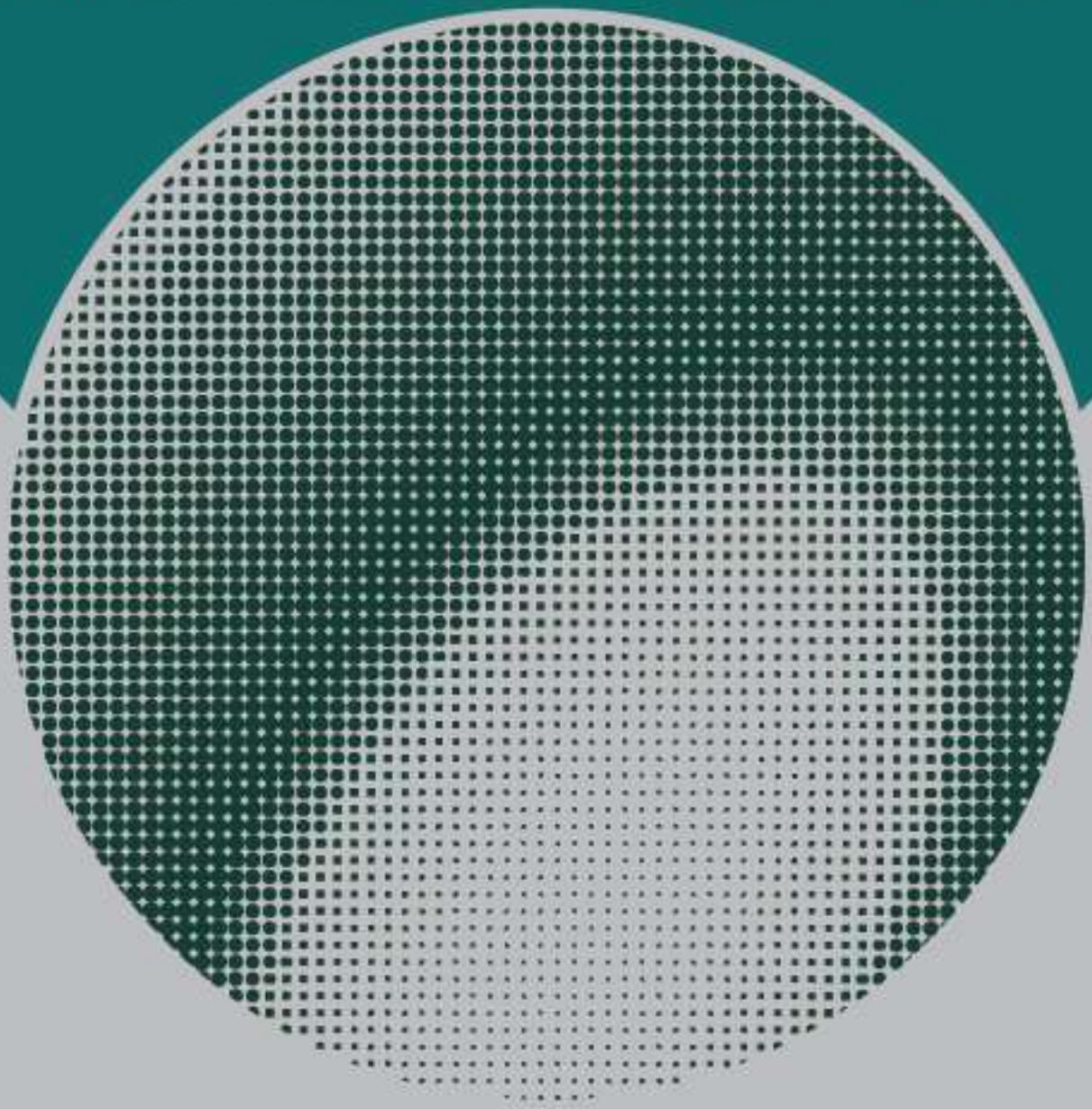
# IJCER

International Journal of Contemporary Educational Research



2025

Volume 12

Issue 1

e-ISSN: 2148-3868

International Journal of Contemporary Educational Research
Volume 12 | Issue 1 | Year 2025

## About the Journal

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| **Journal Name** | International Journal of Contemporary Educational Research |
| **Abbreviation Name of the Journal** | IJCER |
| **e-ISSN** | 2148-3868 |
| **Publication Frequency** | Four issues in year (March, June, September & December) |
| **Dergi Web Sitesi** | www.ijcer.net |
| **Start Publishing** | 31.01.2014 |
| **Chief Editor** | Prof. Dr. Mehmet Nuri Gömleksiz |
| **Publisher** | Assoc. Prof. Muhammed Zincirli |
| **Country of Publication** | Türkiye |
| **Publication Type** | Open access |
| **Publication Content** | International Journal of Contemporary Educational Research contains original scientific publications. All published papers, except editorial manuscripts, are subject to a double blind peer review process. |
| **Audience** | The target audience is members of the profession, teachers, school administrators, experts, researchers, master's and doctoral students as well as students related to this field with all fields of educational sciences. It aims to contribute to the spread of continuous professional development and research culture. |
| **Publication Language** | English |

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| **Peer-Review** | Double anonymized - Double Blind |
| **Plagiarism Checks** | iThenticate & Turnitin |

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Education Full Text (H. W. Wilson) Database Covarage List
Directory of Open Access Journals (DOAJ)
European Reference Index for the Humanities and Social Sciences (ERIH PLUS)

**International Journal of Contemporary Education Research is indexed on the following digital platforms:**

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Scientific Indexing Services (SIS)
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**Complaint**
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International Journal of Contemporary Educational Research

Volume 12, Number 1, March 2025, Page 1-25 Article Type: Research Article

# Examining Stakeholders' Opinions on Coding Education in Primary Schools

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**Abstract**
Coding means writing down the steps to be followed in order to carry out any operation through computers, using commands step by step. In other words, it is the job of finding a solution to an existing problem by using the language that the computer understands. Thanks to coding education, students are provided with skills such as research, problem solving, computational thinking, making inventions, developing projects, questioning and producing from a very young age. For this reason, people in later ages will research, question, think analytically and produce in all areas of their lives, even if they are not in the software business. It is also known that coding skills increase children's ability to look at problems from different perspectives, think systematically, produce solutions, think creatively and establish cause-effect relationships, which requires them to use higher-level thinking skills. The purpose of this research is to determine stakeholders' opinions regarding coding education. While determining stakeholders' opinions, the case study approach, one of the qualitative research methods, was used. Research; It was carried out with 25 stakeholders including teachers, administrators and parents. Data were collected through a semi-structured interview form and face-to-face interviews. According to the research results, teachers, administrators and parents; that coding education is beneficial, that it improves students' thinking skills, that this education should start from the primary school level, and that education started at an early age can develop various skills in students, that teachers must also receive education in order to provide coding education, that coding education should be among the compulsory courses in primary school education programs, and they stated that this education is a need today.

**Keywords:** Coding, Coding education, Stakeholders' opinions

**Citation**
Akkaya, S. & Erkan, A. (2025). Examining stakeholders' opinions on coding education in primary schools. *International Journal of Contemporary Educational Research*, *12*(1), 1-25. https://doi.org/10.52380/ijcer.2025.12.1.568

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|---|---|
| Received | 30.10.2023 |
| Accepted | 26.12.2025 |
| Publication | 28.03.2025 |
| Peer-Review | Double anonymized - Double Blind |
| Ethical Statement | *This article is the revised and developed version of the unpublished conference presentation entitled "Examining Stakeholder Opinions on Coding Education in Primary Schools", orally delivered at the III. International Science, Education, Art and Technology Symposium, 2022, Online, Türkiye. |
| Plagiarism Checks | Yes - Turnitin |
| Conflicts of Interest | The author(s) has no conflict of interest to declare. |
| Complaints | editor@ijcer.net |
| Grant Support | The author(s) acknowledge that they received no external funding in support of this research. |


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# Introduction

## Coding

In recent years, coding education has become a very common activity, especially for young children. Programming or coding education is provided in both private and public schools from kindergarten to high school. The widespread use of coding tools that make the programming teaching process enjoyable makes teaching programming or coding to children easier (Erol, 2020).

When the literature was examined, it was seen that various definitions of the concept of coding were made. Turan, Akça and Küçükkurt (2016) defined coding as the process of bringing commands together in order to direct the computer. Kesici and Kocabaş (2007) defined coding as the processing algorithm that is put forward in the process of running and compiling the operations of computers by converting them into command sequences. Yiğit (2016) defined coding as the task of producing a solution to a problem or problem in a language that the computer can understand in order to solve an existing problem or problem. Wood (2003) defined coding as the process of applying solutions to a problem situation with or without a computer, evaluating the result, and revising the procedures in case the result does not reach the solution. Ülkar (2016) defines coding as writing in a language electronically in a computer environment in order to create software or applications or design a web page. He stated that there are hundreds of languages related to coding, and that when this knowledge or skill is learned, it will be possible for people to create their own applications or software.

Coding is the process of writing one or more commands to perform an action on a computer system. It is to write the algorithm developed to achieve any goal using a programming language. Computer programming or coding; It is the development and implementation process using various command sets to perform a specified process or task on the computer, to try to solve the problems encountered and to ensure the necessary interaction between the computer and the human (Sayın and Seferoğlu, 2016).

According to Mclennan (2017), coding (or programming) is the fundamental language of today's digital age. It involves the step-by-step process of creating the instructions that the computer understands or needs for its programs to run. Gaming systems, mobile phones, tablets, washing machines and even cars use coding to function properly.

## Coding education

Coding means writing down the steps to be followed in order to carry out any operation through computers, using commands step by step. In other words, it is the job of producing solutions to existing problems by using the language that the computer understands (Yiğit, 2016). Coding; It means following the instructions given step by step and explaining exactly what needs to be done through computers in steps (Eba, 2023). Thanks to coding education, students are taught skills such as research, problem solving, computational thinking, making inventions, developing projects, questioning and producing from a very young age. For this reason, people in later ages will research, question, think analytically and produce in all areas of their lives, even if they are not in the software business (BtDersleri, 2023).

The basis of coding education is the tendency to recognize a problem and try to produce solutions for this problem (Erümit, Zirve, Aksot, & Şahin, 2017). It is thought that thanks to coding education started at an early age, children can be successful in other fields thanks to this education, even if they do not continue their education in the software field in the future (Karabak and Güneş, 2013). It is also known that coding skills increase children's ability to look at problems from different perspectives, think systematically, produce solutions, think creatively and establish cause-effect relationships, which requires them to use higher-level thinking skills (Yükseltürk and Altıok, 2016). In addition, with coding education, students; While their skills such as creativity, digital literacy, analytical thinking, problem solving, spatial thinking skills, process and result-oriented thinking skills, collaborative working and learning skills develop, their learning habits by doing and experiencing also develop (Akpınar and Altun, 2014; Demirer and Sak, 2016). However, children who acquire coding skills at an early age; Experiences such as thinking, problem solving and communication. These are of great importance in acquiring 21st century skills, which are very valuable for the future success of our children in the digital world (Mclennan, 2017).

According to Delebe (2018), coding education; Coding or programming is largely included in the education system as early as preschool or primary school in order to raise individuals who produce, question, criticize and are

expected to acquire the necessary skills in line with the needs of the current period. Coding education has an important role as it is not only limited to computer science, but also provides interdisciplinary interaction. For this reason, children are expected to acquire computational thinking skills from an early age and the ability to produce solutions to problems in different fields.

The reason for coding education is not only to produce software or applications, but also to develop information literacy by using information technologies, to communicate, to express oneself, to do research, to share information, to work collaboratively, to solve problems, to structure existing knowledge, to code. and increasing their skills in developing original products (Sayın and Seferoğlu, 2016). While coding, students need to be able to think critically about more than one problem and systematically solve the problems they encounter. Even if students do not want to continue their education in the software field, they will be able to use the skills that coding brings to them throughout their lives (Dizman, 2018). In addition, it is known that coding skills increase students' thinking skills, which require the use of higher-level thinking skills, such as systematic thinking, looking at problems from different perspectives and producing solutions, establishing cause-effect relationships and creative thinking (Yükseltürk and Altıok, 2016).

### Coding Education in Primary School

Many countries have included coding education in primary school curricula to try to improve students' problem-solving skills and logical thinking skills. The number of countries adding coding education to their curriculum is increasing day by day.

In our country, it was ranked 1-4 in 2018. Coding education at the grade level was included in the curriculum within the scope of the information technologies and software (ICT) course. In order to provide coding education, the Ministry of Education has prepared a number of electronic books for teachers and students and supported teachers in providing this education. The MEB BTY course program aims to provide students with skills such as algorithm design, computational thinking, problem solving and logical inquiry. The books prepared for the purpose of providing coding education with this program were prepared by taking into account the teacher skills, the existing technology infrastructure in schools and the readiness levels of the students in order to implement the BTY course. The prepared books include coding activities for schools with technological infrastructure, and computer-free activities such as games, paper-pencil, and drama for schools without technological infrastructure. The main purpose of the program is to provide students with computational thinking skills (MEB, 2018).

Coding education, which has a very important place in education, has started to take its place among the education programs in our country in recent years. The applicability of coding education, which is taught mostly from the secondary school level, to the primary school level is among the topics of curiosity. Based on this context, the purpose of our research is to examine stakeholders' opinions on coding education in primary school.

## Method

### Model of the Research

While examining stakeholders' opinions regarding coding education in primary schools, a case study, one of the qualitative research methods, was used. Case study is a qualitative research method used to investigate a phenomenon in the context of real life, when the boundaries between the context and the phenomenon are not clearly evident in the first place (Yin, 2009). According to Gall, Borg and Gall (1996), a case study is used to better see and define the details of a situation, to develop some explanations for a situation and to evaluate this situation in all its aspects (Quoted by: Büyüköztürk, 2020).

### Working group

The study group of this research consists of stakeholders, including school administrators, teachers and parents of primary school students working in Elazığ in the 2021-2022 academic year. The distribution of the study group is given in Table 1.

Table 1. Distribution of the study group

| Working group | N |
|---|---|
| School Administrator | 5 |

| | |
|---|---|
| Teacher | 10 |
| Guardian | 10 |
| **Total** | 25 |

**Data Collection and Application**

Data were collected through the Semi-Structured Interview Form prepared by the researchers and by face-to-face interviews.

**Analysis of Data**

Content analysis was used to determine the codes and categories of the data. Content analysis can be called a repeatable, systematic technique in which some words of a text are summarized into smaller categories with coding created according to predetermined rules (Büyüköztürk et al., 2020). The questions in the semi-structured interview form include questions about coding education in primary school. In order for the coding to be reliable, the categories were determined separately by the researchers and then combined and inconsistencies were eliminated.

**Ethics approval notification**

Ethical permission was obtained as a result of the decision taken at the meeting of Inönü University Scientific Research and Publication Ethics Committee Social and Human Sciences Scientific Research and Publication Ethics Committee Commission dated 26.10.2023 and numbered 13/1.

## Results and Discussion

Teachers, administrators and parents who participated in the meeting were asked, "Have you heard of coding education before?" "What are your thoughts on this subject?" was asked. The categories/codes and their frequency values determined as a result of the responses received from teachers, administrators and parents are given in Table 2.

Table 2. Opinions on coding education

| | Category/Code | | Frequency |
|---|---|---|---|
| **Teacher (T)** | Yes | | 9 |
| | | Useful | 4 |
| | | Reasoning ability | 2 |
| | | Computer programming | one |
| | | Problem solving skills | one |
| | | Foundation of software education | one |
| | No | | one |
| **Manager (M)** | Yes | | 5 |
| | | The best way to understand technology | 3 |
| | | An education that every child should receive | 2 |
| | | Useful | 2 |
| | | Due to the times | one |
| **Parent(P)** | Yes | | 10 |
| | | It will form the basis for the professions of the future | 3 |
| | | computer alphabet | 2 |
| | | so much fun | one |
| | | Useful for children | one |
| | | Improves children's perspective | one |

| | | |
|---|---|---|
| | In recent years, much emphasis has been placed on | one |
| | Education that teaches application and game design | one |
| | computer program given commands | one |

Since the teachers, administrators and parents interviewed pointed to more than one category while expressing their opinions, the number of opinions in the categories obtained was higher than the number of teachers, administrators and parents who participated in the study.

When Table 2 is examined, 9 of the teachers who participated in the interview stated that they had heard of coding education before, and 1 teacher stated that he had not heard of coding education before. Teachers who have heard of coding education before also say that this education; they stated that it is useful, reasoning skills, computer programming, problem solving skills and the basis of software education.

All of the managers who participated in the interview stated that they had heard of coding education before. Managers of this education; they stated that it is the best way to understand technology, an education that every child should receive, useful and a necessity of the age.

All of the parents who participated in the interview stated that they had heard of coding education before. Parents of this education; they stated that it is a computer program that will form the basis for the professions of the future, is the alphabet of the computer, is very entertaining, useful for children, improves children's perspective, has been emphasized a lot in recent years, teaches how to design applications and games, and gives commands.

*T1: "Coding is quite necessary and even inevitable in today's age."*
*T5: "Coding education is necessary because it provides students with reasoning and problem solving skills."*
*M5: "I think it will be beneficial for children in terms of reasoning and problem-solving skills."*
*M4: "Coding education is an education that every child should receive. It is a necessity of the age. "*
*P8: "I know coding education as the alphabet of the computer."*
*P2: "It is an education that has been emphasized a lot in recent years. I think it is very necessary. "*

Teachers, administrators and parents who participated in the interview were asked, "Do you think coding education is important?" "Why?" was asked. The categories/codes and their frequency values determined as a result of the responses received from teachers, administrators and parents are given in Table 3.

