group consisted of 146 children in the 5-6 age group who were studying in independent kindergartens and preschools of state-affiliated primary schools in Elazığ city center. Demographic information about the research group was collected through the "Personal Information Form" developed by the researchers. This information which was collected under five variables, namely "Gender, Age, Mother's occupation, Father's occupation, and Duration of preschool education", is presented below in tables (Tables 1-5);

Table 1. EBAT Research Group Gender Variables

Gender	<i>f</i>	%
Female	80	54.8
Male	66	45.2

Table 1 indicates that, the number of girls in the study group for the test development application is higher than the number of boys.

Table 2. EBAT Research Group Age Variables

Age	<i>f</i>	%
Age 5	74	50.7
Age 6	72	49.3

Table 2 indicates that, the numbers of 5 and 6 year old children in the research group are almost equal.

Table 3. EBAT Research Group Mother's Occupation Variable

Occupational Group	<i>f</i>	%
Housewife	59	40.4
Teacher	24	16.4
Healthcare worker	22	15.1
Other civil servant	10	6.8
Engineer	9	6.2
Private sector	7	4.8
University graduate (<i>not working</i>)	3	2.0
Adjudger	2	1.4
Other	10	6.8
Total:	146	100

Table 3 indicates that, the majority of the mothers of the children in the research group are housewives, followed by teachers and healthcare workers.

Table 4. EBAT Research Group Father's Occupation Variable

Profession	<i>f</i>	%
Private sector	29	19.9
Engineer	17	11.6
Teacher	16	11.0
Police Officer	15	10.3
Other Civil Servants	13	9.0
Healthcare Worker	10	6.9
Self-employed	8	5.5
Finance	8	5.5
Courthouse employee	5	3.4
Technician	4	2.8
Laborer	4	2.8
Academician	3	2.0
- (no father)	3	2.0
Prosecutor	2	1.4
Other	9	6.2
Total:	146	100

Table 4 indicates that the highest percentage of fathers of children in the research group are private sector employees and engineers, followed by teachers, police officers and other public servants.

Table 5. EBAT Research Group Preschool Education Duration Variable

Duration	<i>f</i>	%
0 year	63	43.2
1 year	52	35.6
2 years	23	15.8
3 years	6	4.1

4 years	2	1.4
Total:	146	100

Table 5 indicates that the majority of the children in the research group had not received any preschool education prior to the kindergarten in which they were enrolled. It is also notable that a considerable number had received approximately one year of preschool education beforehand.

Data Collection Tool

The "Early Childhood Cognitive Perspective Taking Test (EBAT)" developed by the researchers was used for data collection.

Early Childhood Cognitive Perspective Taking Test (EBAT): The test consists of 15 items and a total of 60 (15x4) pictures, 4 pictures for each item. The pictures of the items are structured as a narrative pattern describing events that children are likely to encounter in their natural daily lives. EBAT is a test that can be applied by conducting one-to-one clinical interviews with children aged 5-6 years in early childhood. While administering the test, the researcher first shows the pictures related to the item to each child and allows the child to examine the pictures, make comments or ask questions. Then, researcher explains the plot to the child by pointing with finger from the first picture to the fourth picture for each item. After making sure that the event described in the picture is understood correctly, the researcher covers the picture showing the key point of the event with hand. The researcher then asks the child, "If we invite a friend from outside and show him/her only these three pictures, what do you think he/she will think?". At that time, in order to make the child feel more comfortable and to make the interview more fun, the child can be given the opportunity to choose the friend we assume that the child has invited in. The aim here is for the child to be able to independently predict from his/her own point of view how a friend who has not seen all the pictures might respond if he/she is called in and listens to the event with an incomplete picture. In other words, the child's ability to correctly predict the cause-effect relationship that a friend can establish with incomplete information means the demonstration of the relevant skill. Therefore, the researcher's expectation was that the interviewed child would give any response different from the event that took place in the covered picture. To accurately infer the thoughts of others, a child must overcome their own egocentrism. To measure cognitive perspective taking skill in a healthy way, measures were taken at this point to prevent correct answers that might have been given by chance. Accordingly, the pictures for all items in the test were designed in such a way that when the part showing the key point of the event was covered, the hidden information could not be easily guessed. In other words, each picture that is covered by hand includes a drawing of an unusual moment (e.g. a turtle coming out from under a book that has fallen on the floor). In the interviews, the child is given 1 (one) point for each correct answer and 0 (zero) point for each incorrect answer. As a result, the maximum score that can be obtained from the test is 15 (fifteen).

Development of the Data Collection Tool

A number of scientific steps were followed by the researchers in the development of the EBAT. First, a detailed literature review was conducted on the development of cognitive perspective-taking skill in early childhood and the development of an assessment tool for measuring this skill of children. In these reviews, in addition to cognitive perspective-taking skill, perspective-taking skills in general were also examined and it was investigated whether there are measurement tools for children on these issues. In the reviews, it was noted that the existing studies are generally concentrated in the fields of psychology, neuro-imaging, diagnostics, and medicine under the title of perspective taking, except in the field of early childhood development. In addition, although various studies have been conducted abroad, it can be said that studies in our country have started to increase in recent years, but scale development studies that are specific to the field and can be

directly applied to the child are almost non-existent except for a few studies. Accordingly, it was observed that the "Empathy Scale for Children (ESC). developed by Köksal Akyol and Aslan (2014) and the "Perspective Taking Test for Children (ÇBT)" developed by Aslan and Köksal Akyol (2016) were frequently used in the studies on this subject. Apart from these scales, there are also a few adapted scales in the literature that have been used in relation to perspective taking skills. The first of these scales is the "Theory of Mind Scale" developed by Wellman and Liu (2004) and adapted into Turkish by Gözün Kahraman (2012). In addition, the "Perspective Taking Test" developed by Kurdek and Rodgon (1975) was adapted into Turkish by Şener (1996) and a validity and reliability study was conducted by Akın (2002). Finally, the "Empathy Quotient Scale for Children (ÇEBÖ)" developed by Auyeung et al. (2009) and adapted into Turkish by Altun, Değerli, Çıkrıkçı, and Kınık (2018) can be given as an example of domestic studies related to the subject of our research. As can be seen, the number of original scale development studies measuring cognitive perspective taking skills in early childhood is not sufficient in our domestic literature. Considering the fact that data are usually collected through parents and teachers in studies conducted on preschool children, the development of measurement tools that obtain data directly from the child is becoming more and more important.