Table 3. Opinions on the importance of coding education

| | **Category/Code** | **Frequency** |
|---|---|---|
| **Teacher (T)** | Important | 10 |
| | Improves thinking skills | 15 |
| | Improves problem solving skills | 5 |
| | Improves creative thinking skills | 2 |
| | Improves analytical thinking skills | 2 |
| | Improves thinking power | 2 |
| | Improves reasoning skills | one |
| | Improves analysis ability | one |
| | Supports multidimensional thinking | one |
| **Manager (M)** | Important | 5 |
| | Students care about innovations | one |
| | necessity of the age | 2 |
| | Improves problem solving skills | one |
| | Improves analytical thinking skills | one |
| | Improves communication skills | one |
| | Improves digital literacy skills | one |
| | 21st century skills are gained | one |
| | Important | 10 |

| | | |
|---|---|---|
| **Parent(P)** | The importance of technology is increasing day by day | 4 |
| | It allows people to improve themselves | one |
| | Children who know coding are more advanced | 2 |
| | Gives children problem solving skills | one |
| | Gives children social skills | one |
| | Teaches children to use their imagination | one |
| | Teaches basic computer programs | one |
| | Now everything is produced with software | one |

When Table 3 is examined, all of the teachers who participated in the interview think that coding education is important. Teachers of this education; they stated that it improves thinking skills, problem-solving skills, creative thinking skills, analytical thinking skills, thinking power, reasoning skills, analysis skills, and also supports multi-dimensional thinking.

All managers who participated in the interview think that coding education is important. Managers of this education; they stated that it is important to students, that it is a necessity of the age, that it improves problem-solving skills, analytical thinking skills, communication skills, digital literacy skills, and at the same time, this education provides 21st century skills.

All of the parents who participated in the interview think that coding education is important. Parents of this education; He stated that technology is important because its importance increases day by day, it allows people to improve themselves, children who know how to code will be at a more advanced level, it provides children with problem-solving skills and social skills, it teaches children how to use their imagination and basic computer programs, and everything is now produced with software. They did.

> *T4: "Yes. I think it is useful because it improves creative thinking and problem solving skills."*
> *T1: "Coding education is necessary because it develops analytical thinking and reasoning skills. It also supports multidimensional thinking "*
> *M2: "Yes. It improves the student's problem solving skills. "It also provides students with 21st century skills."*
> *M4: "Coding education is necessary because it develops students' digital literacy skills and supports their ability to communicate. "*
> *P8: "Yes, I think so. "Coding education helps children learn basic computer programs."*
> *P2: "Yes, it's true. Technology is becoming more and more important and coding education allows people to improve themselves. "*

Teachers, administrators and parents who participated in the interview were asked, "At what level of education do you think coding education should start?" "Why?" was asked. The categories/codes and their frequency values determined as a result of the responses received from teachers, administrators and parents are given in Table 4.

Table 4. Education level at which coding education should begin

| | **Category/Code** | **Frequency** |
|---|---|---|
| **Teacher (T)** | Primary school | 8 |
| | The tree bends when it is young | one |
| | The brain is more open to learning | one |
| | The ability to analyze is acquired early | one |
| | Be open to group work | one |
| | Pre-school | 2 |
| | Gains the ability to phase the task | one |
| | Gains the ability to perform the task | one |
| | Work discipline is created | one |
| | Primary school | 3 |
| | Improves digital literacy skills | one |

| | | |
|---|---|---|
| **Manager (M)** | 21st century skills are gained | one |
| | Pre-school | 2 |
| | Can be given with verbal residences | one |
| | Primary school | 5 |
| | Contributes to children's mental development | 2 |
| | Basic education is the reason for success | one |
| | Increases children's learning speed | one |
| **Parent(P)** | Pre-school | 3 |
| | The period when children's mental development is at its best | one |
| | Because it is learned more easily through games | one |
| | in 2nd grade | 2 |
| | Knowledge learned at a young age is more permanent | one |

When Table 4 is examined, 8 of the teachers who participated in the interview think that coding education should start from the primary school level, while 2 teachers think that it should start from the pre-school level. Teachers who think that coding education should start from the primary school level; they stated that the tree bends when it is young, the brain is more open to learning during this period, the ability to analyze is acquired early and it is open to group work. Teachers who think that coding education should start at the pre-school level; they stated that the skill of phasing the task and the ability to perform the task are acquired more easily in early childhood and that work discipline is established in the early period.

While 3 of the managers who participated in the interview think that coding education should start from the primary school level, 2 managers think that it should start from the pre-school level. Administrators who think that coding education should start from the primary school level; He thinks that it improves digital literacy skills and provides 21st century skills. Administrators who think that coding education should start at the pre-school level also say; He stated that this education can only be given to students through verbal commands.

While 5 of the parents who participated in the interview think that coding education should start from the primary school level, 3 of them think that it should start from the pre-school level and 2 think that it should start from the 2nd grade. Parents who think that coding education should start from the primary school level; He stated that it contributes to the mental development of children, that basic education is the reason for success and that it increases the speed of children's learning. Parents who think that coding education should start at the pre-school level; they mentioned that this is the period when children's mental development is at its best and that they learn more easily through play. Parents who think that coding education should start from the 2nd grade also mentioned that the knowledge learned at a young age will be more permanent.

*T6: "It should start in primary school. The brain is more open to learning. "*
*T3: "It should start in pre-school. It ensures the formation of work discipline in the child. "*
*M1: "It should start in primary school. "It can even be given with verbal commands before school."*
*M3: "It should start in primary school. Develop digital literacy skills. "*
*P4: "Should start from 2nd grade"*
*P6: "It should start in primary school. Basic education is the reason for success. It also increases children's learning speed. "*

Teachers, administrators and parents who participated in the interview were asked, "Do you think coding education can be useful for primary school students?" "Why?" was asked. The categories/codes and their frequency values determined as a result of the responses received from teachers, administrators and parents are given in Table 5.

Table 5. Benefits of coding education for primary school students

| **Category/Code** | **Frequency** |
|---|---|
| Yes | 10 |
| Improves Thinking Skills | 7 |
| Improves problem solving skills | 2 |
| Improves creative thinking skills | one |
| Improves analytical thinking skills | one |

| | | | |
|---|---|---|---|
| **Teacher(T)** | | Improves abstract thinking skills | one |
| | | Sees relationships between events and situations | one |
| | | Understands cyclical concepts | one |
| | It is interesting | | one |
| | product reveals | | one |
| | Acquire useful skills | | one |
| | start early | | one |
| | It is necessary to keep up with the times | | one |
| | Broadens children's horizons | | one |
| **Manager(M)** | Yes | | 5 |
| | | Provides different thinking skills | 3 |
| | | Allows children to develop themselves | one |
| | | Makes commands easier to understand | one |
| | | Learns the basis of technological development | one |
| | | It would be interesting | one |
| | | Develops the child's imagination | one |
| | | Develops the child's creativity | one |
| | | Supports learning with fun | one |
| **Parent(P)** | Yes | | 10 |
| | | Supports cognitive development | 4 |
| | | Supports problem solving skills | 3 |
| | | More equipped students are produced | 2 |
| | | Contributes to attention development | 2 |
| | | Provides thinking skills | one |
| | | Provides programming skills | one |
| | | Children understand that the computer is not just a game | one |

When Table 5 is examined, all of the teachers who participated in the interview think that coding education will be beneficial for primary school students. Teachers of this education; He stated that it improved his thinking skills, problem solving skills, creative thinking skills, analytical thinking skills and abstract thinking skills. In addition, thanks to this education, teachers can help students; that students can see the relationships between events and situations, understand cyclical concepts, they stated that it can attract the attention of children, create products, acquire useful skills, keep up with the times, and broaden children's horizons.

All of the managers who participated in the interview think that coding education will be beneficial for primary school students. Managers of this education; they stated that it provides different thinking skills, allows children to develop themselves, makes it easier to perceive commands, teaches the basis of technological development, is interesting, develops the child's imagination, develops the child's creativity and supports learning by having fun.

All participants in the interview think that coding education will be beneficial for primary school students. Parents of this education; they stated that it supports cognitive development, supports problem solving skills, raises better equipped students, contributes to attention development, provides thinking skills, provides programming skills and helps children understand that computers are not just a game.

*T2: "Yes, it might be interesting."*
*T1: "Students learn useful information and create a product. "*
*M5: "Yes. Because it allows children to develop themselves."*
*M2: "Yes, because it develops the child's imagination and creativity. It also supports learning by having fun. "*
*P9: "I think coding is useful for primary school students. Because it gives children thinking skills. It improves problem solving skills."*

*P1: "Yes, it is definitely useful. Because it supports cognitive development and contributes to raising better equipped students. "*

The question "What kind of effects do you think coding education starting at an early age can have on the child?" was asked to the teachers, administrators and parents who participated in the interview. The categories/codes and their frequency values determined as a result of the responses received from teachers, administrators and parents are given in Table 6.

Table 6. Effects of coding education starting at an early age

| | Category/Code | Frequency |
|---|---|---|
| **Teacher(T)** | Improves mental skills | 10 |
| | Improves problem solving skills | 3 |
| | Contributes to mental development | one |
| | Improves analytical thinking skills | one |
| | Improves semantic thinking skills | one |
| | Improves ability to use abilities | one |
| | Supports learning skills | one |
| | Uses imagination | one |
| | Project-oriented thinker | one |
| | Improves self-confidence | one |
| **Manager(M)** | Improves personal skills | 6 |
| | Uses technology correctly | 2 |
| | Learns to achieve the goal | one |
| | learns to strive | one |
| | Invests in the future | one |
| | Becomes a self-confident individual | one |
| | Improves mental skills | 4 |
| | Mathematical intelligence develops | one |
| | Gains problem solving skills | one |
| | Gains analytical thinking skills | one |
| | Gains algorithmic thinking skills | one |
| **Parent(P)** | Improves mental skills | 11th |
| | Improves thinking skills | 4 |
| | Learning happens more easily | 3 |
| | Improves problem solving skills | 2 |
| | Strengthens mathematical intelligence | one |
| | Improves imagination | one |
| | Improves personal skills | 2 |
| | They become self-confident | one |
| | Can use technology effectively | one |

When Table 6 is examined, 10 of the teachers who participated in the interview stated that coding education started at an early age improved students' mental skills, and 1 stated that it improved students' self-confidence. Teachers who stated that this education improved their mental skills; students improve their problem solving skills, they stated that it contributes to mental development, improves analytical thinking skills, improves semantic thinking skills, improves the ability to use one's abilities, supports learning skills, requires the use of imagination and supports project-oriented thinking.

While 6 of the managers who participated in the interview stated that coding education started at an early age improves students' personal skills, 4 of them stated that it improves their mental skills. Administrators stated that students improved their personal skills thanks to this education; they stated that they used technology correctly,

learned to achieve their goals, learned to strive, invested in the future and grew up as a self-confident individual. Managers who stated that this education improved their mental skills; they stated that it develops mathematical intelligence, provides problem solving skills, analytical thinking skills and algorithmic thinking skills.

11 of the participants stated that coding education started at an early age improves students' mental skills, and 2 of them stated that it improves personal skills. Parents stated that this education improved their mental skills; they stated that it improves thinking skills, learning occurs more easily, improves problem-solving skills, strengthens mathematical intelligence and develops imagination. Parents stated that their students improved their personal skills thanks to this education; they stated that they were more self-confident and could use technology more effectively.

> *T4: "Education that starts at an early age provides children with skills such as mathematics, thinking, creative activities and teamwork."*
> *T10: "Coding education started at an early age develops students' semantic thinking and ability to use their skills. It also supports their learning skills."*
> *M3: "The child who receives coding education at an early age develops algorithmic thinking skills and thus becomes a more self-confident individual."*
> *M1: "Coding education started at an early age teaches students to reach their goals and to strive. Thus, students invest in the future. "*
> *P10: "It develops the child's imagination. It strengthens mathematical intelligence."*
> *P7: "Thanks to coding education that starts at an early age, children can use technology effectively and become more self-confident."*

The question "Do you think teachers should be given coding education?" was asked to the teachers, administrators and parents who participated in the interview. The categories/codes and their frequency values determined as a result of the responses received from teachers, administrators and parents are given in Table 7.

Table 7. Opinions on providing coding education to teachers

| | Category/Code | Frequency |
|---|---|---|
| **Teacher (T)** | Yes it should be given | 9 |
| | Teachers should update themselves | 3 |
| | Must follow technological developments | 2 |
| | He should know enough to teach his students | one |
| | No it should not be given | one |
| **Manager (M)** | Yes it should be given | 5 |
| | Must be face to face | one |
| | The teacher must be at a level to provide this education. | one |
| **Parent (P)** | Yes it should be given | 10 |
| | To be more beneficial to children | 2 |
| | Since not every teacher knows this education | one |
| | In order to provide coding education to his students | one |

When Table 7 is examined, 9 of the teachers who participated in the interview think that teachers should be given education on coding, while 1 teacher thinks that it should not be given. Teachers who think that teachers should be trained; they stated that teachers should update themselves, follow technological developments, and know how to code enough to teach students.

All of the administrators who participated in the interview think that teachers should be given education on coding. Administrators stated that this education that should be given to teachers should be face-to-face and that the teacher should be at a level to give this education.

All participants in the interview think that teachers should be given education on coding education. Parents and teachers; they stated that they should receive this education in order to be more beneficial to children, that not every teacher knows this education and that they can provide coding education to their students.

*T2: "Yes, it should be given. Because teachers should update themselves by following technological developments."*
*T9: "Yes, they should because teachers should follow technological developments and know enough coding to teach it to their students."*
*M3: "Yes, it should be given, but this education should be face-to-face."*
*M5: "Yes it should. Educations should especially be face-to-face and the teacher should be able to provide this education. "*
*P7: "Yes, it should be given. "Teachers must learn coding in order to provide this education to their students."*
*P7: "Yes, it should be given because not every teacher knows this education. They need this education to be able to teach their students."*

Teachers and administrators who participated in the interview were asked, "Have you participated in the coding education programs offered through ÖBA?" "Do you think it is important for teachers to receive this education?" was asked. The categories/codes and their frequency values determined as a result of the responses received from teachers and administrators are given in Table 8.

Table 8. Opinions on the importance of teachers receiving coding education

| | **Category/Code** | | **Frequency** |
|---|---|---|---|
| **Teacher (T)** | I did not participate | | 10 |
| | It is important | | 8 |
| | | Children can be taught problem solving skills | one |
| | | Children can be taught creative thinking skills | one |
| | | Since today is the age of technology | one |
| | It doesn't matter | | 2 |
| **Manager (M)** | I did not participate | | 5 |
| | It is important | | 4 |
| | | Not enough announcement and importance was given | one |
| | | Must be face to face | one |
| | | Must be application based | one |
| | | Teachers must be equipped to provide this education. | one |
| | It doesn't matter | | one |

This question, which is among the interview questions, is only among the teacher and administrator questions. When there was no such education for parents, this question was not asked to parents. When Table 8 is examined, all of the teachers who participated in the interview said that they did not participate in the coding education program offered through ÖBA. However, 8 of the teachers stated that receiving this education was important, and 2 of them stated that it was not important. Teachers stated that it is important to receive coding education; He stated that it can provide children with problem-solving skills and creative thinking skills, and that it is necessary to receive this education since today is the age of technology.

All of the managers who participated in the interview said that they did not participate in the coding education program offered through ÖBA. However, 4 of the administrators stated that it was important to receive this education and 1 stated that it was not important. Managers stated that it is important to receive coding education; they stated that there are not enough announcements and importance given to coding education, that these educations should be face-to-face and practice-based, and that teachers should be equipped to provide this education.

*T5: "I did not participate. It is absolutely important because today is the age of technology. "*
*T2: "I didn't attend, but it is important to have this education to teach children problem solving and creative thinking skills. "*
*T8: "I did not participate. "I think it is not important for teachers to receive this education."*
*M4: "I did not participate. "It is important because teachers must be equipped to provide this education."*

*M1: "I did not participate, but I think it is important to receive coding education, but the education should be face-to-face."*
*M5: "I did not participate. "I think it is not important for teachers to receive this education."*

Teachers who participated in the interview were asked, "If you had sufficient knowledge and equipment about coding education, would you give this education to your students?" and administrators were asked, "If you had teachers with sufficient knowledge and equipment about coding education, would you encourage them to give this education to their students? " question was posed. The categories/codes and their frequency values determined as a result of the responses received from teachers and administrators are given in Table 9.

Table 9. Opinions on providing coding education to students

| | **Category/Code** | **Frequency** |
|---|---|---|
| **Teacher (T)** | Yes I would | 9 |
| | No I wouldn't | one |
| **Manager (M)** | I would definitely encourage | 3 |
| | Yes, I would encourage | 2 |

This question, which is among the interview questions, is only among the teacher and administrator questions. When there is no such thing as parents being able to provide such education to students or encouraging teachers in this regard, this question was not asked to parents. When Table 9 is examined, 9 of the teachers who participated in the interview stated that they could provide this education to their students if they had sufficient knowledge and equipment, and 1 stated that they would not provide this education.

Three of the administrators who participated in the interview stated that if there were teachers with sufficient knowledge and equipment working in their institutions, they would definitely encourage students to provide this education, and 2 of them stated that they could encourage teachers in this regard.

*T4: "Yes, I would."*
*T1: ""Yes, I would. "*
*T8: "No, I wouldn't."*
*M4: "I would definitely encourage it."*
*M2: " Yes, I would encourage "*
*M5: " I would definitely encourage it."*

The question "What are your opinions about the contributions of starting coding education at an early age to students?" was asked to the teachers, administrators and parents who participated in the interview. The categories/codes and their frequency values determined as a result of the responses received from teachers, administrators and parents are given in Table 10.

Table 10. Contributions of starting coding education at an early age to students

| | **Category/Code** | **Frequency** |
|---|---|---|
| **Teacher (T)** | Improves thinking skills | 9 |
| | Improves creative thinking skills | 2 |
| | Improves problem solving skills | 2 |
| | Improves systematic thinking skills | one |
| | Improves scientific thinking skills | one |
| | Contributes to the development of attention | one |
| | Improves algorithmic thinking skills | one |
| | Improves decision-making skills | one |
| | Improves creative thinking skills | one |
| | becomes more successful | 2 |
| | Provides technological skills | one |
| | Provides teamwork skills | one |

| | | |
|---|---|---|
| | Helps to overcome problems | one |
| | Improves imagination | one |
| **Manager (M)** | Improves cognitive skills | 6 |
| | Problem solving skills improve | 2 |
| | Thinking skills improve | one |
| | A sense of self-confidence develops | one |
| | They improve attention and focus | one |
| | Increases the brain's learning power | one |
| | They use technology correctly | 2 |
| **Parent (P)** | Improves cognitive skills | 12 |
| | Improves mental skills | 4 |
| | Attention and focus skills improve | 2 |
| | Develops a different perspective | 2 |
| | The concept of location and direction develops | one |
| | Creative thinking skills develop | one |
| | Improves visual intelligence | one |
| | Improves problem solving skills | one |
| | They adapt more easily to technological developments | 4 |
| | Improves imagination | one |
| | They can design simple games | one |
| | Supports fine motor development | one |

When Table 10 is examined, 9 of the teachers who participated in the interview said that coding education started at an early age improves students' thinking skills, 2 said that students will be more successful, 1 said that it provides technological skills, 1 says that it helps them gain teamwork skills, and 1 says that it helps them overcome problems and 1 of them said that it improved their imagination. In addition, teachers who said that this education improved their thinking skills; they stated that it improves creative thinking, problem solving, systematic thinking, scientific thinking, algorithmic thinking, decision making and creative thinking skills and contributes to the attention development of students.

6 of the administrators who participated in the interview stated that coding education started at an early age improves students' cognitive skills, and 2 of them stated that it enables them to use technology correctly. Managers who say that their cognitive skills have improved with this education; they stated that it improves problem solving and thinking skills, develops a sense of self-confidence, contributes to attention and focus, and increases the learning power of the brain.

12 of the parents who participated in the interview stated that coding education started at an early age improved students' cognitive skills, 4 stated that they adapted to technological developments more easily, 1 stated that it improved their imagination, 1 stated that they could design simple games, and 1 stated that it supported their fine motor development. In addition, parents said that this education improved their cognitive skills; they stated that it improves mental skills, attention and focus skills, a different perspective, the concept of location and direction, creative thinking skills, visual intelligence and problem-solving skills.

*T7: "Coding education provides individuals with problem solving, team feeling and collaboration skills."*
*T10: "Coding education improves individuals' creative thinking skills, problem solving skills and systematic thinking skills. It also provides technological skills. "*
*M1: "With coding education, children learn to use technology correctly."*
*M4: "Coding education improves individuals' problem solving skills and thinking skills. They develop a sense of self-confidence. Finally, they improve their attention and focus."*
*P9: "Coding education gives children the opportunity for creativity."*
*P7: 'Thanks to coding education, students adapt to technological developments more easily. They can design games at a simple level. Coding education also supports fine motor development."*

The question "Do you think coding education should be included among compulsory courses starting from primary school?" was asked to the teachers, administrators and parents who participated in the interview. The categories/codes and their frequency values determined as a result of the responses received from teachers, administrators and parents are given in Table 11.

Table 11. Opinions on including coding education among compulsory courses

| | Category/Code | Frequency |
|---|---|---|
| **Teacher (T)** | Yes it should be taken | 8 |
| | From 4th grade | one |
| | No it should not be taken | 2 |
| | Must be included in the program as an elective | one |
| **Manager (M)** | Yes it should be taken | 4 |
| | From primary school | one |
| | Not as a separate course but in conjunction with other courses | one |
| | No it should not be taken | one |
| **Parent (P)** | Yes it should be taken | 9 |
| | It should be mandatory | 2 |
| | Definitely a must buy | one |
| | From primary school | one |
| | No it should not be taken | one |
| | Should be elective | one |

When Table 11 is examined, 8 of the teachers who participated in the interview think that coding education should be included among the compulsory courses starting from primary school but should start in the 4th grade, while 2 teachers think that coding education should not be included among the compulsory courses but should be included in the program as an elective course.

While 4 of the managers who participated in the interview think that coding education should be included among the compulsory courses starting from primary school and should be included in the program in conjunction with other disciplines, not as a separate course, 1 manager thinks that coding education should not be included among the compulsory courses.
While 9 of the parents who participated in the interview think that coding education should be included among the compulsory courses starting from primary school, 1 parent thinks that coding education should not be included among the compulsory courses, but should be included in the program as an elective course.

*T3: "It should be included among the compulsory courses."*
*T2: "It should be included among compulsory courses and should start from the 4th grade."*
*M5: "It should be among the compulsory courses."*
*M1: " It should be included among compulsory courses and should not be taught as a separate course but in conjunction with other courses. "*
*P6: "It shouldn't be mandatory. "It should be an elective course."*
*P10: " It should definitely be included in compulsory courses and taught from primary school onwards."*

The question "Why students should be given coding education?" was asked to the teachers, administrators and parents who participated in the interview. The categories/codes and their frequency values determined as a result of the responses received from teachers, administrators and parents are given in Table 12.

Table 12. Reasons for providing coding education to students

| | Category/Code | Frequency |
|---|---|---|
| | Improves thinking skills | 9 |
| | Improves problem solving skills | 3 |

| | | |
|---|---|---|
| **Teacher (T)** | Improves creative thinking skills | 2 |
| | Improves systematic thinking skills | one |
| | Improves mathematical thinking skills | one |
| | Improves algorithmic thinking skills | one |
| | Improves analytical thinking skills | one |
| | Gains technological skills | 3 |
| | Lays the foundation of the software | 2 |
| | It is equipped | one |
| **Manager (M)** | Improves cognitive skills | 9 |
| | Problem solving skills improve | 2 |
| | Improves quick thinking skills | 2 |
| | They learn to code | one |
| | Production and product creation skills develop | one |
| | Improves creative thinking skills | one |
| | Improves systematic thinking skills | one |
| | They gain analytical thinking skills | one |
| | They use technology correctly | one |
| | Motor skills improve | one |
| | They discover what they are best at | one |
| | It is the need of the age | one |
| **Parent (P)** | Contributes to mental development | 7 |
| | It also facilitates learning in other fields | 2 |
| | They improve themselves | 2 |
| | Develops a different perspective | one |
| | Analytical thinking skills develop | one |
| | Learning speeds increase | one |
| | They can use technology effectively | 3 |
| | Their self-confidence improves | one |

When Table 12 is examined, 9 of the teachers who participated in the interview think that the reason why students are given coding education is to improve their thinking skills, while 3 think that it provides them with technological skills, 2 think that they have laid the foundation of the software, and 1 thinks that they are better equipped. Teachers who think that coding education improves their thinking skills; they stated that they have problem solving, creative thinking, systematic thinking, mathematical thinking, algorithmic thinking and analytical thinking skills.

While 9 of the managers who participated in the interview think that the reason why students are given coding education is to improve their cognitive skills, 1 thinks that it enables them to use technology correctly, 1 thinks that it improves motor skills, 1 thinks that it enables them to discover their best aspects, and 1 thinks that it is a necessity of the age. . Managers who think that coding education improves cognitive skills; they stated that they have problem solving, fast thinking, coding, production and product creation, creative thinking, systematic thinking and analytical thinking skills.

While 7 of the parents who participated in the interview think that the reason why students are given coding education is that it contributes to mental development, 3 of them think that it helps them learn to use technology effectively and 1 of them thinks that it improves their self-confidence. Parents who think that coding education contributes to mental development; they stated that it could be in the form of facilitating their learning in other fields, improving the students themselves, developing a different perspective, analytical thinking and increasing their learning speed.

*T2: "In order for the child to be better equipped."*

*T10: "By providing coding education to students, their mathematical thinking skills, algorithmic thinking skills and analytical thinking skills can be improved. In addition, students gain technological skills and thus lay the foundation for software. "*
*M4: "Because it provides creative thinking, problem solving and systematic thinking skills."*
*M1: "By providing coding education to students, they learn how to code, develop their ability to produce and create products, and improve their creative thinking skills. Students also learn to use technology in the right way."*
*P5: "Because it improves their self-confidence.*
*P6: "By providing coding education to students, it facilitates their learning in other areas and thus improves themselves."*

Teachers, administrators and parents who participated in the interview said, "Coding education is also included among the 21st century skills." "Do you think coding education should be among the 21st century skills?" was asked. The categories/codes and their frequency values determined as a result of the responses received from teachers, administrators and parents are given in Table 13.

Table 13. Opinions on whether coding education is a 21st century skill

| | **Category/Code** | **Frequency** |
|---|---|---|
| **Teacher (T)** | Yes it should be included | 10 |
| **Manager (M)** | Yes it should be included | 5 |
| **Parent (P)** | Yes it should be included | 10 |

When Table 13 is examined, all of the teachers, administrators and parents who participated in the interview think that coding education should be among the 21st century skills.

*T2: "It should take place"*
*T9: "It should definitely be included. "*
*M1: "Yes, it should be included."*
*M5: "It must be included. "*
*P8: "Absolutely yes"*
*P3: "Yes, it should. "*

The question "Can coding education be seen as a need in education?" was asked to the teachers, administrators and parents who participated in the interview. The categories/codes and their frequency values determined as a result of the responses received from teachers, administrators and parents are given in Table 14.

Table 14. Opinions on whether coding education is needed or not

| | **Category/Code** | **Frequency** |
|---|---|---|
| **Teacher (T)** | Yes it can be seen | 9 |
| | No | one |
| **Manager (M)** | Yes it can be seen | 5 |
| **Parent (P)** | Yes it can be seen | 10 |

When Table 14 is examined, 9 of the teachers who participated in the interview see coding education as a need in education, while 1 teacher does not see it as a need. All of the administrators and parents who participated in the interview stated that they saw coding education as a need in education.

*T2: "No."*
*T8: "Yes, it is a need. "*
*M5: "It is definitely a need."*
*M2: "Yes, it is a need. "*
*P8: "Yes it can be seen."*
*P1: "It is definitely a need."*

Teachers, administrators and parents who participated in the meeting asked, "Can coding education be given to every child?" The question "Does this require a certain competency?" was posed. The categories/codes and their frequency values determined as a result of the responses received from teachers, administrators and parents are given in Table 15.

Table 15. Competencies required for coding education

| | Category/Code | Frequency |
|---|---|---|
| **Teacher (T)** | Yes it can be given | 7 |
| | Suitable for development level | 3 |
| | Individual differences should be taken into account | 2 |
| | To those who have talent | 2 |
| | No it should not be given | 3 |
| **Manager (M)** | Yes it should be given | 4 |
| | According to each child's level and ability | 3 |
| | According to each child's interests | 2 |
| | No it should not be given | one |
| | Requires certain competence | one |
| **Parent (P)** | Yes it should be given | 9 |
| | No qualification required | 2 |
| | If there is no problem in understanding ability | one |
| | Unless there is a special situation | one |
| | More for those with sufficient digital competence | one |
| | Even if at a basic level | one |
| | No it should not be given | one |
| | Coding education requires a strong memory | one |

When Table 15 is examined, 7 of the teachers who participated in the interview think that coding education can be given to every child, while 3 of them think that it cannot be given to every child. Teachers who think that coding education can be given to every child, have the competencies required for this education; they stated that the development level should be appropriate, individual differences should be taken into account, and the child should have talent in this field.

While 4 of the managers participating in the interview think that coding education can be given to every child, 1 thinks that it cannot be given to every child. Administrators who think that coding education can be given to every child should provide the competencies required for this education; they stated that it should be suitable for each child's level, ability and interest. Administrators who think that coding education cannot be given to every child also stated that this education requires a certain competence.

While 9 of the parents who participated in the interview think that coding education can be given to every child, 1 thinks that it cannot be given to every child. Parents who think that coding education can be given to every child; they stated that no competency is required, unless there is a problem with the child's ability to understand, if there is no special situation, and those who have sufficient digital competence can be given coding education, albeit at a basic level. The parent who thinks that coding education cannot be given to every child also stated that this education requires a strong memory.

*T8: "I think it should be given to children with talent."*
*T3: "Yes. It can be given to students whose developmental level is appropriate and individual differences are taken into consideration."*
*M4: "It can be given taking into account the interests of each child."*
*M2: "No it should not. Coding education requires a certain competence. "*
*P3: "It should be given to every child starting from primary school."*
*P7: "If there is no problem in the child's comprehension skills or if there is no special situation, coding education can be given."*

The question "How do you think a child who receives coding education develops mentally and socially?" was asked to the teachers, administrators and parents who participated in the interview. The categories/codes and their frequency values determined as a result of the responses received from teachers, administrators and parents are given in Table 16.

Table 16. Opinions on the mental and social development of the child receiving coding education

| | **Category/Code** | **Frequency** |
|---|---|---|
| **Teacher (T)** | Mentally | 15 |
| | Reasoning skills improve | 3 |
| | Problem solving skills develop | 3 |
| | Systematic thinking skills develop | 2 |
| | Analytical thinking skills develop | one |
| | Perception improves | one |
| | Imagination develops | one |
| | Generates bright ideas | one |
| | Abstract thinking skills develop | one |
| | Creativity improves | one |
| | Establishes cause and effect relationship | one |
| | Socially | 6 |
| | Participates in team work | 2 |
| | Takes responsibility | one |
| | Self-confidence improves | one |
| | Communication power improves | one |
| | Becomes active | one |
| | It improves positively | 4 |
| **Manager (M)** | Mentally | 9 |
| | Problem solving skills improve | 2 |
| | Thinking skills improve | 2 |
| | Solution-oriented thinkers | 2 |
| | They think fast | one |
| | Creative thinking skills develop | one |
| | Analytical thinking skills develop | one |
| | Socially | 5 |
| | Increases self-confidence | 3 |
| | They express themselves easily | one |
| | Supports sociality | one |
| | It improves positively | one |
| **Parent (P)** | Mentally | 11th |
| | Develops a different perspective | 4 |
| | Makes you think practically | 3 |
| | Improves mathematical intelligence | 2 |
| | Analytical thinking skills develop | one |
| | Improves imagination | one |
| | Socially | 5 |
| | Social relationships are strengthened | 4 |
| | Increases self-confidence | one |
| | It improves positively | 3 |

When Table 16 is examined, 15 of the teachers who participated in the interview think that coding education will improve students mentally, 6 of them socially and 4 of them in a positive way. Teachers who think that this education will improve their students mentally; they stated that their reasoning, problem solving, systematic thinking, analytical thinking, abstract thinking, establishing cause and effect relationships, and generating bright ideas will improve their skills and creativity, and their perception and imagination will also improve. Teachers who think that their students will develop socially with this education; they stated that they could participate in team work, take responsibility, improve their self-confidence, improve their communication skills and be more active.

9 of the managers who participated in the interview think that coding education will improve students mentally, 5 socially and 1 positively. Administrators who think that this education will improve their students mentally; they stated that problem solving, thinking, solution-oriented thinking, fast thinking, creative thinking and analytical thinking skills will improve. Administrators who think that this education will help students develop socially; they stated that it would increase their self-confidence, enable them to express themselves easily and support sociality.

11 of the parents who participated in the interview think that coding education will improve students mentally, 5 think that it will develop them socially and 3 think that it will improve them positively. Parents who think that this education will improve their students mentally; they stated that they can develop a different perspective, enable them to think practically, develop mathematical intelligence, develop analytical thinking skills and develop imagination. Parents who think that this education will improve their students socially: they stated that it would strengthen their social relationships and increase their self-confidence.

*T5: "Mentally; It provides skills such as reasoning, problem solving and analytical thinking. Socially; "It provides teamwork skills."*
*T2: "A child who receives coding education develops imagination, creativity, abstract thinking skills, generates bright ideas and establishes cause and effect relationships. In addition, the child takes responsibility and becomes more active. "*
*M2: "It improves the child's creativity skills. "His self-confidence increases."*
*M5: "Children who receive coding education think faster, their thinking skills improve, their problem solving skills improve and they think solution-oriented."*
*P4: "It develops in a positive direction."*
*P9: "Children who receive coding education think faster, their thinking skills improve, their problem solving skills improve and they think solution-oriented."*

Teachers, administrators and parents who participated in the interview were asked, "Could there be difficulties in the coding education to be given during the primary school period?" What difficulties may occur?'' question was posed. The categories/codes and their frequency values determined as a result of the responses received from teachers, administrators and parents are given in Table 17.

Table 17. Difficulties of coding education in primary school

| | **Category/Code** | **Frequency** |
|---|---|---|
| **Teacher (T)** | It is possible | 10 |
| | Lack of technological equipment | 3 |
| | economic difficulties | 3 |
| | Children's development may not be appropriate | 2 |
| | lack of infrastructure | one |
| | Educator competence | one |
| | Impossible | 3 |
| **Manager (M)** | It is possible | 6 |
| | Students who do not have technological devices have difficulty | one |
| | May not be suitable for every child | one |
| | The quality of the education provided may not be sufficient | one |
| | Educator competence | one |
| | lack of infrastructure | one |
| | Lack of equipment | one |

| | | |
|---|---|---|
| | Impossible | one |
| | If the necessary conditions are met | one |
| **Parent (P)** | It is possible | 8 |
| | May not interest every child | 2 |
| | Each student's learning level varies | 2 |
| | Lack of infrastructure in schools | one |
| | Education may not be given enough importance | one |
| | There may not be enough time allocated to education | one |
| | Children become anxious when they do not understand the system and the language | one |
| | Impossible | 4 |
| | It would be fun for kids | one |

When Table 17 is examined, 10 of the teachers who participated in the interview think that the coding education to be given in the primary school period may have some difficulties, while 3 of them think that it will not have any difficulties. Teachers who think that they have some difficulties; the difficulties that may be experienced while giving coding education in primary school; they expressed these as lack of technological equipment, economic difficulties, education may not be suitable for children's development, lack of infrastructure and inadequacy of educators in this regard.

While 6 of the administrators who participated in the interview think that coding education to be given in primary school may have some difficulties, 1 of them thinks that there will be no difficulties if the necessary conditions are met. Managers who think that they have some difficulties; the difficulties that may be experienced while giving coding education in primary school; they stated that students who do not have technological devices may have difficulty, they may not be suitable for every child, the quality of the education provided may not be sufficient, educators may not be competent in this regard, there is a lack of infrastructure and equipment.