As a result, considering the need for better recognition of cognitive perspective taking skill, which is a type of social skill, in our country and the need for measurement tools for this skill, it was aimed to contribute to the field by developing EBAT. After a comprehensive literature review, test items were determined, pictures were drawn for the items, data were collected (trial applications), and data were analyzed (validity and reliability analyses). In addition, expert opinions were utilized in all steps of the test development process.

Determination of Test Items

In order to determine the test items, it was first decided to create an item pool. While creating the item pool, criteria such as the items' suitability for the early childhood period, including supported behaviors, being able to fully measure the skill under investigation, being suitable for widespread use, and being internationally adaptable were taken as basis. In addition to these, care was taken to ensure that the items addressed events that children are likely to encounter in environments where they spend a lot of time in their daily lives. Accordingly, first the physical environments where 5-6 years old children usually spend time during the day were identified. In order to make the test adaptable to different cultures, it was decided that these environments would be common areas for all children. Considering the equal distribution of indoor and outdoor spaces, environments such as home environment (living room, dining room, children's room, balcony and garden), neighborhood, kindergarten, kindergarten garden, nature, natural life park, bicycle path for children were determined. Another criterion taken into consideration when creating the item pool was gender distribution. In order to prevent gender-based internalizations that may reduce the validity of the test, both because gender equality is important and because the tested skill is 'perspective taking', the number of male and female characters depicted in the items was kept equal. All these criteria were taken into consideration and an item pool of 50 items was initially created. Afterwards, expert opinions of 5 faculty members from the field of preschool education and 3 faculty members from the field of measurement and evaluation were obtained to ensure item validity. In addition, the expert opinions of 9 preschool teachers working in public and private kindergartens were also sought to support test validity. After the item and factor analyses were conducted, the number of items was reduced to 15. Thus, in its final form, 15 items were identified in the EBAT to be directly applied to children in the 5-6 age group in the early childhood period. Finally, since there are 4 pictures for each item in the test, there are 60 (15x4) pictures in the EBAT. The process of drawing the pictures is explained in detail below.

Drawing Pictures Related to Test Items

An illustrator was hired to draw the pictures for the items in the EBAT. In addition to the professional experience of the illustrator, personal characteristics such as having two children, a boy and a girl, were also

effective in terms of recognizing the nature of the child. The purpose and the way the test was administered were explained to the illustrator in detail during the first interview. In addition, the development of the 5-6 years old children constituting the research group and the issues to be considered about children's pictures were mentioned and the importance of the pictures being suitable for the early childhood period was emphasized. Then, the instructions of the items were read together by the researchers and the illustrator and ideas were discussed on how the pictures should be prepared. At the end of the interview, a sample of the test was given to the illustrator and she was asked to review it again. During this time, the illustrator was allowed to make various preparations. In the following interviews, the questions the illustrator was curious about were clarified and it was ensured that the purpose of the research and the structure of the test were well understood. In the first stage of the drawings, the illustrator created sketches in accordance with the instructions by visualizing the pictures suitable for the items. Throughout the drawing process, the pedagogical appropriateness of the drawings was checked by the researchers. In addition, attention was paid to issues such as originality, gender distribution, unity between the drawings, drawing the characters in different items in different ways, and the ability of the drawings to attract children's attention. Accordingly, the main characters were portrayed as girls in some pictures and boys in others, ensuring equal gender distribution. Thus, it was tried to prevent the gender-oriented illusions of the children interviewed in the test trial applications that could negatively affect the validity of the test. On the other hand, in order to prevent children from making any associations between the pictures of different items, the physical characteristics (height, facial structure, hair structure, clothing, etc.) of the characters depicted in each item were designed and drawn in a distinctive way. In addition, the pictures were painted with various colors in pastel (light) tones. Thus, it was aimed to focus the child's attention on the drawing during the administration of the test and to prevent the child from getting bored. Finally, utmost care was taken to ensure that the pictures visualized the event described in the test items in a way that could measure the exact event described in the test items, rather than artistic concerns. For this purpose, each picture was first sketched, evaluated by the researchers and the illustrator together, shown to a girl and a boy in the 5-6 age group, checked for comprehensibility, and necessary corrections were made. After these procedures, the drawings were presented to the expert opinions of 5 faculty members from the field of preschool education and 3 faculty members from the field of visual arts education, as well as 9 preschool teachers. As a result of making the necessary corrections in line with the expert opinions, 60 drawings for the 15 items in the test were completed and the EBAT was ready for trial applications.

Data Collection (Trial Applications)

In order to collect data, the researchers conducted face-to-face clinical interviews with 146 children in the 5-6 age group in the early childhood period. These interviews were conducted in public and private independent kindergartens and primary schools with kindergartens within the framework of volunteerism by obtaining the necessary Ministry of National Education permissions and Ethics Committee Approval. At the beginning of the research the purpose, content and scope of the study were explained to the parents in detail, and official permission and ethics committee approval documents were presented through school administrators. In the meantime, parents were asked for permission to audio record the interview forms for later verification. Audio recordings were taken during the interviews with the children for whom parental permission was obtained.