While 8 of the parents who participated in the interview think that the coding education to be given during the primary school period may have some difficulties, 4 of them think that there will be no difficulties and even it can be fun. Parents who think that they have some difficulties say that the difficulties that may be experienced while giving coding education in primary school are; they stated that it may not attract the attention of every child, the learning level of each student may differ, there is a lack of infrastructure in schools, not enough importance and time may be devoted to coding education, and children may become anxious when they do not understand the system and language.

> *T7: "Infrastructure may be inadequate. "The development of every child may not be appropriate."*
> *T2: "Lack of technological equipment, insufficient infrastructure and the competence of educators in this field."*
> *M4: "The quality of the education provided may not be sufficient."*
> *M3: "Students who do not have technological tools may struggle. It may not be suitable for every child."*
> *P2: "I don't think it will be a problem, in fact it will be fun for children."*
> *P6: "It may not be of interest to all children. Education may not be given enough importance. Children also get anxious when they do not understand the system and the language."*

Teachers, administrators and parents who participated in the meeting were asked, "What kind of equipment should be in schools to provide coding education?" "Do you think schools are sufficient in this sense?" was asked. The categories/codes and their frequency values determined as a result of the responses received from teachers, administrators and parents are given in Table 18.

Table 18. Opinions on the equipment that should be available in schools for coding education

| **Category/Code** | **Frequency** |
|---|---|
| Not enough | 8 |
| Technological equipment is missing | 4 |
| Visual materials are missing | one |

| | | |
|---|---|---|
| **Teacher (T)** | No domain experts | one |
| | Infrastructure is inadequate | one |
| | Mostly not enough | 2 |
| **Manager (M)** | Not enough | 5 |
| | Technological equipment is missing | 2 |
| | Visual materials are missing | one |
| | Infrastructure is missing | one |
| **Parent (P)** | Not enough | 10 |
| | Technological infrastructure is lacking | 7 |
| | Educator is missing | 2 |
| | Class sizes are large | one |
| | It would be enough | 3 |
| | Having a computer laboratory is sufficient | 3 |

When Table 18 is examined, 8 of the teachers who participated in the interview think that schools do not have enough equipment to provide coding education, while 2 teachers think that it is mostly not enough. Teachers who think that schools are not adequately equipped; they stated that technological equipment was lacking, visual materials were missing, there were no field experts and the infrastructure was inadequate.

All of the managers who participated in the interview think that schools do not have sufficient equipment to provide coding education. Administrators in schools; they stated that technological equipment, visual materials and infrastructure were lacking.

All of the parents who participated in the interview think that schools do not have sufficient equipment to provide coding education. Parents in schools; He stated that the technological infrastructure and educators were lacking and the class sizes were crowded. In addition, 3 parents stated that the deficiencies in coding education could be eliminated if there were computer laboratories in schools.

*T4: "It is not enough. "Every student should have a computer and people who are experts in this field should work in schools."*
*T5: "It is not enough. Technological equipment and visual materials are lacking. "*
*M4: "It is not sufficient. "There are no visual equipment in schools to provide coding education."*
*M1: "It is not sufficient. Schools lack technological equipment and infrastructure. "*
*P10: "It is not enough, but coding education can be provided if there are computer laboratories in schools."*
*P8: "It is sufficient. Having computer laboratories in schools is sufficient for coding education. "*

The question "How do you evaluate the fact that coding education starts from primary school in private schools and does not start in public schools?" was asked to the teachers, administrators and parents who participated in the interview. The categories/codes and their frequency values determined as a result of the responses received from teachers, administrators and parents are given in Table 19.

Table 19. Opinions about coding education being given in private schools but not yet in public schools

| | **Category/Code** | **Frequency** |
|---|---|---|
| **Teacher (T)** | Inequality | 9 |
| | contrary to equal opportunity | 5 |
| | Conditions are not equal | 2 |
| | Double standard | one |
| | There is not enough support for public schools | one |
| | Not required in public school | one |
| | Private schools offer to impress parents | one |
| **Manager (M)** | Inequality | 5 |
| | inequality of opportunity | 2 |
| | Private schools raise their students with more self-confidence | one |
| | Private schools have different perspectives on life | one |

| | | |
|---|---|---|
| | Administrators and parents in private schools are more conscious | one |
| **Parent (P)** | Inequality | 7 |
| | Conditions are not equal | 3 |
| | Costs are high in public schools | one |
| | Private schools do not have financial difficulties | one |
| | Technological infrastructure is inadequate in public schools | one |
| | Parents and educators in public schools are not sufficiently aware | one |
| | It should be offered in public schools as soon as possible | 3 |
| | By education enough educators | one |
| | It's too late | one |

When Table 19 is examined, 9 of the teachers who participated in the interview think that it is inequality that coding education is given in primary schools in private schools but has not yet started in public schools, while 1 teacher thinks that it is not necessary for this education to be given in public schools. Teachers who think that not starting coding education in public schools is an inequality; He stated that it is against equality of opportunity, conditions are unequal, double standards are applied and sufficient support is not provided to public schools. The teacher, who thought that coding education was not necessary in public schools, also stated that private schools gave coding education to impress parents.

All 9 of the administrators who participated in the interview think that it is inequality that coding education is given in primary schools in private schools but has not yet started in public schools. Managers of this situation; they stated that it creates inequality of opportunity, private schools raise their students more self-confident, private schools have a different perspective on life, and administrators and parents in private schools are more conscious.

While 7 of the parents who participated in the interview think that it is inequality that coding education is given in primary schools in private schools but has not yet started in public schools, 3 parents think that coding education should start as soon as possible in public schools. Parents think that not starting coding education in public schools is inequality; they stated that the conditions are not equal, the costs are high in public schools, private schools do not have financial difficulties, the technological infrastructure in public schools is inadequate, and parents and educators in public schools are not sufficiently conscious. In addition, parents stated that it is necessary to train a sufficient number of educators who know coding education and start this education in public schools, and that it is already late.

> *T8: "I don't think it is very necessary. "Private schools provide coding education to impress parents."*
> *T5: "I see it as inequality. It is against equal opportunity. First of all, the conditions students have are not equal. "*
> *M4: "It proves that there is inequality of opportunity in education."*
> *M2: "I see it as inequality. Private schools raise their students more confident. This is also private schools have a different outlook on life. "*
> *P7: "It should be given in public schools as soon as possible. In fact, the fact that it has not started by this time shows that it is too late."*
> *P1: "I see it as inequality. I think the conditions are not equal, but I think the cost of providing this education in public schools is high and private schools do not have financial problems."*

## Conclusion

As a result of the interviews with the teachers, the following results were obtained;

While 9 out of 10 teachers who attended the meeting had an idea about what coding education is, 1 teacher had never heard of coding education before. Teachers who know coding education also generally think that the education is useful. All of the managers who participated in the interview said that they had heard of coding education before. Managers generally think that coding education is the best way to understand technology. All of the parents who participated in the interview said that they had heard of coding education before. Parents generally think that coding education is an education that will form the basis for the professions of the future.

All of the teachers who participated in the interview think that coding education is important and that coding education in general improves thinking skills. All of the managers who participated in the interview think that coding education is important and that this education has gained importance because students generally care about innovations. All of the parents who participated in the interview think that coding education is important and that this education is gaining importance as the importance of technology in general increases day by day.

While 8 of the teachers who participated in the interview think that coding education should start from primary school, 2 teachers think that education should start from pre-school. While 3 of the managers who participated in the interview think that coding education should start from primary school, 2 of them think that education should start from pre-school. While 5 of the parents who participated in the interview think that coding education should start from primary school, 3 think that this education should start from preschool and 2 think that it should start from the 2nd grade. Bozpolat and Topdağı (2022) stated that teachers should start providing coding education, especially from primary school, and that this education will provide thinking skills, problem solving, project generation and basic algorithm-related skills. In addition, teachers expressed their opinions that there are certain characteristics and qualifications that students must have in order to provide coding education, and that teachers who can provide this education must also have some qualifications.

Although all of the teachers who attended the meeting thought that coding education could be beneficial for primary school students, the majority thought that coding education improved their thinking skills. Although all of the managers participating in the interview think that coding education can be beneficial for primary school students, the majority think that it provides them with different thinking skills. Although all of the parents who participated in the interview think that coding education can be beneficial for primary school students, the majority think that this education supports cognitive development.

Most of the teachers who participated in the interview think that coding education started at an early age will improve students' mental skills. Most of the managers who participated in the interview think that coding education started at an early age improves students' personal skills. Most of the parents who participated in the interview think that coding education started at an early age will improve students' mental skills.

While 9 of the teachers who participated in the interview think that teachers should be given coding education, 1 thinks that this education should not be given. All of the administrators and parents who participated in the interview think that teachers should be given coding education.

None of the teachers who participated in the interview have participated in the coding education programs offered through ÖBA, but 8 of our teachers think that this education is necessary, while 2 of our teachers think that it is not necessary. Not all of the managers who participated in the interview have attended the coding education programs offered through ÖBA, but all of our managers think that this education is necessary.

While 9 of the teachers who participated in the interview think about giving this education to their students if they have sufficient knowledge and equipment about coding education, 1 of our teachers does not think about giving this education. All of our managers who participated in the interview stated that they would encourage the teachers working in their institutions to provide this education to students if they have sufficient knowledge and equipment about coding education.

The majority of the teachers who participated in the interview think that coding education started at an early age improves students' thinking skills. The majority of the managers who participated in the interview think that coding education started at an early age improves students' cognitive skills. The majority of the parents who participated in the interview think that coding education started at an early age improves students' cognitive skills. Ülger (2022) received from teachers, teachers; they stated that coding education is suitable for all fields and all ages, and that they want to use coding in course contents, school activities, student competitions and projects, and thus their students' problem-solving skills can be improved.

Most of the teachers who participated in the interview think that coding education should be compulsory in primary school programs. Most of the administrators who participated in the interview think that coding education should be included in primary school curricula. Most of the parents who participated in the interview think that coding education should be compulsory in primary school programs.

The majority of the teachers who participated in the interview think that coding education should be given on the grounds that it improves students' thinking skills, the majority of administrators develop cognitive skills, and the majority of parents contribute to mental development. Şenol (2019) study, classroom teachers; they stated that

coding education is an important tool in gaining thinking skills, but teachers need support to provide coding education.

All of the teachers, administrators and parents who participated in the interview think that coding education should be among the 21st century skills. Anılan and Gezer (2020), classroom teachers expressed the opinion that students' skills such as problem solving, analytical and creative thinking can be improved with coding education.

The majority of teachers, administrators and parents who participated in the interview see coding education as a need.

While the majority of the teachers who participated in the interview think that coding education should be given to every child, some teachers think that instead of giving it to every child, it should be given to children who meet certain criteria. While the majority of the administrators who participated in the interview think that it should be given to every child, one administrator also thinks that a certain level of competence is required to provide this education. While the majority of the parents who participated in the interview think that it should be given to every child, one parent thinks that it is necessary to have a strong memory for this education. Şenol and Demirer (2017) also stated that it is possible to start coding education from a young age and apply it at all levels. In this context, the studies mentioned are similar to the research results.

All of the teachers, administrators and parents who participated in the interview think that students who receive coding education will develop mentally and socially.

While most of the teachers, administrators and parents who participated in the interview think that the coding education to be given in the primary school period may have some difficulties, some teachers do not think that it will have any difficulties.

Most of the teachers, administrators and parents who participated in the interview think that schools are not sufficiently equipped to provide coding education. Şenol and Demirer (2017) stated in their study that classroom teachers see coding education among the 21st century skills and that they see coding education as a tool to gain these skills, but they need an information technologies class, internet infrastructure and materials for coding education.

Most of the teachers, administrators and parents who participated in the interview describe the fact that coding education is given in private schools but not in public schools as inequality. They think that this situation creates inequality of opportunity between private schools and public schools.

## Recommendations

As a result of interviews with teachers, administrators and parents, the opinions of education stakeholders regarding coding education were determined. The opinions received show that coding education is a need in the education system. For this reason, researchers can design experimental studies on coding education. Opinions of prospective teachers regarding coding education can also be obtained. Teachers can be provided with this education by providing in-service education on coding education.

## Acknowledgements or Notes
This study was presented as an oral presentation at the III. International Science, Education, Art and Technology Symposium (2022, Online, Türkiye).

## Author (s) Contribution Rate
The authors contributed equally to this work.

## Ethical Approval
Ethical permission was obtained as a result of the decision taken at the meeting of Inönü University Scientific Research and Publication Ethics Committee Social and Human Sciences Scientific Research and Publication Ethics Committee Commission dated 26.10.2023 and numbered 13/1.

## References


Akpınar, Y. and Altun, A. (2014). The need for programming education in information society schools. Primary Education Online Journal, I, 13:1-4.

Anını, H. and Gezer, B. (2020). Examining the opinions of classroom teachers regarding coding activities and analytical thinking skills. Anadolu University Faculty of Education Journal, 4(4), 307-324.

Bozpolat, E., and Topdağı, M. A (2022). Needs analysis for basic algorithm and coding education in primary school. Manas Journal of Social Research , 11 (3), 933-957.

BtLessons. (2023, February 1). BtLessons. Retrieved from: https://www.btdersleri.com/ders/kodlama -e%C4%9Fitimi-nedir-kodlama-dersinin-amac%C4%B1 .

Büyüköztürk, Ş., Kılıç Çakmak, E., Akgün, Ö. A., Karadeniz, Ş. and Demirel, F. (2020). Scientific Research Methods (28th ed.). Ankara: Pegem Academy.

Delebe, E. (2018). 5th and 6th grade information technologies and software course coding guide. Ankara: MEB General Directorate of Innovation and Educational Technologies.

Demirer, V., and Sak, N. (2016). Programming education and new approaches in the world and Turkey. Theory and Practice in Education, CXXI, 3:521-546.

Dizman, A. (2018). The effect of coding, robotics, 3D design and game design education on problem solving skills and metacognitive awareness levels of students aged 11-14 , (Master's thesis). Bahcesehir University Institute of Educational Sciences.

EBA. (2023, February 1). EBA. . Retrieved from: www.eba.gov.tr/kod.

Erol, O. (2020). Coding teaching approaches from programming to coding and sample applications. Ankara: Anı Publishing.

Erümit, AK, Zirve, A.İ., Aksoy DA, Aksoy, A., Şahin, G. (2017). Programming teaching steps for algorithmic thinking. Journal of Educational Technology Readings, 3, 1-17.

Karabak, D., Güneş, A. (2013). Curriculum recommendation in software development for first-year secondary school students. Journal of Research in Education and Teaching , 2 (3), 163-169.

Kesici, T., and Kocabaş, Z. (2007). Computer-1 for High Schools. Ankara: MEB.

Mclennan, D.C. (2017). Creating coding stories and games. Teaching Young Children, 10 (30).

MEB. (2018). Information technologies and software course (Primary School 1st, 2nd, 3rd and 4th Grades) Curriculum. (2023, February 2) Retrieved from: http://www.teknolojikogretmenler.com/bilisim-teknolojileri-ve yazilimdersi-ilkokul-1-2-3-ve-4-siniflar-ogretim-programi/ It was acquired on .

Sayın, Z., and Seferoğlu, S.S. (2016). Coding education as a new 21st century skill and the impact of coding on education policies. Academic Informatics Conference, Aydın.

Şenol, Ş. (2019). Coding education in primary school: The example of classroom teachers (Master's Thesis). Süleyman Demirel University Institute of Educational Sciences.

Şenol, Ş. and Demirer, V. (2017). Opinions of classroom teachers who provide coding education regarding coding education. 5th International Instructional Technologies and Teacher Education Symposium. Izmir.

Turan, İ., Akça, M. and Küçükkurt, M. (2016). Basic coding education 1-2. Ankara: Pusula Publishing.

Ülger, A. (2022). Teachers' opinions on conducting block-based robotic coding education through distance education and the effect of this education on permanence (Master's Thesis). Gazi University Institute of Educational Sciences.

Ülkar, E. (2016, March 28). Coding education in 10 questions. Retrieved from: https://www.hurriyet.com.tr/egitim/10-soruda-kodlama-egitimi-40076661 .

Wood, S. (2003). Robotics in the classroom: A teaching tool for K- 12 educators. Symposium of Growing up with Science and Technology in the 21st Century, Virginia, USA.

Yiğit, MF (2016). Examining the effect of teaching with a visual programming environment on students' learning computer programming and their attitudes towards programming (Master Thesis). Ondokuz Mayıs University Institute of Educational Sciences.

Yin, R. (2009). Case study research: design and methods (4th ed.). CA: Sage Publications.

Yukselturk, E,. and Altıok, S. (2015). Opinions of information technology teacher candidates towards teaching computer programming. Amasya University Faculty of Education Journal, 4 (1), 50-65.

International Journal of Contemporary Educational Research

Volume 12, Number 1, March 2025, Page 26-38 Article Type: Research Article

# Philosophy for/with Children: A Meta-Analysis

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**Abstract**
This meta-analysis presents empirical research using a Philosophy for/with Children (P4wC) approach. P4wC involves a teacher engaging in philosophical problem posing and dialogue with students. There has been research focussed on the benefits derived from this practice for students. This meta-analysis calculates the effect size of these benefits that can be calculated using quantitative measures. This meta-analysis contains 62 data sets from 30 studies. P4wC is found to have a significant overall effect size of 0.65. Moreover, subgroup analyses show that when the research focusses on the development of critical thinking, the effect size is substantial at 0.89. This indicates that P4wC has a large impact on the capacity for children and young people to develop critical thinking. Other subgroup analysis also shows that this holds across age ranges. However, it does differ by region, with studies conducted in Eastern countries yielding a higher effect size than Western countries.