In order to conduct the interviews at the ideal time when children were most productive, their teachers were consulted and it was decided to start the interviews at 11:00 am before noon. In order to make the children feel comfortable, each child was introduced to each other before the interview and a short conversation was held. Again, for this purpose, the test trials were conducted one-on-one with the child in another kindergarten close to the child's own classroom and in a quiet kindergarten, using kindergarten table chairs. An interview recording form prepared separately for each child was filled in during the practices. At the beginning of the

interview, the EBAT test booklet was shown to each child and the following statement was made: "There are very beautiful and colorful pictures in this book. Now I am going to show you those pictures and tell you their stories, but in some places I will need your guesses about the event described in the picture. Come on, let's get started!" During the interventions, before each item, the child was given the opportunity to examine the picture related to the question, and if there was anything he/she wanted to say about what he/she saw in the picture or the event described in the picture, it was discussed. In addition, during the interviews, it was observed that some children needed to play and move around. In such cases, short breaks were given so that the child would not get bored with the interview and could fulfill his/her need for movement. If a child did not want to participate or continue the interview, the interview was terminated and the interview record was excluded. These interviews, which were conducted within the framework of test trial applications, lasted an average of 35-40 minutes for 5-year-old children and 25-30 minutes for 6-year-old children.

Data Analysis

In order to ensure the validity and reliability of the test, expert opinions were first taken and necessary arrangements were made accordingly. During the process of receiving expert opinions, no item was excluded from the test. After this process, EBAT trial applications were carried out on 146 children. For data analysis, the data obtained from these interviews were categorized according to age groups (5 and 6 years old), and the accuracy of the data was confirmed by matching the interview recording forms and audio recordings. Then, the collected data were transferred to the SPSS (Statistical Package for the Social Sciences) program to create a data set. For the validity of the test, factor analysis procedures were carried out using SPSS software. Factor analysis (FA) can be defined as a multivariate statistic that aims to find and discover a small number of conceptually meaningful new variables (factors, dimensions) by bringing together many interrelated variables (Büyüköztürk, 2002). For this reason, the test development process was completed with 15 items determined as a result of the factor analysis performed on the 50-item item pool. After these procedures in SPSS, TAP (Test Analysis Program) was used for item difficulty and item discrimination analyses, which constitute another validity evidence of the test. The data were analyzed separately for each age group in TAP. Kuder Richardson-20 (KR-20) reliability coefficient was used for the reliability analyses showing the degree of 'freedom from errors' of the test since the data structure was 1-0.

Findings

In the analysis of the data, first the reliability of the 74 data in the 5-year age group was examined and it was seen that the KR-20 score was .89. It was determined that the item discrimination indices of TAP, 2nd, 5th, 5th, 6th, 6th, 7th, 7th, 8th, 10th, 10th, 17th, 42nd, 45th, 46th, 49th, 50th items were low. These items were noted to be re-processed after the situations in the other age group. Then, the same process was applied for the remaining 72 data as a result of deleting 1 extreme value from 73 data in the 6-year age group. The KR-20 reliability score was found to be .83. In this age group, the discrimination indices of items 1, 2, 5, 6, 7, 8, 10, 11, 17, 18, 23, 24, 26, 29, 32, 37, 39, 41, 42, 43, 44, 46, 49, 50 were low. Following these results, the common items that TAP predicts to be removed between 5 and 6 years old (low discrimination) were identified and excluded from the analysis, and the reliability for 5-6 years old was re-examined. When the 2nd, 5th, 6th, 7th, 8th, 10th, 17th, 42nd, 46th, 49th, 50th, 42nd, 46th, 49th, 50th items were excluded from the analysis, it was seen that the KR-20 reliability score for ages 5-6 increased to .90. This shows that the test being developed has a very high reliability for 5 and 6 years old children.

Descriptive Statistics Related to Data

In the trial applications conducted for the development of EBAT, a total of 146 students in the 5-6 age group were administered the test and the data were coded as 1-0. Before proceeding with the item analysis,

descriptive statistics for the 5-6 age group data are presented below in two different tables: age groups together (Table 6.) and age groups separately (Table 7.);

Table 6. Descriptive Statistics Related to 5-6 Ages Data

Number of Students	146
Maximum Score	50
Lowest Score Received	19
Highest Score Received	50
Median	41
Mean	39.11
Standard Deviation	7.16
Variance	51.36
Skewness	-.75
Kurtosis	-.34

When the descriptive statistics for the 5-6 ages data are examined in Table 6, it is seen that the mean value of the data is 39.11 out of 50. This value shows that the achievement level of the children participating in the research is high. On the other hand, the fact that the value obtained by dividing the kurtosis and skewness coefficients, which are important values for normality, by the standard error is between -3 and +3 values shows that the data are close to normal distribution.

Table 7. Separate Descriptive Statistics for 5-6 Age Data

Feature	Age 5	Age 6
Number of Students	74	72
Maximum Score	50	50
Lowest Score Received	19	24
Highest Score Received	48	50
Median	38	43
Mean	36.70	41.59
Standard Deviation	7.79	5.44
Variance	60.72	26.60
Skewness	-.37	-.95
Kurtosis	-1.02	.64

When the descriptive statistics for the 5-6 age group data are analyzed separately, it is seen that the mean values of both data are 36.70 and 41.59 out of 50, respectively. These values show that the achievement levels of the 6-year-old children participating in the research are higher than those of the 5-year-old children. On the other hand, the kurtosis and skewness coefficients, which are important values for normality, are between -3 and +3 values, indicating that the data are close to normal distribution.

Item analysis is a statistical procedure used when developing a measurement analysis. Item analysis refers to the examination of whether each item in the measurement tool is suitable for the psychological structure determined at the beginning. In this examination process, it is examined whether the items distinguish between the ones that show the feature to be measured and the ones that do not, whether they are in the right dimension and their place in the relevant dimension (Erkuş, 2007). Before the item analysis results are presented, the general results are summarized in Table 8;

Table 8. General Results of Item Analysis

Number of Items Analyzed	50
Average Item Difficulty	.78
Average Item Discrimination	.34

Item Discrimination (Double Series)	.36
-------------------------------------	-----

When Table 8 is examined, it is seen that the average item difficulty is .78. As the item difficulty value approaches 1, the items become easier, and as it approaches 0, the items become more difficult. Considering the average item difficulty, it can be said that the items are easy according to the children's levels. On the other hand, when we look at the item discrimination values, which is the level of discrimination between students who know and those who do not know, it is seen that the item discrimination value is .34. An item discrimination value between .30 and .39 can be interpreted as an acceptable value (Tekin, 1977). In other words, it shows that the test (EBAT) has a high discriminating power between students who know and who do not know.

For item-based examinations, the discrimination and difficulty values of all items were calculated and presented in Table 9;

Table 9. Results of Item Analysis

Items (1-25)	Substance Difficulty	Substance Discrimination	Items (26-50)	Substance Difficulty	Substance Discrimination
Item 01	.99	.24*	Item 26	.84	.25*
Item 02	.55	.05*	Item 27	.46	.32
Item 03	.54	.48	Item 28	.68	.73
Item 04	.53	.32	Item 29	.98	.22*
Item 05	.99	.07*	Item 30	.64	.63
Item 06	.95	.13*	Item 31	.68	.75
Item 07	1.00	*****	Item 32	.98	.30*
Item 08	.98	.15*	Item 33	.74	.45
Item 09	.55	.56	Item 34	.68	.74
Item 10	.97	.07*	Item 35	.40	.21*
Item 11	.98	.16*	Item 36	.75	.71
Item 12	.66	.68	Item 37	.98	.30*
Item 13	.36	.21*	Item 38	.73	.72
Item 14	.71	.48	Item 39	.92	.26*
Item 15	.62	.66	Item 40	.68	.70
Item 16	.76	.35	Item 41	.99	.18*
Item 17	.99	-.05*	Item 42	.45	.11*
Item 18	.89	.29*	Item 43	.74	.32
Item 19	.60	.69	Item 44	.99	.20*
Item 20	.95	.27*	Item 45	.90	.13*
Item 21	.79	.33	Item 46	.99	.05*
Item 22	.72	.71	Item 47	.71	.75
Item 23	.99	.23*	Item 48	.81	.50
Item 24	.93	.21*	Item 49	.79	.04*
Item 25	.65	.69	Item 50	.95	.12*

n=50

When Table 9 is examined, first of all, according to the item analysis results, 27 items were excluded from the analysis because the items with item discrimination levels of .30 and below had low discrimination. These items are; items 1, 2, 5, 6, 7, 8, 10, 11, 13, 17, 18, 20, 23, 24, 26, 29, 32, 35, 37, 39, 41, 42, 44, 45, 46, 49, and 50. After the items were excluded from the analysis, the item analysis was repeated and presented in Table 7;

Table 10. Item Analysis with Revised Data

Items	Substance Difficulty	Substance Discrimination	Items	Substance Difficulty	Substance Discrimination
Item 03	.54	.60	Item 28	.68	.87
Item 04	.53	.45	Item 30	.64	.75
Item 09	.55	.77	Item 31	.68	.87
Item 12	.66	.82	Item 33	.74	.44
Item 14	.71	.57	Item 34	.68	.85
Item 15	.62	.85	Item 36	.75	.74
Item 16	.76	.36	Item 38	.73	.85
Item 19	.60	.90	Item 40	.68	.85
Item 21	.79	.28	Item 43	.74	.37
Item 22	.72	.85	Item 47	.71	.85
Item 25	.65	.90	Item 48	.81	.44
Item 27	.46	.31			

Number of items excluded from the analysis= 27

Number of items analyzed= 23

Average item difficulty= .67

Average item discrimination= .68

Item discrimination (double series)= .60

KR-20 (Alpha)= .92

When Table 10 is examined, it is seen that both the average discrimination and KR-20 reliability coefficient increased. As a result of the item analysis, the item discrimination levels of all items increased. After this stage, EFA was conducted for construct validity evidence.

Exploratory Factor Analysis (EFA) Results

For the validity of the test, Exploratory Factor Analysis (EFA), which is frequently used in test development, was used. EFA can be defined as a multivariate statistic that aims to discover a small number of conceptually meaningful new variables (factors, dimensions) by bringing together a large number of interrelated variables (Büyüköztürk, 2002). Kaiser-Meyer-Olkin (KMO) test was conducted to test the suitability of the sample size for factorization. As a result of the analysis, it was determined that the KMO value of the sample of 146 participants was .94. In line with this finding, it was concluded that the sample size was 'perfect' for factor analysis (Tavşancıl, 2006; Çokluk, Şekercioğlu, & Büyüköztürk, 2012). On the other hand, Bartlett's Test of Sphericity result is also significant [χ^2 :1570.53.p<.01]. It was concluded that the data set was 'suitable for factor analysis'.

In order to reveal the factor pattern of the scale, Principal Component Analysis was chosen as the factorization method and Varimax, one of the orthogonal rotation methods, was chosen as the rotation method. In the factor analysis conducted to reveal the factor pattern of the scale, the acceptance level for factor loading values was determined as .32. As a basic rule, the loading value of each variable should be .32 and above (Tabachnick & Fidell, 2001). The items with factor loadings below .32 and overlapping items were removed and the analysis was repeated. The criterion that can be taken for overlapping items to enter more than one factor is that there should be at least .10 difference between the factor loadings (Tavşancıl, 2006). When the scree plot graph is examined, the eigenvalue is greater than 1 and the break is from the 1st point shows that the structure is suitable for a single factor structure. Therefore, the analysis was limited to one factor and repeated. As a result of the second factor analysis, the total variance explained was found to be 58.15%. As a result of these procedures, 8 items were excluded. As a result, the EBAT scale was determined as 15 items with a single factor and presented in Table 11;

Table 11. EFA Results of the Cognitive Perspective Taking Test in Early Childhood