**Keywords:** Philosophy for/with Children; P4wC; Empirical Research; Critical Thinking; Meta-analysis

**Citation**
Kilby, B. (2025). Philosophy for/with Children: A Meta-Analysis. *International Journal of Contemporary Educational Research, 12*(1), 26-38. https://doi.org/10.52380/ijcer.2025.12.1.703

| | |
|---|---|
| Received | 21.08.2024 |
| Accepted | 05.03.2025 |
| Publication | 28.03.2025 |
| Peer-Review | Double anonymized - Double Blind |
| Plagiarism Checks | Yes - iThenticate |
| Conflicts of Interest | The author(s) has no conflict of interest to declare. |
| Complaints | editor@ijcer.net |
| Grant Support | The author(s) acknowledge that they received no external funding in support of this research. |


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## Introduction

This paper presents a meta-analysis of empirical research using a Philosophy for/with Children (P4wC) [2] approach. P4wC is an approach focussed on philosophical inquiry through dialogue, developing critical, creative, caring, and collaborative thinking in students from childhood through senior secondary and even tertiary level study (Lipman & Bynum, 1976). P4wC uses a dialogic approach to engage students in critical collaborative exploratory discussion (Kilby, 2021). This approach aims to develop a wide variety of philosophical outcomes, including in the areas of values, understanding, and intellectual humility – but for which quantitative empirical research has not been conducted. While there are variations in how P4wC is practices such as the role of the teacher or how discussions should be structured (e.g., Kilby, 2022a), there are generally accepted practices within P4wC (Murris, Haynes, & Gregory, 2016). There are a number of skills and dispositions present in all P4wC practice that are of educational value. Some of these are capable of being measured by quantitative empirical research and have been researched through quantitative empirical studies. This meta-analysis analyses data from quantitatively measured empirical studies in P4wC where the computation of an effect size is possible and creates an overarching effect size for interventions that utilise P4wC. This meta-analysis identifies 62 data sets from 30 studies (Table 7). The rationale for this study is to provide an updated meta-analysis of the effectiveness of P4wC. Two previous reliable meta-analyses were conducted in 2004 and 2005 (Trickey & Topping, 2004; Moriyón, Robello, & Colom, 2005). Therefore, given the time between previous meta-analyses and the additional empirical research that has taken place since that time, this updated meta-analysis of P4wC research is beneficial to conduct at this time.

## Philosophy for/with Children

What is Philosophy for/with Children? P4wC was initially a primary school curriculum and pedagogy but is now practised at all levels of education. It was created by American Philosopher Matthew Lipman in the 1970s, who criticised the existing education system for fostering children's lack of critical and creative thinking capabilities. Cam (2006, p. 2) states that part of the impetus for developing these capabilities is that "no developed society would tolerate unchecked endemic disease in the way that we suffer the consequences of widespread poor thinking in our society." Lipman began providing children a space to think philosophically and study complex ideas at a younger age through immersion in philosophical thinking and dialogue. He developed a set of purpose-written children's books with accompanying teacher manuals. The books were used as stimuli to encourage students to explore philosophical problems. The book's characters also modelled the kind of communal dialogue and reasoning skills that P4wC aimed for students to develop (Lipman, 1983). Through this, a wide array of thinking skills would be developed that would aid children in developing more rounded cognitive skills and a broader sense of questioning that would benefit them across all disciplines, as well as throughout their lifelong learning journey (Lipman, 1985). As Cam (2006, p. 1) explains,

> *There can be no doubt that the ability to think about the issues and problems that we face in our lives, to explore life's possibilities, to appreciate alternative points of view, to critically evaluate what we read and hear, to make appropriate distinctions and needful connections, and generally to make reasonable judgements are among the attributes of anyone who has learnt to think effectively in life.*

Lipman's philosophical view was not founded in *a priori* reason or rationalism, but in pragmatism. This pragmatism was developed out of learnings of others, including Charles Sanders Peirce and later by John Dewey; psychologist William James; sociologist George Herbert Mead; among others. Lipman stated that the goal of P4wC was to allow children to develop *reasonableness*, which he described as rationality tempered by judgment, involving the ability to provide reasons for one's opinions and claims and be moved by the reasons of others (Lipman, 2003, p. 10). His program had a reliance on critical thinking, which enabled children to make distinctions between stronger and weaker forms of reasoning. His program provided analytical and logical thinking and reasoning skills. These skills were seen to be best developed in what was called a Community of Inquiry (CoI), an idea derived from Peirce. Teachers would facilitate the acquisition of these skills by using philosophy as a learning

[2] Currently, there are a variety of terms used to talk about doing philosophy with children, these including Philosophy for Children (P4C) (Montclair State University, 2017), philosophy with children (SOPHIA, 2017), philosophical inquiry with children (ICPIC, 2017), philosophy in schools (FAPSA, 2017), philosophy alongside children (Murris, 2016), and the use of any particular term is still debated today (Kohan et al., 2017). This research does not take a terminological position on any of these, but will use a popular term, Philosophy for/with Children and "P4wC," to represent a range of approaches that have grown out of Lipman and Sharp's initial Philosophy for Children (P4C) approach.

method, and students would participate in communal critical analyses of philosophically problematic concepts. Within philosophy, students might explore such problematic concepts like the good, freedom, justice, and fairness in sub-disciplines of ethics and political philosophy; truth, knowledge, and authority in the sub-discipline of epistemology; and reality, creation, and the mind in the sub-discipline of metaphysics; beauty, art, and the emotions in the sub-discipline of aesthetics. Moving through the 1990s and early 2000s, P4wC moved beyond the original Lipman analytical/logical model by including intersubjective experiences, pluralistic reasonableness, a connection to meaning making in children's lives, and the involvement of embodied experiences and emotions that affected children's reasoning (Vansieleghem, 2013, p. 1303). This moved away from the more analytical method that Lipman initially employed, which relied heavily on logic. Lipman himself embraced this change by adding "caring thinking" as one of three key types of thinking – the others being critical and creative thinking (Lipman, 2003). The influence of Lipman's long-term collaborator, Ann Sharp, played a key role in this, as she connected P4wC to ideas from feminist and continental philosophy (Gregory & Laverty, 2017).

Importantly, P4wC is not a matter of taking university level philosophy and implanting it in schools (Pritchard, 2014, s. 3; Lone, 2021; Kizel, 2024, p. 45). There is not a focus on philosophical knowledge in the form of learning about particular philosophers, theories, or ideas from the history of philosophy (Golding, 2014, p. 71). Instead, the focus has always been on *philosophical understanding*: insofar as that understanding supports children to make meaning of, respond to, and criticise philosophically problematic concepts in their own way (p. 70). The teacher provides dialogic skills, strategies, and procedures that may be used to enhance philosophical understanding (Kilby 2019a; Kilby 2022b; Kizel 2022). The aim of P4wC is to produce a philosophiser, not a historian of philosophy or a person who can recite the ideas of other philosophers, but a person who can think well, solve problems, and lead a meaningful, ethical life. This is an important caveat in relation to CCD. P4wC is not the teaching of philosophy as a discipline but a pedagogical approach. Therefore, the features of its pedagogical approach are not necessarily bound to a particular discipline area and can support diverse and inclusive thinking (Kilby 2023). The P4wC community is separate from the academic discipline of philosophy and focuses more on the ideas and thinking of students themselves, rather than the study of great philosophers and philosophies like you might find in an academic philosophy course. For this reason, you will find P4wC being applied across all disciplines, including maths (Kennedy, 2007; Kennedy & Marsal, 2023), science (Sprod, 1997; Dobashi, 2009), and art (Prior & Wilks, 2018; Wartenberg, 2019) to name a few.

## Search & Selection

A systematic search of the databases of ERIC, Web of Science, and Google Scholar was undertaken to identify studies that fit the profile for Philosophy for/with Children. The search terms used to identify studies were only those that are commonly used in P4wC. These are: "Philosophy for/with Children", "Philosophy for Children", "Philosophy with Children", "Philosophy in Schools", "Philosophical Inquiry". To ensure that as many empirical datasets on P4wC research were included, known Philosophy for/with Children spaces were also accessed to ensure that data was not missed. These included the *Institute for the Advancement of Philosophy for Children* at Montclair State University, which hosts a page dedicated to research in Philosophy for children (Montclair State University, 2017). It also included P4wC related academic journals were searched manually including the *Journal of Philosophy in Schools*, *Critical and Creative Thinking*, *Thinking: The Journal of Philosophy for Children*, *Childhood and Philosophy*, and *Analytic Teaching and Philosophical Praxis*. Additionally, further searching was conducted when new studies were found by looking through reference lists of papers to find other studies that were cited, and also using the Google Scholar citation features which provide information about other articles that have subsequently cited a specific article. 97 studies were initially identified. 30 of these studies met the inclusion criteria.

The inclusion criteria for this meta-analysis were studies that:

- Involved a Philosophy for/with Children intervention;
- Involved quantitative data;
- Involved a control group;
- Had the data required to perform a meta-analysis available or calculatable.

This meta-analysis requires the presentation of data in terms of effect size, calculated using Hedges G (Hedges & Olkin, 1985). To meet this requirement, data that needed to be presented or calculable from the original research papers included:

- Mean average of the gain in the intervention group

- Mean average of the gain in the control group
- Standard deviation of the gain in the intervention group
- Standard deviation of the gain in the control group
- Number of participants in the intervention group
- Number of participants in the control group

Some studies had already calculated effect sizes using this method themselves, therefore this effect size was used. Other studies had not calculated effect size at all. While other students had not calculated effect size using the same method (e.g., some studies used Cohen's D instead of Hedges G), therefore the effect size was recalculated using Hedges G for consistency. Research that lacked the above data sets were excluded on the basis that effect size was not able to be calculated.

At the conclusion of the selection process, 62 data sets were included for analysis from 30 different studies. Inclusive of the 62 data sets were some studies that were separated into multiple parts. For example, the study of Worley and Worley (2019) reported measures of improvement in reading, and also improvement the use and success critical thinking and metacognitive skills. Data is presented separately in this meta-analysis for reading and critical thinking, allowing a subgroup analysis to separate these different measures for greater insight into the benefits for reading as compared to the benefits in terms of critical thinking during a P4wC intervention. Similarly, Gür, Koçak, and Muharrem (2017) provided separate data for research on 5-year-olds compared to 6-year-olds. These data sets, and similar others, were treated separated.

## Method

This meta-analysis deliberately chose to include a wide variety of studies measuring different outcomes that resulted from a P4wC intervention. The purpose of which was to assess the overall educational effect of P4wC on students. However, subsequent subgroup analyses within this paper reveal more specificity about individual effects. Included in this meta-analysis are measures assessing students' reading, critical thinking, general academic achievement (including maths and writing), and socio-emotional skills. While these are disparate measures of achievement, they are all valuable measurements of educational achievement for schools, thus, the relevance of how P4wC impacts on all of these measures provides valuable insights. Further subgroup analyses within these categories detailed how P4wC impacts in those particular areas (e.g., how does P4wC impact reading achievement specifically). Some of the studies included in this paper were also included in previous meta-analyses such as Trickey and Topping (2004) and Moriyón, Robello, and Colom (2005). They were included again here if they fit the selection criteria to provide a cumulative update on the effect size of P4wC. Additionally, 22 of the 30 studies included in the current paper were published later than 2006, making them newer than the two previously cited meta-analyses.

Hedges G (Hedges & Olkin, 1985) was used to measure all effect sizes. This was chosen as there was variability in the number of participants in the control compared to the experiment group in most studies. This meta-analysis computed effect sizes using the standardised mean difference for outcomes reported in the studies. For this reason, only studies with a pre-post control-intervention comparison were included. In many studies, the calculation was made using the data published. However, for some studies the standard deviations were missing from the publication. In these studies, efforts were made to contact the researchers to clarify the standard deviations. If this was unsuccessful, the standard deviations were calculated from the data provided and then used in the calculation of Hedges G. There is not a standardised way of reporting data in education (e.g., Cohen's D or Hedges G for calculating effect size). Therefore, as Bernard, Borokhovski, Schmid, and Abrami (2014) explain, it is sometimes required to calculate effect sizes "from test statistics (e.g., t-ratios), exact probabilities (e.g., $p = .023$) or even inexact hypothesis-test outcomes (e.g., $p < .05$) (cf. Glass, McGaw, & Smith, 1981; Hedges, Shymansky, & Woodworth, 1989)." An example of this in this paper was Fair et al. (2015b). This study provided the means and standard deviations of individual tests, as well as the number of participants, and t and p scores derived from parametric dependent sample t-tests. While standard deviations were provided for each test, standard deviations for the gains from pre-test to post-test were not provided. However, these were calculated by analysing the t-tests in the following way:

$$t = \frac{Me}{\mathrm{Sx}}$$

where

$$Sx = \frac{Se}{\sqrt{n}}$$

*t* = the published t score

*Me* = mean difference in gain scores

*Se* = standard deviation of the gain scores

*n* = number of participants

*t*, mean gain, and the number of participants were all provided, therefore we could solve this equation for *Se* to calculate the gain in standard deviation and then use it in the formula to calculate effect size using Hedges G.

Some effect sizes were slightly different because of the different tools used to calculate. For example, Topping and Trickey (2007b) used their data to calculate an effect size of 0.75. They used Cohen's D to calculate this. In this current meta-analysis, the study of Topping and Trickey (2007b) has an effect size of 0.83. The same data was used to calculate this, however this meta-analysis used Hedges G for all calculations. Hedges G was determined to be a more appropriate measure for two reasons. Firstly, Hedges G provides an effect size by weighting the participant groups. When the intervention and control groups have the same number of participants, Hedges G will be identical to Cohen's D. However, when there is a difference in participant numbers, Hedges G will provide a better analysis be weighting the effect size for participant numbers. This resulted in the difference in calculated effect size in the Topping and Trickey (2007b) paper compared to the effect size reported in this paper.

Where the standard deviation of the gain score was not reported, or the raw data was not available, the standard deviation of the gain score was derived from calculating the covariance with an estimated correlation of 0.5. The standard deviation of the gain score was then calculated using the following formula:

$Var(x) + Var(y) + 2Cov = Se(z)$

$Cov = Se(x) \times Se(y) \times Cor$

where

*Se(x)* = Standard deviation of pre-test

*Se(y)* = Standard deviation of post-test

*Cor* = Correlation (estimated at 0.5)

*Var(x)* = $\mathrm{Se(x)}^2$

*Var(y)* = $\mathrm{Se(x)}^2$

*Se(z)* = Standard deviation of the gain

Care was also taken to avoid double counting. For example, Youssef (2014) reported results from a pre-test and post-test, then also a follow up test. The results from the follow up test only were also reported in Youssef, Campbell, and Tangen (2016). Therefore, the data from Youssef (2014) only includes the unique pre-test and post-test results, as the follow up test results had already been included from Youssef et al. (2016).

In conducting subgroup analyses, there was some variability in how different studies were presented. Therefore, some categorisation was performed to fit each study into a specific category for analysis. For example, the subgroup related to 'time of intervention' was measured in semesters for this meta-analysis. However, some studies reported time in terms of weeks (Fair et al., 2015a), hours (Gür et al., 2017), or dates (Lam, 2012). These reported timeframes were roughly translated to semesters based on best guess. For example, Fair et al. (2015a) reported 10 weeks of intervention, this was translated to 1 Semester. Gür et al. (2017) reported 50 hours of intervention, this was translated to 1 Year. Lam (2012) reported October to March, and this was translated to 1 semester. Moreover, similar translations were made in terms of age of students, as some studies reported year level and others reported

age. Measures were also categorised as either Critical Thinking, General, SEL, or Reading. However, there were also different instruments used to measure within each of these categories. Studies that did not include any information were excluded from categorisation in that subgroup. For example, Marashi (2008) did not report the length of the intervention, so this study was excluded from the subgroup related to 'time of intervention.' Where the data allowed, studies were split between subgroups. For example, Worley and Worley (2019) conducted their intervention and used pre- and post-testing for both critical thinking and metacognitive skills, as well as reading comprehension. The data from this study was reported separately (i.e., critical thinking and reading comprehension data were not combined). Therefore, the data from this study pertaining to reading comprehension was used in the 'Measure' subgroup category of 'Reading', while the critical thinking and metacognitive skills data from this study was used in the subgroup category of 'Critical Thinking'. Some studies required subjective decisions to be made about the subgroup analysis. For example, Fair et al. (2015b) measured students when they were 16. However, this was a follow-up assessment. The intervention itself occurred 3 years prior and no further intervention had taken place. It was judged that this study fit into the 8–14-year-old age category because the intervention took place when students were 8-14, despite the assessment occurring at an age that would fit in the <14 category. Similarly, the participants in Walker, Wartenberg, and Winner (2013) were aged 7-8, splitting the subgroup categories of >8 and 8-14. It was decided to place this study in the 8-14 subgroup.

For some studies, only a part of the study were used. For example, Reznitskaya et al. (2012) were attempting to measure transfer of argumentation skills to different contexts. This goal is not relevant and was not considered. However, the study did include a measure of 'elaborated reasoning' among a number of other variables. Only the measure of elaborated reasoning was used from this study in the present meta-analysis.

## Findings

This meta-analysis across 62 data sets from 30 studies using a random effects model to calculate Hedges G revealed an overall effect size for P4wC interventions of 0.65, statistically significant to the value of p = <0.0001. The Institute of Education Sciences (2017) suggests that effect sizes greater than 0.25 are of substantive interest, while Hattie (2020) suggests that the average effect size in education is 0.40. With an effect size of 0.65, this puts P4C in a high category of teaching strategies that improve educational achievement for students from early childhood to senior secondary schooling.

This meta-analysis shows a slightly higher effect size overall than previous meta-analyses conducted on P4wC. However, similar patterns are able to be seen across various meta-analyses. Moriyón et al. (2005) reported an overall effect size of 0.58 and Yan, Walters, Wang, and Wang (2018) reported an identical effect size (even though different studies were used). Trickey and Topping (2004) reported a lower effect size of 0.43.

**Table 1.Effect size of P4wC**

| k | Effect Size | 95% CI | t | p-value |
|---|---|---|---|---|
| 62 | 0.6511 | 0.4656 – 0.8366 | 7.02 | <0.0001 |

Subgroup analyses were conducted across five different subgroups:

1. Age of Participants: >8; 8-14; <15
2. Measure of Study: Critical Thinking; General Academic; Reading; Social-Emotional Learning
3. Time of Intervention: 1 Semester; 1 Year; 2 Years
4. Region: West; East
5. Decade of Study: 1980; 1990; 2000; 2010

Time of Intervention demonstrated higher effect sizes for studies of One Semester over studies of One Year. There was only one study that was in the Two Years category so this category was excluded. This was determined to be most likely a result of the reliability of the studies, with shorter term studies less likely to be as sound as longer-term studies, thereby appearing to generate more significant results.