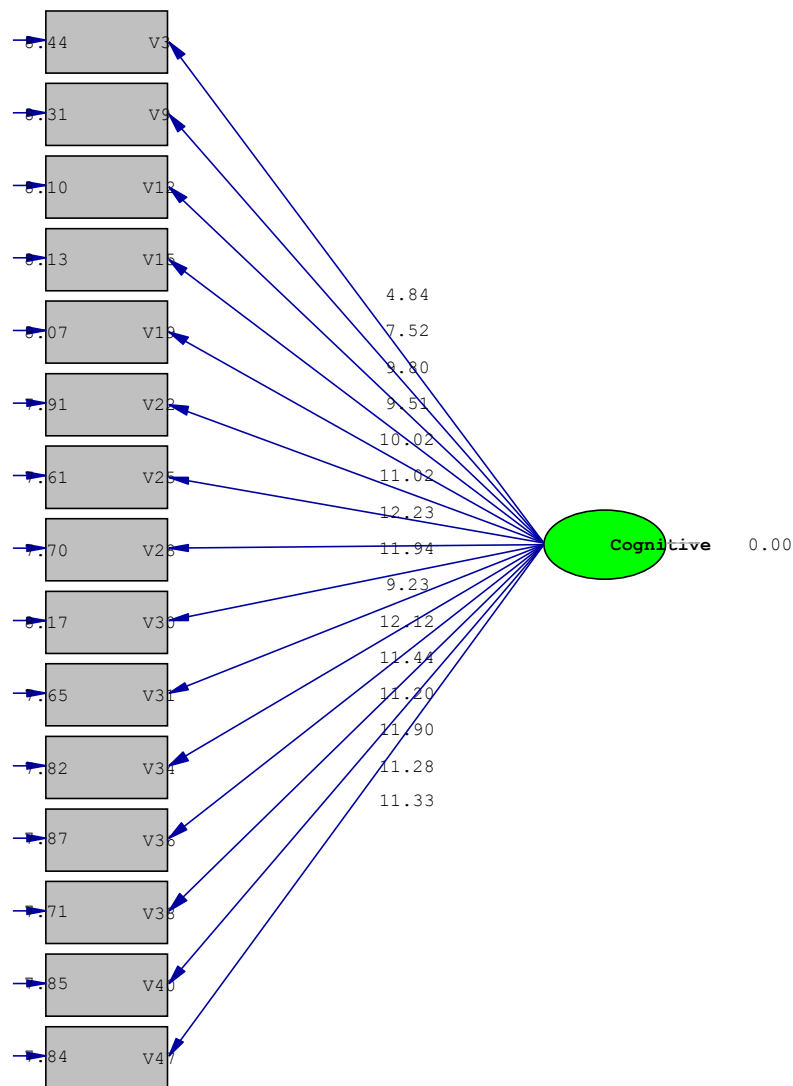
Factor: Early Childhood Cognitive Perspective Taking Test (EBAT)	Rotated Factor Loadings	Item-Total Correlation
Item 3	.44	.19
Item 9	.63	.39
Item 12	.75	.56
Item 15	.73	.53
Item 19	.76	.57
Item 22	.80	.64
Item 25	.84	.71
Item 28	.83	.68
Item 30	.71	.51
Item 31	.84	.70
Item 34	.81	.65
Item 36	.80	.63
Item 38	.82	.68
Item 40	.80	.64
Item 47	.80	.65

Eigenvalue= 8.72 and Explained Variance= 58.15%

χ^2 :1570.53.p<0.01 and KMO: .94

Confirmatory Factor Analysis (CFA) Results

Confirmatory Factor Analysis (CFA) was conducted using LISREL software in order to verify the structure obtained from EFA for the test development process. CFA is an analysis that tests whether a previously defined and delimited structure is confirmed as a model (Brown, 2006). CFA was applied to determine how well the one-factor structure determined by EFA fit. As a result of CFA, the fit indices were χ^2 =261.27 [sd=90, p< .001], [χ^2 /sd]=2.90, RMSEA= .11, GFI= .81 and AGFI= .74. The coefficients of item-factor relationships calculated by CFA are shown in Figure 1.



Chi-Square=261.27, df=90, P-value=0.00000, RMSEA=0.115

Figure 1. CFA results for EBAT

When the CFA results are analyzed, $\chi^2/df=2.90$ means that the tested structure shows 'perfect' fit (Kline, 2005). Another fit index, RMSEA= .11, indicates a 'good' fit (Hu & Bentler, 1999; Thompson, 2004). In the literature, it is stated that GFI and AGFI values close to 1 are indicators of 'excellent' fit (Hooper, Coughlan, & Mullen, 2008; Kelloway, 1998; Schumacker & Lomax, 1996; Sümer, 2000). In this research, GFI= .81 and AGFI= .70 and these values were accepted as 'adequate'.

Conclusion, Discussion and Recommendations

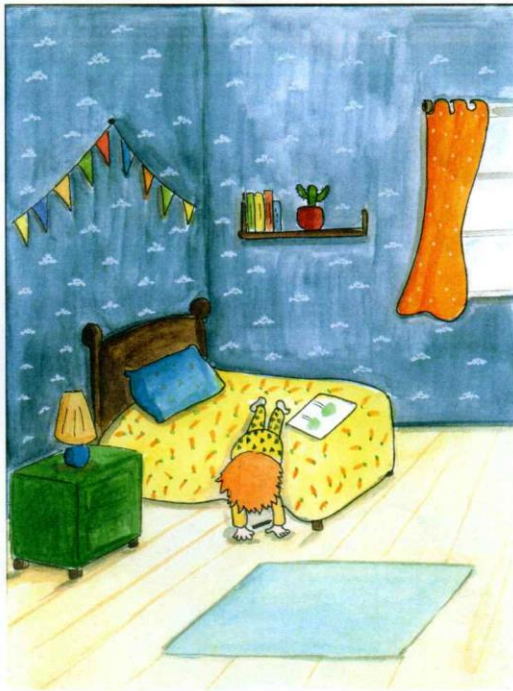
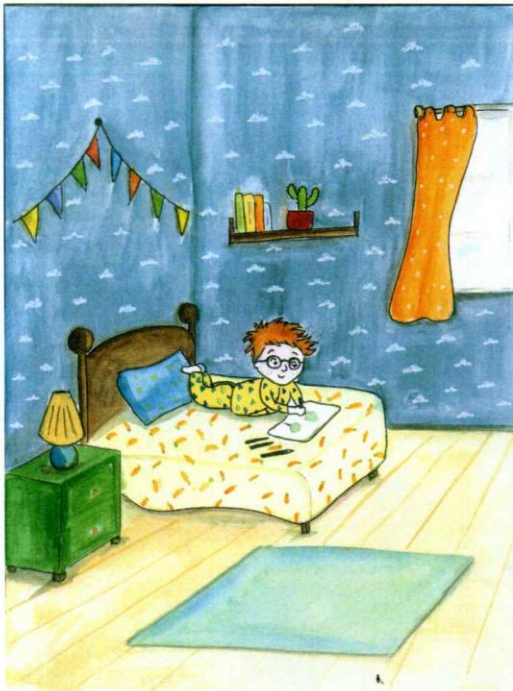
The aim of this research is to develop a valid and reliable test that can be directly applied to children and that measures the cognitive perspective-taking skills of children in the 5-6 age group in early childhood. For this purpose, an item pool of 50 items was first prepared. While preparing the item pool, considering that the test will be applied directly to the child, the items were considered to be suitable for early childhood, to include supported behaviors, to measure cognitive perspective taking skills accurately, and to be suitable for widespread and international use. In line with these criteria, the items were created for the common physical spaces where 5-6 years old children usually spend time in their daily lives and the events they are likely to experience. In addition, the gender distribution of the main characters mentioned in the items was kept equal. As a matter of fact, in a study conducted by Oruç, Tecim, and Özyürek (2011) on the personality development