**Table 2. Effect size of P4wC by 'Time of Intervention'**

| | k | Effect Size | 95% CI | p-value |
|---|---|---|---|---|
| 1 Semester | 36 | 0.8479873 | 0.605 – 1.091 | 0.000000000007474971 |
| 1 Year | 25 | 0.3976110 | 0.147 – 0.648 | 0.001872165 |
| 2 Years | 1 | 0.01 | -0.012 – 0.032 | 0.3809295 |

Similarly, Decade of Study also showed some non-significant variation but without any pattern. The highest effect size average came from the 2010 decade, following by 1990, 1980, then 2000. There was no substantive conclusion drawn regarding why this variation occurred.

**Table 3. Effect size of P4wC by 'Decade of Study'**

| | k | Effect Size | 95% CI | p-value |
|---|---|---|---|---|
| 1980 | 7 | 0.5885718 | -0.011 – 1.188 | 0.05418785 |
| 1990 | 3 | 0.6197084 | 0.376 – 0.863 | 0.000005968723 |
| 2000 | 14 | 0.2830657 | 0.084 – 0.482 | 0.005245003 |
| 2010 | 38 | 0.8020616 | 0.546 – 1.058 | 0.000000000819807 |

The Age of Participants subgroup category yielded almost identical results for the >8 group and the 8-14 group at 0.73 and 0.75 respectively. The <15 group was disregarded as the data from this age group all came from the same research.

**Table 4. Effect size of P4wC by 'Age of Participants'**

| | k | Effect Size | 95% CI | p-value |
|---|---|---|---|---|
| >8 | 12 | 0.726181921 | 0.279 – 1.173 | 0.001450949 |
| 8-14 | 42 | 0.753364629 | 0.533 – 0.974 | 0.00000000002275605 |
| <15 | 8 | 0.0090941040 | -0.071 – 0.089 | 0.8237544 |

Studies undertaken in Eastern countries yielded higher effects sizes than studies undertaken in Western countries, with effect sizes of 0.89 and 0.56 respectively with statistically significant p-values.

**Table 5. Effect size of P4wC by 'Location: East/West'**

| | k | Effect Size | 95% CI | p-value |
|---|---|---|---|---|
| East | 18 | 0.8854543 | 0.519 – 1.252 | 0.000002201270 |
| West | 44 | 0.5564449 | 0.353 – 0.760 | 0.00000008860444 |

Student data on reading and general academic achievement were significantly lower than data from measures of critical thinking. Data on socio-emotional skills was also high, but there were only four datasets that fit this category, all of which came from the same research and all of which were highly variable. For these reasons, the socio-emotional skills category was excluded from analysis here. Focussing on Critical Thinking exclusively, P4wC interventions generate an impressive effect size of 0.89. Reading skills and general academic achievement had much smaller effect sizes, with lower confidence intervals around 0 and, either non-statistically significant, or on the margins of statistically significant, p-values. It is clear that P4wC interventions in these studies had a greater effect on students' critical thinking skills than on their reading or general academic achievement.

**Table 6. Effect size of P4wC by 'Measure of Study'**

| | k | Effect Size | 95% CI | p-value |
|---|---|---|---|---|
| Critical Thinking | 32 | 0.8915116 | 0.623 – 1.130 | 0.000000000000218429 |
| General | 15 | 0.3581801 | 0.076 – 0.640 | 0.01281767 |
| Reading | 11 | 0.3566126 | -0.052 – 0.765 | 0.08707577 |
| Socio-Emotional | 4 | 0.6149649 | -0.621 – 1.851 | 0.3296109 |

## Discussion

This meta-analysis provides an update on the effectiveness of Philosophy for/with Children across a range of measures. Further, subgroup analyses enable a deeper exploration of the effectiveness of P4wC within specific subsets. Most interestingly, subgroup analyses for age, region, and measure of study provided significant insights. These will be unpacked in greater detail in this section.

The subgroup analysis for the variable of age provides important findings for the application of P4wC. P4wC may often be viewed from the outside as an educational initiative that most strongly supports older and/or highly-able students (cf. Haynes, 2007). This usually implies that older students – those who already have a strong grasp on the basics of literacy and numeracy – can access P4wC to extend their thinking capabilities. The data from this meta-analysis challenges this narrow view of P4wC as (1) only beneficial as an extension program for high ability students, or (2) only beneficial to older students who have already grasped basic understandings in literacy and numeracy. This data suggests that there is an equal benefit for P4C in early childhood (>8) as there is in middle

schooling (8-14). For studies conducted with students under the age of 8, the effect size was 0.73. For students aged 8-14 the effect size was 0.75. This demonstrates that there is a clear benefit to students under 8 years of age as well as students aged 8-14. This is an important facet of the research conducted for this paper. It dispels assumptions about P4wC as a practice for older or high ability students. This finding should provide an impetus towards further research and practice in P4wC for the early childhood years of schooling, as the data demonstrates a significant benefit to that age range in addition to the 8-14 age range.

Another subgroup analysed the distinction between regions, separated into Eastern and Western regions of the world. While both Eastern and Western subgroups had an impactful effect size, the effect size in Eastern Regions was significantly more pronounced. This has been explored theoretically in the past, with the idea that Western countries are already adopting teaching practices related to open-ended inquiry, whereas Eastern countries are less likely to be doing so (Park, 1997; Ee & Seng, 2008; Lam & Park, 2016). Therefore, the exposure of P4wC in educational institutions that are more familiar with traditional teaching methods may yield greater outcomes. The subgroup analysis conducted here supports this conclusion.

The most interesting results from subgroup analyses came from the Measure of Study subgroup category. The effect size for critical thinking was 0.89, which reading and general academic achievement were 0.36. Patterns in critical thinking compared with other measures of achievement were similar in previous meta-analyses compared to this one. Moriyón et al. (2005) reported an effect size of 0.63 when the measure was the New Jersey Test of Reasoning Skills (a Critical Thinking measure), but only 0.31 when other measures were used. Similarly, Yan et al. (2018) reported an effect size of 1.06 from measures of "reasoning skill", a lower effect of 0.40 on general cognitive ability, and a lower effect again on reading of 0.28. Trickey and Topping (2004) did not present a subgroup analysis as part of their paper. The results of the current meta-analysis align with these previous ones. A much higher effect size in Critical Thinking measures was found, and much lower effects on measures of general academic and reading ability. Additionally, both reading and general academic achievement had p-values indicating results that are only marginally - or not at all - statistically significant at just below or above 0.05. In contrast, critical thinking had a p-value well below the 0.05 threshold for what is generally considered statistically significant. This indicates that P4wC has a strong significant effect on students' critical thinking, and a potentially small effect size on reading and general academic achievement.

There has been debate and criticism within the P4wC community about the use of P4wC to further reading and other general academic achievement measures (such as maths or writing; Anderson, 2020). This is a point of contention in P4wC due to concerns about the practice being used instrumentally to try and advance standardised test scores in literacy and numeracy, rather than advocating for the intrinsic benefits of philosophical thinking being these aspects of education. This subgroup analysis in this study shows a clear strength of P4wC in fostering critical thinking skills, but not in reading or general academic achievement. It is therefore evidenced that P4wC is more strongly associated with improving standardised quantifiable measures of critical thinking than of standardised quantifiable measures of reading or general academic achievement. This does not discount the possibility that P4wC may improve reading or general academic achievement in non-standardised measures or in non-quantifiable ways, such as through oracy or creativity which are important in both areas. However, given the results of this subgroup analysis demonstrating that critical thinking measures are improving to a much more significant degree than measures of reading or general academic achievement, it is recommended that those interested in implementing P4wC understand that one of the primary positive effects of its implementation is in the improvement of critical thinking for students. Reading, maths, and writing skills may be slightly improved through P4wC, but this improvement is likely to be in a much smaller range than that of critical thinking. The focus of P4wC is not improving standardised test scores in reading, maths, or writing, and the data analysed here shows that P4wC is not a very effective way to improve these facets of education. Therefore, the P4wC community should aim at fostering an understanding about the more significant positive effects of implementing P4wC, or focussing on measures that are understudied in this area such as the impacts on oracy or socio-emotional learning.

## Conclusion

This meta-analysis provides an update on the effectiveness of Philosophy for/with Children across a number of educational measures. This is a reinforcement of the value of P4wC as a valuable educational endeavour that is evidenced-based in improving outcomes for children and young people. There is further evidence that suggests the adoption of P4wC in Eastern countries may be of increased benefit. This is perhaps related to the traditional teaching styles more often practiced in Eastern countries compared to Western countries. Moreover, the value of P4wC is not restricted to certain age groups. This study finds similar results for children in early childhood as it does for children in middle years schooling. P4wC is not something that needs to wait until children are 'old

enough', there is value to be found in P4wC in early childhood education. The most valuable measure that is calculable based on quantitative empirical data is the development of critical thinking in children and young people. Using P4wC as a means to improve general academic achievement or reading comprehension appears to be less effective. However, as a means to improve the critical thinking capacity of students, this meta-analysis demonstrates that P4wC is a powerful tool to achieve this outcome. Future studies in P4wC should not focus on the notion that P4wC can be used to improve outcomes in reading, writing, and maths in a way measured by standardised testing. Research in P4wC should focus on what is particularly important and valuable, which this study shows is the development of critical thinking. Further research in P4wC should also be balanced with the many areas of educational value that P4wC contributes to that are not capable of being measured through quantitative empirical research, and are thus not able to be included in a meta-analysis such as this one (Kilby, 2019b). P4wC is a powerful educational tool, evidenced by the effect sizes calculated in this paper, and should be further promoted through schools across the world.

## Table 7. Summary of Studies Used in Meta-Analysis

| Study | Effect Size | Number of Participants |
|---|---|---|
| Cooke (2015) | 1.473035982 | 26 |
| Fair et al. (2015a) | 0.203146349 | 540 |
| Fair et al. (2015b) | 0.34071392 | 183 |
| Gasparatou and Kampeza (2012) | 0.420065749 | 30 |
| Giménez-Dasí, Quintanilla, and Daniel (2013) (4-year-olds emotional comprehension) | -0.81313661 | 27 |
| Giménez-Dasí et al. (2013) (4-year-olds strategies for interaction) | 0.478567233 | 27 |
| Giménez-Dasí et al. (2013) (5-year-olds emotional comprehension) | 0.527299689 | 33 |
| Giménez-Dasí et al. (2013) (5-year-olds strategies for interaction) | 2.260482902 | 33 |
| Jenkins (1986) | 0.63321872 | 60 |
| Jo (2001) | 0.76747721 | 54 |
| Lam (2012) | 0.61570622 | 42 |
| Marashi (2008) | 1.026746898 | 60 |
| Othman and Hashim (2006) (critical thinking) | 0.361586106 | 48 |
| Othman and Hashim (2006) (reading) | 0.358824478 | 48 |
| Pourtaghi, Hosseini, and Hejazi (2014) (creative elaboration) | 1.570134134 | 32 |
| Pourtaghi et al. (2014) (creative flexibility) | 1.051608837 | 32 |
| Pourtaghi et al. (2014) (creative fluency) | 1.037555227 | 32 |
| Pourtaghi et al. (2014) (creative innovation) | 1.280935499 | 32 |
| Säre, Luik, and Tulviste (2016) (making connections) | 1.317195914 | 125 |
| Säre et al. (2016) (sense-making) | 1.287162424 | 125 |
| Säre et al. (2016) (reasoning) | 1.501159397 | 125 |
| Säre et al. (2016)(talkativeness) | 0.672080214 | 125 |
| Sprod (1997) | 0.488786883 | 54 |
| Tok and Mazi (2015) (Listening comprehension) | 0.298236912 | 74 |
| Tok and Mazi (2015) (Reading comprehension) | -0.085209845 | 74 |
| Topping and Trickey (2007a) | 0.650602188 | 148 |
| Topping and Trickey (2007b) | 0.800601534 | 177 |
| Walker et al. (2013) | 1.33 | 23 |
| Worley and Worley (2019) (Reading) | 0.119565712 | 213 |
| Worley and Worley (2019) (Critical Thinking and Metacognitive Strategies - Success) | 1.410820787 | 220 |

| | | |
|---|---|---|
| Worley and Worley (2019) (Critical Thinking and Metacognitive Strategies - Use) | 2.005494575 | 220 |
| Youssef (2014) | 0.239308792 | 246 |
| Youssef et al. (2016) (Reading Comprehension) | 0.323925408 | 222 |
| Zulkifli and Hashim (2020) | 0.088040065 | 61 |
| Rahdar, Pourghaz, and Marziyeh (2018) (critical thinking) | 1.934146056 | 54 |
| Rahdar et al. (2018) (critical openness) | 1.64672722 | 54 |
| Rahdar et al. (2018) (reflective scepticism) | 3.014506862 | 54 |
| Rahdar et al. (2018) (self-efficacy) | 0.779460014 | 54 |
| Gür et al. (2017) (5-year-olds) | 0.16675672 | 63 |
| Gür et al. (2017) (6-year-olds) | 0.067988472 | 63 |
| Slade (1989) (high achieving) | 0.4946893 | 30 |
| Slade (1989) (low achieving) | 0.242532067 | 20 |
| Palsson (1996) | 0.839639068 | 126 |
| Moriyón, Colom, Lora, Rivas, and Traver (2000) (spatial) | -0.090438402 | 175 |
| Moriyón et al. (2000) (abstract reasoning) | -0.075824404 | 175 |
| Moriyón et al. (2000) (verbal) | -0.04243683 | 175 |
| Moriyón et al. (2000) (numerical) | 0.157829608 | 175 |
| Moriyón et al. (2000) (verbal intelligence) | 0.055296144 | 175 |
| Moriyón et al. (2000) (non-verbal intelligence) | -0.093623681 | 175 |
| Moriyón et al. (2000) (general intelligence) | -0.020117044 | 175 |
| Moriyón et al. (2000) (cognitive) | 0.217043723 | 115 |
| Reznitskaya et al. (2012) | 1.693649189 | 260 |
| Gorard, Siddiqui, and Huat See (2015) (Reading) | 0.134081456 | 1529 |
| Gorard et al. (2015) (Writing) | 0.035847035 | 1529 |
| Gorard et al. (2015) (Maths) | 0.102481007 | 1529 |
| Gorard et al. (2015) (Cognitive) | 0.068740783 | 1511 |
| Allen (1988) (low-ability students - reading) | 2.292065685 | 52 |
| Allen (1988) (high-ability students - reading) | -0.282583441 | 52 |
| Allen (1988) (low-ability students - reasoning) | 0.376777921 | 52 |
| Allen (1988) (high-ability students - reasoning) | 0.345379761 | 52 |
| Lord, Dirie, Kettlewell, and Styles (2021) (Reading) | 0.01 | 7677 |
| | | Total[3] Participants: 12066 |

## Ethical Approval

This meta-analysis deliberately chose to include a wide variety of studies measuring different outcomes that resulted from a P4wC intervention. The papers are open-access publications. Ethical principles and rules have been meticulously observed. In addition, ethics committee approval is not required to conduct this study.

[3] This total includes participants who engaged in a follow up study (e.g., Fair et al. (2015a) and Fair et al. (2015b)), but does not double count the splitting of studies that was done for this meta-analysis (e.g., Gorard et al. (2015) was split in reading, writing, maths, and cognitive assessment categories but used the same students. These students were not double counted for this total.

## References


Allen, T. (1988). I Think, Therefore I Can: Attribution and Philosophy for Children. *Thinking: The Journal of Philosophy for Children, 8*, 14-18.

Anderson, A. (2020). Categories of Goals in Philosophy for Children. *Studies in Philosophy and Education, 39*, 607-623.

Bernard, R. M., Borokhovski, E., Schmid, R. F., & Abrami, P. C. (2014). A Meta-Analysis of Blended Learning and Technology Use in Higher Education: From the General to the Applied. *Journal of Computing in Higher Education, 26*, 87-122. doi:https://doi.org/10.1007/s12528-013-9077-3

Cam, P. (2006). *20 Thinking Tools: Collaborative Inquiry for the Classroom*. Camberwell: ACER Press.

Cooke, P. A. (2015). *The Impact of Engaging in Philosophy with Middle School Children on the Development of Critical Thinking.* (Doctor of Philosophy). University of Rochester, New York.

Dobashi, T. (2009). Philosophising as Archetype Science: Takeji Hayashi's Clinical Pedagogy (H. Hague, Trans.). In E. Marsal, T. Dobashi, & B. Weber (Eds.), *Children Philosophise Worldwide: Theoretical and Practical Concepts* (pp. 185-200). Frankfurt: Peter Lang.

Ee, J., & Seng, T. O. (2008). Cultural Influences of the East & West: Implications on the Educational Reforms in the Singapore Context. *KEDI Journal of Educational Policy, 5*(1).

Fair, F., Hass, L. E., Gardosik, C., Johnson, D. D., Price, D. P., & Leipnik, O. (2015a). Socrates in the Schools from Scotland to Texas: Replicating a Study on the Effects of a Philosophy for Children Program. *Journal of Philosophy in Schools, 2*(1).

Fair, F., Hass, L. E., Gardosik, C., Johnson, D. D., Price, D. P., & Leipnik, O. (2015b). Socrates in the Schools: Gains at Three-Year Follow-Up. *Journal of Philosophy in Schools, 2*(2).

FAPSA. (2017). Federation of Australasian Philosophy in Schools Associations. Retrieved from http://fapsa.org.au/

Gasparatou, R., & Kampeza, M. (2012). Introducing Philosophy for Children (P4C) in Kindergarten in Greece. *Analytic Teaching and Philosophical Praxis, 33*(1), 72-82.

Giménez-Dasí, M., Quintanilla, L., & Daniel, M. F. (2013). Improving Emotion Comprehension and Social Skills in Early Childhood through Philosophy for Children. *Childhood & Philosophy, 9*(17), 63-89.

Glass, G. V., McGaw, B., & Smith, M. L. (1981). *Meta-Analysis in Social Research*. Beverly Hills: Sage.

Golding, C. (2014). A Handy Account of Philosophy in Schools. *Journal of Philosophy in Schools, 1*(1), 68-88.