of preschool children, children were made to watch cartoons and it was observed that children adopted cartoon heroes of their own gender more. Therefore, such a measure was taken in order to prevent such gender-related internalizations from affecting the validity of the research and thus the principle of gender equality was respected. After the 50 items in the item pool were determined in line with the expert opinions, the process of drawing the pictures related to these items was started. For this purpose, an expert illustrator was hired and the necessary information was given about the purpose and scope of the study, the structure of the test and the suitability of the drawings for early childhood. After ensuring the expressiveness of the items and pedagogical controls of the drawings, the drawings were presented to the expert opinions of faculty members working in the field of preschool education (5) and visual arts (3) and preschool teachers (9). After the necessary corrections were made in line with the expert opinions, the trial applications of the EBAT were started.

A total of 146 students in the 5-6 age group studying in independent kindergartens and preschools of primary schools were administered the test. Thus, validity and reliability evidence for the test was obtained. For reliability, since the responses to the items were 1-0, the KR-20 reliability coefficient was used and its value was found to be .92. This result means that the reliability of the developed measurement tool is quite high (Büyükoztürk, 2023; Ensari & Bayrak, 2023). On the other hand, within the scope of item and test statistics, item discrimination and difficulty values were calculated and inappropriate items were removed from the test. After the items were removed, the average discrimination of the test was calculated as .68 and the average difficulty was calculated as .67. These values lead to the conclusion that the items in the test were created in accordance with their purpose and that it is a scale with high validity for children in the 5-6 age group in the early childhood period. Exploratory Factor Analysis (EFA) was conducted in the context of the evidence for the validity of the test and it was determined that the factor structure was appropriate. On the other hand, Confirmatory Factor Analysis (CFA) was applied to confirm the structure obtained from EFA and it was concluded that the structure obtained was confirmed. As a result of the analysis of the data obtained from the trial applications, it was determined that EBAT is a test with high validity and reliability.

This test can be used as a data collection tool in new studies on cognitive perspective taking or perspective taking skills in early childhood. In addition, EBAT can be utilized in the development of different measurement tools that can be applied directly to the child to measure the level of social skills in early years. In addition, by determining the perspective-taking skills of preschool children, the social skills training given in the classroom and home environment can be evaluated. Therefore, since the child's social skills development level can be known during the transition from kindergarten to the first grade of primary school, it becomes possible to make the necessary interventions. As a result, with this test, it is aimed to respond to the need for a measurement tool that can be applied directly to the child, especially in our national literature, and to contribute to the field of early childhood development.

APPENDICE: EBAT Sample Item



APPENDICE: EBAT Sample Item (continued)

ITEM 14.

Directive 14;

- The researcher shows the child the pictures and allows him/her to examine them. If there is anything the child wants to ask or tell about the pictures, the researcher talks with the child about it. After that, the researcher tells the child about the event drawn in the pictures. According to this;
 - ✚ **In the first picture;** the child is lying on the bed and drawing a picture.
 - ✚ **In the second picture;** one of the child's crayons falls on the floor and the child bends under the bed to pick it up.
 - ✚ **In the third picture;** when the child looks under the bed, he sees the guitar his mother bought him as a gift and realizes that he hid it there. (The third picture will be covered by hand later.)
 - ✚ **In the fourth picture;** the child joyfully goes to his mother and hugs her.
- After ensuring that the interviewed child grasps the flow of events in these four pictures, the most striking part of the event, the third picture (i.e. the child bending under the bed to get the crayon and seeing the gift guitar) is covered by hand.
- Now the child is asked the following question by the researcher: "Do you think that if we called a friend from outside here and showed him/her only these three pictures, he/she would tell us why this child, who was drawing on his/her bed at the beginning, went to his/her mother and hugged her?"
- In the meantime, the interviewed child is allowed to choose the friend who is supposed to come in (e.g. which friend do you think we should invite, who would you want to come in?)
- The child is asked to guess the event with three pictures;
 - ✚ *"0 (zero) points" is given if he/she says that the child in the picture saw the guitar that his/her mother had bought for him/her when he/she bent under the bed and that is why he/she went to his/her mother and hugged her.*
 - ✚ *If he/she makes any other guess, "1(one) point" is given.*

REFERENCES

- Akın, Y. (2002). *Altı yaş grubu çocuklarında başkasının bakış açısını alma üzerinde eğitici drama programının ve aile tutumlarının etkisinin incelenmesi* (Yayımlanmamış yüksek lisans tezi). Marmara Üniversitesi Eğitim Bilimleri Enstitüsü, İstanbul.
- Aras, C. Y. (2018). *Okul öncesi çocukların bakış açısı alma becerilerine "ben sorun çözebilirim programı"nın etkisi* (Yayımlanmamış yüksek lisans tezi). Çukurova Üniversitesi Sosyal Bilimler Enstitüsü, Adana.
- Aslan, D. (2017). *Okul öncesi dönem çocuklarının bakış açısı alma becerilerine empati eğitim programının etkisinin incelenmesi* (Doktora tezi). Ankara Üniversitesi Fen Bilimleri Enstitüsü. Ankara.
- Aslan, D., & Köksal Akyol, A. (2016). Çocuklar için Bakış Açısı Alma Testi ÇBT'nin Geliştirilmesi. *Ahi Evran Üniversitesi Kırşehir Eğitim Fakültesi Dergisi*, 17(3), 207-221.
- Birch, S. A. J., Li, V., Haddock, T., Ghrear, S. E., Brosseau-Liard, P., Baimel, A., & Whyte, M. (2017). Perspectives on perspective taking: how children think about the minds of others. *Advances in Child Development and Behavior*, 52, 185-226.
- Brown, T. A. (2006). *Confirmatory factor analysis for applied research*. The Guilford Press.
- Büyüköztürk, Ş. (2002). Faktör analizi: Temel kavramlar ve ölçek geliştirmede kullanımı. *Kuram ve uygulamada eğitim yönetimi*, 32(32), 470-483.
- Büyüköztürk, Ş. (2023). *Sosyal bilimler için veri analizi el kitabı: İstatistik, araştırma deseni SPSS uygulamaları ve yorum*. PEGEM Akademi.
- Cantekin, D., & Akduman, G. G. (2020). Duyguları yönetme becerileri eğitim programının çocukların duyguları yönetme ve bakış açısı alma becerilerine etkisinin incelenmesi. *Türk Eğitim Bilimleri Dergisi*, 18(2), 777-798.
- Cigala, A., Mori, A., & Fangareggi, F. (2015). Learning others' point of view: Perspective taking and prosocial behaviour in preschoolers. *Early Child Development and Care*, 185(8): 1199-1215. Doi: 10.1080/03004430.2014.987272
- Cole, G. G., Samuel, S., & Eacott, M. J. (2022). A return of mental imagery: The pictorial theory of visual perspective-taking. *Consciousness and Cognition*, 102, 103352.
- Coşkun, E. (2019). *Okul öncesi eğitim kurumlarına devam eden dört-beş yaş grubu çocukların sosyal problem çözme ve bakış açısı alma becerileri arasındaki ilişkinin incelenmesi* (Yayımlanmamış yüksek lisans tezi). Pamukkale Üniversitesi Eğitim Bilimleri Enstitüsü. Denizli.
- Çokluk, Ö., Şekercioğlu, G., & Büyüköztürk, Ş. (2012). *Sosyal bilimler için çok değişkenli istatistik: SPSS ve LISREL uygulamaları* (Vol. 2). PEGEM Akademi.
- Derman, M. T., Cıvcık, Y., Baykara, S., & Özçınar, S. (2019). Sınıflarında kaynaştırma öğrencisi olan ve olmayan 4-6 yaş çocuklarının bakış açısı alma becerilerinin belirlenmesi. *Trakya Eğitim Dergisi*, 9(3), 580-589.
- Dinç Altun, Z., Değerli, F. İ., Çıkrıkçı, N. ve Kınık, Ö. (2018). Çocuklar için Empati Bölümü Ölçeğinin Türkçe'ye uyarlanması. *Mehmet Akif Ersoy Üniversitesi Eğitim Fakültesi Dergisi*, 45, 153-168. Doi: 10.21764/maeuefd.309234
- Dosch, M., Loenneker, T., Bucher, K., Martin, E., & Klaver, P. (2010). Learning to appreciate others: Neural development of cognitive perspective taking. *NeuroImage*, 50(2), 837-846.
- Emen, M. (2018). *Okul öncesi dönem çocuklarının bakış açısı alma becerileri ile dil becerileri arasındaki ilişkinin incelenmesi* (Yüksek lisans tezi). Çukurova Üniversitesi Sosyal Bilimler Enstitüsü. Adana.

- Ensari, Ö. & Bayrak, C. (2023). Kuantum Fiziği Kavramsal Anlama Testinin Geliştirilmesi: Geçerlik ve Güvenirlik Çalışması. *Abant İzzet Baysal Üniversitesi Eğitim Fakültesi Dergisi*, 23(1), 520-541. Doi: 10.17240/aibuefd.2023.-1177413
- Erkuş, A. (2007). Ölçek geliştirme ve uyarlama çalışmalarında karşılaşılan sorunlar. *Türk Psikoloji Bülteni*, 13(40), 17-25.
- Erkuş, A. (2010). Psikometrik terimlerin Türkçe karşılıklarının anlamları ile yapılan işlemlerin uyumsuzluğu. *Journal of Measurement and Evaluation in Education and Psychology*, 1(2), 72-77.
- Eunha, K. & Inho, C. (2016). Developmental Characteristics of Cognitive Perspective-Taking in Deaf Children: Differences in Reading Ability. *The Journal of Special Children Education*, 18(2), 1-18.
- Genal, S. (2018). *Okul öncesi eğitiminden yararlanan 5-6 yaş çocuklarının sosyal duygusal yeterlilikleri ile bakış açısı alma becerilerinin incelenmesi* (Yayımlanmamış yüksek lisans tezi). Burdur Mehmet Akif Ersoy Üniversitesi Eğitim Bilimleri Enstitüsü. Burdur.
- Gözün Kahraman, Ö. (2012). *Zihin kuramına dayalı eğitim programının 48-60 aylık çocukların bilişsel bakış açısı becerileri ve prososyal davranışları üzerindeki etkisinin incelenmesi* (Yüksek lisans tezi). Gazi Üniversitesi Eğitim Bilimleri Enstitüsü, Ankara.
- Halavurt, H. (2019). *Okul öncesi eğitim kurumlarına devam eden 4-5 yaş çocukların bakış açısı alma düzeyleri ile anne tutumları arasındaki ilişkinin incelenmesi* (Doktora tezi). Bursa Uludağ Üniversitesi Eğitim Bilimleri Enstitüsü. Bursa.
- Healey, M. L., & Grossman, M. (2018). Cognitive and affective perspective-taking: evidence for shared and dissociable anatomical substrates. *Frontiers in Neurology*, 9, 491.
- Hein, G., & Singer, T. (2008). *Understanding others: empathy and cognitive perspective taking in the human brain*. In: Inaugural Herzliya Symposium on Personality and Social Psychology: Prosocial Motives, Emotions, and Behavior, Herzliya, Israel, 24 March 2008 - 27 March 2008.
- Hinnant, J. B., & O'Brien, M. (2007). Cognitive and emotional control and perspective taking and their relations to empathy in 5-year-old children. *The Journal of Genetic Psychology*, 168(3), 301-322.
- Hodges, T. S., McTigue, E., Wright, K. L., Franks, A. D., & Matthews, S. D. (2018). Transacting with characters: Teaching children perspective taking with authentic literature. *Journal of Research in Childhood Education*, 32(3), 343-362.
- Hooper, D., Coughlan, J. and Mullen, M. (2008). Structural equation modelling: Guidelines for determining model fit. *The Electronic Journal of Business Research Methods*, 6(1), 53-60.
- Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural equation modeling: a multidisciplinary journal*, 6(1), 1-55. Doi: 10.1080/10705519909540118
- Karoğlu, H. (2022). *Resimli Çocuk Kitaplarının 5 Yaş Çocuklarının Bakış Açısı Alma Becerisi ve Dil Gelişimine Etkisi* (Doktora tezi). Hacettepe Üniversitesi Eğitim Bilimleri Enstitüsü. Ankara.
- Katrein, J. L. (2021). *Children's Perspectives and Diverse Literacy Experiences: The Role of Social Perspective Taking Skills Within Social, Emotional, and Academic Learning* (Doctoral dissertation). Judson University. Illinois.
- Kelloway, E. K. (1998). *Using LISREL for structural equation modeling: A researcher's guide*. Sage.
- Kim, E. & Chung, I. (2016). Developmental Characteristics of Cognitive Perspective-Taking in Deaf Children: Differences in Reading Ability. *The Journal of Special Children Education*, 18(2), 1-18.