Gorard, S., Siddiqui, N., & Huat See, B. (2015). *Philosophy for Children: Evaluation Report and Executive Summary*. Retrieved from Durham:

Gregory, M., & Laverty, M. (2017). *In Community of Inquiry with Ann Margaret Sharp*: Routledge.

Gür, C., Koçak, N., & Muharrem, S. (2017). The Study of the Effect of Thinking from Multidimensional Perspectives Training Program on the School Readiness of 5 and 6 Year-old Children. *Education and Science, 42*(189), 153-165.

Hattie, J. (2020). Visible Learning Meta: Global Research Database. http://www.visiblelearningmetax.com/Influences: Corwin.

Haynes, J. (2007). Freedom and the Urge to Think in Philosophy with Children. *Gifted Education International, 22*(2-3), 229-237.

Hedges, L. V., & Olkin, L. (1985). *Statistical Methods for Meta-Analysis*. Orlalndo: Academic Press.

Hedges, L. V., Shymansky, J. A., & Woodworth, G. (1989). *A Practical Guide to Modern Methods of Meta-Analysis*. Washington: National Science Teachers Association.

ICPIC. (2017). The International Council of Philosophical Inquiry with Children. Retrieved from http://icpic.org/

Institute of Education Sciences. (2017). *What Works Clearinghouse: Standards Handbook* (4 ed.). Washinton: U.S. Department of Education.

Jenkins, J. (1986). Philosophy for Children Programme at a Gloucestershire Comprehensive School in Great Britain. *Thinking: The Journal of Philosophy for Children, 6*(3), 33-37.

Jo, S. (2001). Literacy: Constructing Meaning through Philosophical Inquiry. *Analytic Teaching, 21*(1), 44-52.

Kennedy, N. (2007). Philosophy for Children and Mathematics Teaching and Learning: Insights, Models, Possibilities. In E. Marsal, T. Dobashi, & B. Weber (Eds.), *Children Philosophise Worldwide: Theoretical and Practical Concepts*. Frankfurt: Peter Lang.

Kennedy, N., & Marsal, E. (2023). *Dialogical Inquiry in Mathematics Teaching and Learning: A Philosophical Approach*. Berlin: LIT Verlag.

Kilby, B. (2019a). Why teachers' beliefs and values are important in p4c research: an australian perspective. *Childhood & philosophy, 15*.

Kilby, B. (2019b). Who am I? Why am I here? Why children should be taught philosophy (beyond better test scores). *The Conversation*. Retrieved from https://theconversation.com/who-am-i-why-am-i-here-why-children-should-be-taught-philosophy-beyond-better-test-scores-120160

Kilby, B. (2021). Dialogic Pedagogies: Defining and Analyzing Four Types of Dialogue in Education. *Analytic Teaching and Philosophical Praxis, 41*(2).

Kilby, B. (2022a). Competition in Philosophy is a Feminist Issue. *Journal of Philosophy in Schools, 9*(2), 90-113.

Kilby, B. (2022b). Philosophy for/with Children and Teachers' Perspectives: The Need to Understand Teachers' Beliefs and Values. In *Philosophy with Children and Teacher Education* (pp. 42-50). Routledge.

Kilby, B. (2023). Gender and communication in children and school: aligning theory and evidence. *SN Social Sciences, 3*(2), 36.

Kizel, A. (Ed.). (2022). *Philosophy with children and teacher education: global perspectives on critical, creative and caring thinking*. Taylor & Francis.

Kizel, A. (2024). *Enabling Students' Voices and Identities: Philosophical Inquiry in a Time of Discord*. Lanham: Lexington Books/Fortress Academic.

Kohan, W., Murris, K., Mostert, P., Sutcliffe, R., D'Olimpio, L., & Worley, P. (2017, 30 June). *What Does P4C Capture.* Paper presented at the 18th International Council of Philosophical Inquiry with Children, Madrid.

Lam, C. M. (2012). Continuing Lipman's and Sharp's Pioneering Work on Philosophy for Children: Using Harry to Foster Critical Thinking in Hong Kong Students. *Educational Research and Evaluation, 18*(2), 187-203.

Lam, C. M., & Park, J. W. (2016). Introduction: A Sociological and Philosophical Approach to Education. In C. M. Lam & J. W. Park (Eds.), *Sociological and Philosophical Perspectives on Education in the Asia-Pacific Region. Education in the Asia-Pacific Region: Issues, Concerns and Prospects* (Vol. 29). Singapore: Springer.

Lipman, M. (1983). *Lisa*. Montclair: IAPC.

Lipman, M. (1985). Thinking Skills Fostered by Philosophy for Children. *Thinking and Learning Skills, 1*, 83-108.

Lipman, M. (2003). *Thinking in Education* (2 ed.). Cambridge: Cambridge University Press.

Lipman, M., & Bynum, T. (1976). *Philosophy for Children*. Oxford: Blackwell.

Lone, J. M. (2021). *Seen and Not Heard: Why Children's Voices Matter*. Landham: Rowman & Littlefield.

Lord, P., Dirie, A., Kettlewell, K., & Styles, B. (2021). *Evaluation of Philosophy for Children: An Effectiveness Trial*. Retrieved from London:

Marashi, S. M. (2008). Teaching Philosophy to Children: A New Experience in Iran. *Analytic Teaching, 27*(1), 12-15.

Montclair State University. (2017). Institute for the Advancement of Philosophy for Children. Retrieved from http://www.montclair.edu/cehs/academics/centers-and-institutes/iapc/

Moriyón, F. G., Colom, R., Lora, S., Rivas, M., & Traver, V. (2000). Valoración de «Filosofía para Niños»: un programa de enseñar a pensar. *Psicothema, 12*(2), 207-211.

Moriyón, F. G., Robello, I., & Colom, R. (2005). Evaluating Philosophy for Children: A Meta-Analysis. *Thinking: The Journal of Philosophy for Children, 17*(4).

Murris, K. (2016). *The Posthuman Child: Educational Transformation Through Philosophy with Picturebooks*. Abingdon: Routledge.

Murris, K., Haynes, J., & Gregory, M. J. (2016). *The Routledge International Handbook of Philosophy for Children*. London: Routledge.

Othman, M., & Hashim, R. (2006). Critical Thinking & Reading Skills: A Comparative Study of Reader Response & the Philosophy for Children Approaches. *Thinking: The Journal of Philosophy for Children, 18*(2), 26-34.

Palsson, H. (1996). We Think More than Before about Others and their Opinions (An Evaluation Report from Ireland). *Thinking: The Journal of Philosophy for Children, 12*(4), 24-29.

Park, J. W. (1997). Education for Democratic Citizenship and the Community of Inquiry: Some Implications for Educational Reform in Korea. *Thinking: The Journal of Philosophy for Children, 13*(3), 2-5.

Pourtaghi, V., Hosseini, A., & Hejazi, E. (2014). Effectiveness of Implementing Philosophy for Children Program on Students' Creativity. *Scientific Journal of Pure and Applied Sciences, 3*(6), 375-.

Prior, S., & Wilks, S. (2018). Philosophy in Public and Other Educational Spaces. *Philosophical Inquiry with Children*, 185-198.

Pritchard, M. (2014). Philosophy for Children. In Edward N Zalta (Ed.), *The Stanford Encyclopedia of Philosophy* (Spring 2014 ed.). Stanford: Metaphysics Research Lab, Stanford University.

Rahdar, A., Pourghaz, A., & Marziyeh, A. (2018). The Impact of Teaching Philosophy for Children on Critical Openness and Reflective Skepticism in Developing Critical Thinking and Self-Efficacy. *International Journal of Instruction, 11*(3), 539-556.

Reznitskaya, A., Glina, M., Carolan, B., Michaud, O., Rogers, J., & Sequeira, L. (2012). Examining Transfer Effects from Dialogic Discussions to New Tasks and Contexts. *Contemporary Educational Psychology, 37*, 288-306.

Säre, E., Luik, P., & Tulviste, T. (2016). Improving Pre-Schoolers' Reasoning Skills using the Philosophy for Children Programme. *Trames, 20*(3), 273-295.

Slade, C. (1989). Logic in the Classroom. *Thinking: The Journal of Philosophy for Children, 8*(2), 14-20.

SOPHIA. (2017). SOPHIA: European Foundation for the Advancement of Doing Philosophy with Children. Retrieved from http://www.sophianetwork.eu/

Sprod, T. (1997). Improving Scientific Reasoning through Philosophy for Children. *Thinking: The Journal of Philosophy for Children, 13*, 11-16.

Tok, S., & Mazi, A. (2015). The Effect of Stories for Thinking on Reading and Listening Comprehension: A Case Study in Turkey. *Research in Education, 93*. doi:http://dx.doi.org/10.7227/RIE.0006

Topping, K. J., & Trickey, S. (2007a). Collaborative Philosophical Enquiry for School Children: Cognitive Gains at Two-Year Follow-Up. *British Journal of Educational Psychology, 77*(4).

Topping, K. J., & Trickey, S. (2007b). Collaborative Philosophy Enquiry for School Children: Cognitive Effects at 10-12 Years. *British Journal of Educational Psychology, 77*(2).

Trickey, S., & Topping, K. J. (2004). Philosophy for Children: A Systematic Review. *Research Papers in Education, 19*(3).

Vansieleghem, N. (2013). What is Philosophy for Children? From an educational experiment to experimental education. *Educational Philosophy and Theory, 46*(11), 1300-1310. doi:10.1080/00131857.2013.771442

Walker, C. M., Wartenberg, T. E., & Winner, E. (2013). Engagement in Philosophical Dialogue Facilitates Children's Reasoning about Subjectivity. *Developmental Psychology, 49*(7), 1338-1347.

Wartenberg, T. (2019). *Philosophy in Classrooms and Beyond: New Approaches to Picture-Book Philosophy*. Lanham: Rowman & Littlefield.

Worley, P., & Worley, E. (2019). Teaching Critical Thinking and Metacognitive Skills through Philosophical Enquiry: A Practitioner's Report on Experiments in the Classroom. *Childhood & Philosophy, 15*, 1-34.

Yan, S., Walters, L. M., Wang, Z., & Wang, C. C. (2018). Meta-Analysis of the Effectiveness of Philosophy for Children Programs on Students' Cognitive Outcomes. *Analytic Teaching and Philosophical Praxis, 39*(1), 13-33.

Youssef, C. (2014). *A Multilevel Investigation into the Effects of the Philosophical Community of Inquiry on 6th Grade Students' Reading Comprehension, Interest in Maths, Self-Esteem, Pro-Social Behaviours and Emotional Well-Being.* (Doctor of Philosophy). Queensland University of Technology, Brisbane.

Youssef, C., Campbell, M., & Tangen, D. (2016). The Effects of Participation in a P4C Program on Australian Elementary School Students. *Analytic Teaching and Philosophical Praxis, 37*(1), 1-19.

Zulkifli, H., & Hashim, R. (2020). Philosophy for Children (P4C) in Improving Critical Thinking in a Secondary Moral Education Class. *International Journal of Learning, Teaching and Educational Research, 19*(2), 29-45. doi:https://doi.org/10.26803/ijlter.19.2.3

International Journal of Contemporary Educational Research
Volume 12, Number 1, March 2025, Page 39-55 Article Type: Research Article

# Developing the "Social Skills Assessment Scale–Teacher Form" for Preschool Children: A Validity and Reliability Study

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**Abstract**
This study aimed to develop the "Social Skills Assessment Scale–Teacher Form" (SOSAS–TF) for preschool children. Data were collected from three distinct groups of participants. The first dataset, obtained from 254 preschool children, was collected during a *preliminary trial*. The second dataset, gathered from 896 preschool children, was used for the *trial practice*, while the third dataset, consisting of 263 preschool children, was used to assess *test-retest reliability*. Within this scope, the Kaiser-Meyer-Olkin (KMO) value was determined to be .96, and Bartlett's test yielded a significant chi-square value, indicating the suitability of the data for factor analysis. The findings of the study revealed that the scale, consisting of 44 items, included five dimensions: "communication," "adaptation,'' "self-control,'' "prosocial behaviors,'' and "assertiveness.'' The factor loadings of all items ranged from .46 to .74, while the common factor variances varied between .42 and .69. These five factors collectively explained 54.57% of the total variance. The Cronbach's alpha reliability coefficients ($\alpha$) for the dimensions of "communication," "adaptation," "self-control," and "prosocial behaviors" were .89, .90, .86, and .87, respectively. The total reliability was strong ($\alpha$ = .94), and the "assertiveness" dimension ($\alpha$ = .76) was found to be significantly reliable. Regarding the scale's test-retest reliability, the correlation coefficients for the dimensions of "communication" ($r$ = .82), "adaptation" ($r$ = .86), "self-control" ($r$ = .75), "prosocial behaviors" ($r$ = .86), and "assertiveness" ($r$ = .63), as well as the total score ($r$ = .89), were positive and highly significant ($p$ < .001). In conclusion, a valid and reliable assessment instrument was developed, contributing to the literature on social skills assessment in preschool children.

**Keywords:** Preschool children, Social skills, Social Skills Assessment Scale–Teacher Form, Scale development, Validity and reliability

**Citation**

Aksoy, P. & Baran, G. (2025). Developing the "Social Skills Assessment Scale─Teacher Form" for preschool children: A validity and reliability study. *International Journal of Contemporary Educational Research*, *12*(1), 39-55. https://doi.org/10.52380/ijcer.2025.12.1.390

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|---|---|
| Received | 14.03.2024 |
| Accepted | 19.03.2025 |
| Publication | 28.03.2025 |
| Peer-Review | Double anonymized - Double Blind |
| Ethical Statement | * This article is derived from the corresponding author's doctoral dissertation, entitled "Examination of the Effect of Story Telling Based and Play Based Social Skills Training on the Social Skills of Children Attending to Kindergarten," supervised by the second author (Ph.D. Dissertation, Ankara University, Ankara, Turkey). |
| Plagiarism Checks | Yes - iThenticate |
| Conflicts of Interest | The author(s) has no conflict of interest to declare. |
| Complaints | editor@ijcer.net |
| Grant Support | The author(s) acknowledge that they received no external funding in support of this research. |


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## Introduction

Social skills are considered learned behaviors that are socially accepted and allow individuals to respond positively to their interaction with others, and help them avoid negative reactions (Gresham & Elliot, 1984). Social skills, in a way, are certain behaviors that are required for successfully achieving social duties (McFall, 1982) and serve as guiding principles for individuals to quickly reach their goals, take advantage of opportunities, and adapt to their environment easily (Gresham, 2002; Gresham & Elliott, 1987). At this point, social skills enable individuals to achieve acceptance in social life and encourage them to be in harmony with their environment. Similarly, as individuals' mental health is rooted in establishing healthy relationships with others, social skills are highly important for protecting individuals' mental well-being. In the case of inadequacies in social skills, individuals' satisfaction with close relationships tends to be lower, and they are more likely to experience increased clinical problems such as depression, loneliness, and social anxiety (Arnold et al., 2012; Campbell et al., 2010; Ceylan, 2009; Clayton et al., 2021; Dong et al., 2023; Erkul & Sonmez, 2020; Gresham, 2001; Gresham et al., 2006; Jones et al., 1982; Kalutskaya et al., 2015; Leary & Kowalski, 1995; Malecki & Elliot, 2002; Mulvey et al., 2020; Segrin, 2000; Segrin & Flora, 2006; Sharma et al., 2016; Welsh et al., 2001; Whirter & Voltan Acar 1998; Zsolnai, 2002). Inadequacies in social skills hinder the development of interpersonal communication and prevent individuals from establishing effective communication with people around them in a social environment, thus reducing their participation in social settings. These deficiencies, more importantly, prevent individuals from forming meaningful relationships with their environment, ultimately leading to regression in life and social isolation (Bellini, 2008; Conger & Keane, 1981; Erwin, 1994; Gresham, 2016; Gresham & Elliott, 1987; Kalutskaya et al., 2015; Lodder et al., 2016; Quinn et al., 1999; Strain et al., 1984). Children who struggle with social interactions often experience difficulties in socio-emotional development, which may lead to lower academic achievement and heightened vulnerability to emotional challenges (Kılıç et al., 223; Offer-Boljahn et al., 2022; Parker & Asher, 1987; Rademacher et al., 2020; Schneider & Byrne, 1985; Zöggeler-Burkhardt et al., 2023). Liberman et al. (1989) identified several factors contributing to inadequacies in individuals' social skills, as follows. (i) A lack of appropriate role models, preventing individuals from learning effective social interactions; (ii) conditions such as social anxiety, alcohol addiction, and schizophrenia, impairing the development of social skills; (iii) traumatic events and stressful situations, making it difficult for individuals to demonstrate their social skills effectively; and (iv) significant life changes, such as imprisonment, homelessness, job loss, starting preschool, and relocating to a new environment.

When an inadequacy in social skills is detected, targeted interventions are necessary to address the deficiency. At this point, employing effective strategies and intervening during the early stages of life is crucial. The primary approach to addressing social skills inadequacies is identifying their underlying causes. If the inadequacy results from a lack of appropriate role models, it may be necessary to create environments that provide children with examples of appropriate behavior or to organize activities that allow them to observe such behaviors. Additionally, if the deficiency stems from individual characteristics that hinder the acquisition or demonstration of social skills, solutions should focus on addressing the specific behaviors or skills contributing to the problem. Gaining insights into these challenges requires a comprehensive and systematic evaluation (Cooke & Apolloni, 1976; Dong et al., 2023; Günindi, 2023; Gresham, 2001; Gresham et al., 2006; Meuwissen, 2022; Takahashi et al., 2015).