- Kline, R. B. (2005). *Principles and practice of structural equation modelling: Methodology in the social sciences* (2nd eds.). Guilford Press.
- Köksal Akyol A., & Aslan D. (2014). The development of Empathy Scale for Children (ESC). In Yasar, M., Ozgun O. & Galbraith J. (Eds), *Contemporary Perspectives and Research on Early Childhood Education* (pp. 113-123). Cambridge Scholar.
- Körükçü, Ö., & Güngör, H. (2021). Okul Öncesi Kuruma Devam Eden 60-72 Ay Çocukların Çevre Tutumları İle Bakış Açısı Alma Becerileri Arasındaki İlişkinin İncelenmesi. *International Journal of New Trends in Arts, Sports & Science Education (Ijtase)*, 10(3), 166-176.
- Martin, A. K., Perceval, G., Davies, I., Su, P., Huang, J., & Meinzer, M. (2019). Visual perspective taking in young and older adults. *Journal of Experimental Psychology: General*, 148(11), 2006.
- Maza, S. (2019). *Effects of Perspective Taking Induction on Parent Empathy and Validation*. Doctoral dissertation, Hofstra University, New York.
- Mouw, J., Saab, N., Gijlers, H., Hickendorff, M., Paridon, Y. V., & Broek, P. (2020). The differential effect of perspective-taking ability on profiles of cooperative behaviours and learning outcomes. *Frontline Learning Research*, 8(6), 88-113.
- Oruç, C., Tecim, E., & Özyürek, H. (2011). Okul öncesi dönem çocuğunun kişilik gelişiminde rol modellik ve çizgi filmler. *EKEV Akademi Dergisi*, 15(48), 281-297.
- Sang, S. A., & Nelson, J. A. (2017). The effect of siblings on children's social skills and perspective taking. *Infant and Child Development*, 26(6), e2023.
- Schumacker, R. E., & Lomax, R. G. (1996). *A guide to structural equations modeling*. Hillsdale, Erl-baum.
- Sümer, N. (2000). Yapısal Eşitlik Modelleri: Temel Kavramlar ve Örnek Uygulamalar. *Türk Psikoloji Yazıları*. 3(6), 49-74.
- Şahin, M. (2018). *Çocukların bakış açısı alma becerilerine okul öncesi eğitim alma durumunun etkisi* (Yayımlanmamış yüksek lisans tezi). Çukurova Üniversitesi Sosyal Bilimler Enstitüsü. Adana.
- Şener, T. (1996). *4-5 yaş anaokulu çocuklarında dramatik oyunun ve inşa oyununun bakış açısı alma becerisine etkisi* (Yayımlanmamış yüksek lisans tezi). Ankara Üniversitesi Sosyal Bilimler Enstitüsü. Ankara.
- Tabachnick, B.G. & Fidell, L.S. (2001) *Using Multivariate Statistics* (4th eds.). Allyn and Bacon.
- Tavşancıl, E. (2006). *Tutumların ölçülmesi ve SPSS ile veri analizi* (3. baskı). Ankara: Nobel.
- Tekin, H. (1977). *Eğitimde Ölçme ve Değerlendirme*. (s.328). Ankara: Mars.
- Thompson, B. (2004). Exploratory and confirmatory factor analysis: Understanding concepts and applications. *10694(000)*, 3.
- Trzcinski, M. D. (2021). *The Role of Perspective Taking on Adult Attachment and Empathy during Mortality Saliency* (Doctoral dissertation). Alliant International University, California.
- Welsh, F., Najdowski, A. C., Strauss, D., Gallegos, L., & Fullen, J. A. (2019). Teaching a perspective-taking component skill to children with autism in the natural environment. *Journal of Applied Behavior Analysis*, 52(2), 439-450.
- Woodbridge, A. (2017). *Cognitive perspective taking and audience awareness in second grade narrative writing* (master's thesis). University of California, Los Angeles.

Yalçın, M. (2019). *Çocukların empatik bakış açısı alma becerisinin akran kabulü ve öğretmenleri ile olan iletişimleri üzerindeki etkilerinin incelenmesi* (Yüksek lisans tezi). Ege Üniversitesi Sosyal Bilimler Enstitüsü. İzmir.