As social skills are highly complex, various techniques, such as formal and informal methods, are required to evaluate them. Standard measurement instruments are used for formal evaluations, while observation, interviews, sociometry, self-evaluation, and behavior-rating scales are used for informal evaluations (Cooke & Apolloni, 1976; Kutlu & Kaya, 2005). Sociometry is a useful method for evaluating social skills, but it has some limitations in how it can be used comprehensively in line with the objectives (Cornish & Ross, 2004; Merrell, 2001). This explains why sociometric techniques, although commonly used, may result in less peer acceptance for children. Results from sociometric evaluations may vary depending on the classroom population and do not provide adults with information on which social skills of the children should be supported. Therefore, it is recommended to use sociometry in conjunction with other measurement instruments (Foster et al., 1993; Kavale et al., 1988; Warnes et al., 2005). The self-evaluation technique involves individuals marking whether they have performed a behavior or not, or to what extent they have performed it, using rating scales or checklists. In this sense, the individual makes an evaluation based on their judgment. Using the self-evaluation technique alone to determine inadequacies in social skills is not considered sufficient, and it is recommended to use it in combination with additional information obtained through direct observation. Nonetheless, it is not possible to apply the self-evaluation technique to preschool children, as the concrete thinking and self-centered mentality of preschool children make it difficult for

them to make objective evaluations about themselves (Bacanlı, 2008; Connolly & Doyle, 1981; Deutsch, 1974; Elliott, & Busse, 1991; Gülay & Akman, 2009; Merrell, 2001; Merrell & Gimpel, 2014; Warnes et al., 2005). Although natural observation has some advantages, such as not involving intervention and being specific and objective, it also has disadvantages, such as susceptibility to bias and lack of predictive validity. Based on this, it is not recommended to use a single instrument solely for the evaluation of social skills. Moreover, certain target behaviors can only be observed in particular environments, and thus, it is not sufficient to evaluate less exhibited behaviors with a single observation. Therefore, it is also important to use broad screening inventories and social skill rating scales to make a comprehensive evaluation of social skills in children (Boisjoli & Matson, 2009; Elliott, & Busse, 1991; Gresham, 1981; Sheridan, & Walker, 1999).

Behavior-rating scales provide several advantages for evaluating children's social skills. Merrell (1999) suggested that the advantages of behavior-rating scales can be categorized under six dimensions. First, behavior-rating scales require less professional time and training activities to utilize the evaluation system compared to direct behavioral observation. Second, while data collected through behavior-rating scales might be of low frequency, it is possible to obtain data on important behaviors that might not be revealed during a limited number of direct observations. Third, an objective evaluation method is provided with behavior-rating scales, and this method yields more reliable data than expressive techniques or unstructured interviews. Fourth, they are useful for evaluating individuals who have difficulty providing information about themselves, including children with low verbal skills and/or young individuals who tend not to be cooperative. Fifth, behavior-rating scales can be used in children's schools or homes, which may be considered the natural environment for children. Sixth, children's parents or teachers are expected to have strong observations of and judgments about children, as they are highly familiar with them, and these observations and judgments are used in behavior-rating scales. In this respect, it is concluded that behavior-rating scales are effective and important instruments for evaluating children's social skills (Boisjoli & Matson, 2009; Hosp et al., 2003; Merrell & Gimpel, 2014). Such cases indicate that evaluating social skills through rating scales is more efficient. As highlighted, developing a reliable scale to assess preschool children's social skills would be valuable.

The evaluation of children's social skills by individuals who are familiar with these children is an ideal application for behavior-rating scales. In this context, teachers are considered one of the most reliable and valuable sources of information regarding children's behaviors. This is because teachers systematically observe and monitor children in various situations, and they are the individuals who interact with children during play and other activities. Additionally, teachers are expected to possess both theoretical and practical knowledge of child development, which enables them to assess children's behaviors and skills realistically. Furthermore, teachers are trained in supervision techniques and are knowledgeable about behaviors that deviate from the norm, thus ensuring the reliability of their evaluations (Çağlar, 1981; Connolly & Doyle, 1981; Wilson & Bullock, 1989). Nevertheless, it is crucial to recognize that social skills are behaviors exhibited in social environments and society. Teachers can observe children's behaviors in the classroom and their interactions with peers, which increases the validity of the results. Therefore, during the development of the scale in this study, validity and reliability analyses were conducted based on data provided by teachers. Similar measurement instruments are used in studies evaluating the social skills of preschool children, and currently, there are a limited number of measuring instruments available in the literature (Avcıoğlu, 2007; Gresham & Elliott, 1990; Kapıkıran et al., 2006; Merrell, 1996). It is noteworthy that these measurement instruments were developed in previous years. While social skills remain essential, their assessment should be conducted using updated processes. Each contribution to the literature on social skills evaluation represents a significant step in advancing the field. In this regard, the measurement instrument developed in this study to assess preschool children's social skills is expected to serve as a valuable resource for future research and provide researchers with a new perspective. Accordingly, this study aimed to develop the "Social Skills Assessment Scale–Teacher Form" (SOSAS–TF) for preschool children. To achieve this, validity and reliability studies were conducted with Turkish preschool children.

For the scope of this study, existing instruments for assessing social skills were comprehensively analyzed, with the aim of developing a more contemporary and effective instrument based on the insights and findings obtained from these instruments. The existing instruments generally measure social skill levels from a broad perspective and are limited to specific observations within the educational environment. These limitations pose challenges in evaluating social skills in a more detailed and specific manner. In this context, the present study is designed to develop a psychometrically reliable instrument that better meets the needs of the education system and teacher evaluation processes, while also considering cultural sensitivities. During the scale development process, no initial limitations were imposed on the number of items. Instead, to ensure validity, items that allowed social skills to be measured in a more comprehensive, directly observable, and context-specific manner were prioritized. At this stage, adaptation to the unique characteristics of the Turkish preschool education system was prioritized, with the ultimate goal of designing a scale that would enable teachers to assess social skills in a more valid and

comprehensive way. This scale, developed in response to current needs and increasing demands in the field of education, is expected to be a practical instrument that not only determines children's social skill levels but also enables teachers to monitor and support social skills development more effectively.

## Method

This study focused on developing a measuring instrument to evaluate preschool children's social skills, based on the results of exploratory factor analysis. The operations performed during the process of developing the SOSAS–TF scale are illustrated in Figure 1.

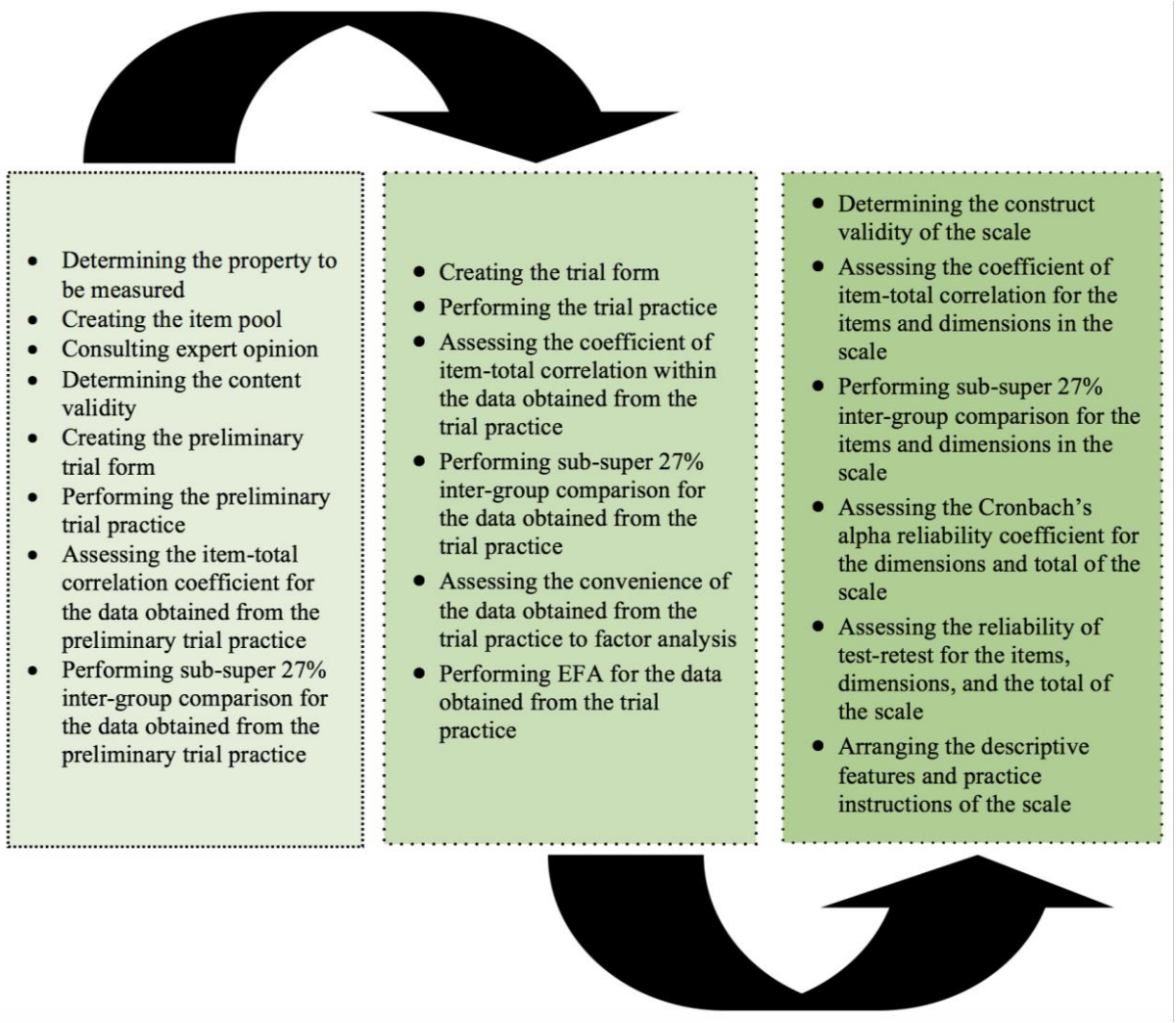


Figure 1. Operations performed during the process of developing the SOSAS-TF scale

### Participants

The study was conducted with three groups of participants. In the first group, a **preliminary trial** was performed. For the preliminary trial of the items, upon determining their content validity, eight preschool teachers working at five schools in the city center of Tokat, Turkey, were asked to view the form. The teachers were asked to indicate the items they had difficulty in understanding, or they found incomprehensible. As no item was reported as incomprehensible/inappropriate, implementation of the preliminary trial was continued. Accordingly, the researcher distributed the preliminary trial form consisting of 66 items, to the teachers through one-to-one interviews and explained the researcher's purpose and the implementation instructions of the form. Accordingly, a group of preschool teachers working at 20 schools was selected among the teachers working at preschools and

kindergarten classes located in a city center in the Black Sea Region in Turkey. They were asked to evaluate the skills given in the form according to children's frequency of exhibiting the skills in their classrooms. Ten forms were given to each of the 29 preschool teachers who volunteered to participate in the study to fill in, considering the children in their classrooms. In this context, any form that was filled incorrectly was not included in the implementation data. Thus, preliminary trial form data of 254 children were collected. Among these children, 54.3% (n= 138) were boys and 45.7% (n= 116) were girls, with a mean age of 66.4 months (SD = 3.5).

The **trial practice** was performed in the second group. In factor analysis studies, it is recommended that the number of participants should be approximately five or ten times greater than the number of the items in the scale to be developed to obtain eligible results (Tavşancıl, 2005). Comrey & Lee (1992) defined the adequacy of a sample size, which will be subjected to factor analysis, as "very bad" for 50 participants, "bad" for 100 participants, "medium" for 200 participants, "good" for 300 participants, "very good" for 500 participants, and "perfect" for 1000 and more participants. According to this, it was aimed to include at least 10 times more children in the study group than the 63 items in the scale for the trial form. In this context, 92 preschool teachers working at 36 schools were selected through a random sampling method among teachers in the city center of Tokat. These teachers represented schools of different socioeconomic levels. The forms of 896 children who were evaluated correctly by these teachers, were obtained. Accordingly, the number of the forms filled out by the teachers for the children in their classrooms varies between 2 and 12, and 53.8% (n= 482) of the children, who were evaluated within the scope of the trial form, were boys; while 46.2% (n= 414) of them were girls. The mean age of this children was 65.9 months (SD = 3.7).

**Test-retest reliability** was performed in the third group. To determine the external reliability of the scale, the classrooms of the teachers who had previously filled out the form within the scope of the trial implementation were revisited four weeks later, and they were asked to fill out the form once more for the children who had previously been subjected to the form. In this context, the teachers were given forms for 300 children, and they filled out the forms for 263 children completely. 55.1% (n= 145) of the children who were involved in the process for test-retest reliability were girls, while 44.9% (n= 118) of them were boys, with a mean age of 66.1 months (SD = 3.4).

**Process**

The study was conducted after obtaining a letter of approval from the Turkish Ministry of National Education [MoNE] and consent forms from parents. During the development of the SOSAS–TF scale, a literature survey was first conducted, and then a search was made on studies regarding this subject and existing assessment instruments in the national and international literature. In this context, social skills evaluation scales for preschool children developed in various countries (Gresham, & Elliott, 1990; Merrell, 1996) and adapted to Turkish (Kamaraj, 2004; Koçyiğit, & Kayılı, 2008), and that developed in Turkey (Avcıoğlu, 2007; Gülay, 2004; Kapıkıran et al., 2006), were reviewed. At this point, the learning outcomes and indicators in the preschool program of the MoNE (2013) were addressed. Accordingly, 106 items in the scope of social skills were created. These items were examined based on several criteria: whether they explain a single characteristic/skill, their expression in a simple and understandable manner, observability in an environment, suitability for preschool children, evaluability by teachers, relevance to the study's purpose, and the contextual skills they encompass. A theoretical and conceptual framework was used to develop scale items as a data collection instrument and to create a trial form. These items were organized according to the social learning approach (Bandura, 1972; Rotter, 1982), which integrates common elements from multiple theories (cognitive and behavioral theories) and is centered on children's learning through observation and modeling.

Seventy-four candidate scale items were created by eliminating and correcting some items. In order to balance the validation trends of these items in the draft form during the evaluation phase, and avoid manipulations, 38 of them were defined as positive, and 36 were defined as negative (Tavşancıl, 2005). At this point, the evaluation criteria of the scale items in the literature are reviewed and it was decided to evaluate the items in the scale as "always," "often," "sometimes," "rarely," and "never" based on the frequency of each child to exhibit them. In addition to this, "always" was defined as 5 points, "often" as 4 points, "sometimes" as 3 points, "rarely" as 2 points, and "never" as 1 point for the items expressed positively. Reverse scoring (recode) was decided to be applied for the items that were expressed negatively, and "always" was defined as 1 point, "often" as 2 points, "sometimes" as 3 points, "rarely" as 4 points, and "never" as 5 points. A section for implementation instructions was included in the introduction of the form, including the scale items, providing explanations on the aim and the response manner of the scale.

The content validity of the 74 candidate scale items created in the study was analyzed. Content validity reveals whether the items in the scale are sufficient to measure social skills in terms of quality and quantity. Expert opinion is considered one of the logical methods of determining the content validity (Büyüköztürk, 2014). Therefore, expert opinion was obtained to test the content validity of the items. In this context, a form was given to the experts in which they report to what extent they found it appropriate to include the items in the preliminary trial form into the scale. The experts were asked to evaluate each item in the trial form using a rating coding system that included categories such as "suitable," "partly suitable," and "not suitable". They were also asked to provide a "comment" section for each item in the form, allowing them to add their opinions and recommendations about the items. They were asked to evaluate the items based on their suitability for preschool children, alignment with the scope of social skills, clarity of expression, comprehensibility, utility for teachers/parents to use, and coverage of various dimensions of social skills while determining the content validity of the items that were created in line with expert opinion.

In this direction, the opinions of 11 experts were obtained to ensure content validity, comprising five field experts in *preschool education*, four field experts in *child development and education*, and two field experts from *psychological counseling and guidance department* who conducted studies on social skills during the preschool period. Additionally, two Turkish language education field experts were consulted to assess whether the items adhered to correct grammar rules and were comprehensible. Furthermore, three field experts in measurement and evaluation analyzed the items in terms of the way of expression and their procedural convenience. Accordingly, the opinions were obtained from a total of 16 experts. Twelve of these experts had doctoral degrees, three had master's degrees, and one had a bachelor's degree. Meanwhile, fourteen of them were academics, and two were preschool teachers.

After the expert opinions were obtained, all feedback in the expert forms was combined in a single form, and the number of experts approving the potential choices of each item was determined. During this process, according to the expert opinions, items with 90% and above approval were completely selected. Items with 70-80% approval were rearranged according to the recommendations, and items with lower approval rates were removed from the scale (Büyüköztürk, 2014). In this scope, six items of the draft scale were excluded, four items were rearranged, and two items were combined using a common expression that was present in both to create a single item. According to the expert opinions, no new item was included as no item was recommended to be added. Thus, a preliminary trial form consisting of 66 items among 74 candidate scale items was created.

Data (of 254 children) on the preliminary trial form consisting of 66 items were collected in the study. As a result of the Pearson correlation analysis conducted to determine the item-total correlation, it was found that item 32 ($r$= -.017, $p$= .784), item 46 ($r$= .085, $p$= .179), and item 50 ($r$= .193, $p$= .001) had lower item-total correlation. It was determined that the item-total correlation of the remaining 63 items apart from these items (items 32, 46, and 50) was greater than .30. Items with an item-total correlation of .30 and higher distinguish individuals very well; items with an item-total correlation between .20 and .30 might be included in the trial, in case it is deemed mandatory, or the item should be corrected, and items with an item-total correlation lower than .20 should not be included in the trial.

The positive and high item-total correlation indicates that the items illustrate similar behaviors and internal consistency of the trial is high (Büyüköztürk, 2014). According to this, it was determined that items 23, 46, and 50 should be excluded from the scale, as they would have a negative effect on the internal consistency of the trial. Item distinguishing capability was also considered to decide the item exclusion process. Sub-super 27% group comparison was performed to determine the distinctiveness validity of the SOSAS–TF scale.

A t-test for independent groups was performed to determine whether the difference between the item scores of the subjects in the sub (n= 69) and super (n= 69) groups for each item of the test scale was significant. Similarly, the findings revealed that the total scores of items 32 ($t$= .333, $p$= .739) and 46 ($t$= -.603, $p$= .547) did not differ significantly among the sub and super groups subjects. Accordingly, it was decided to exclude the items 32, 46, and 50 from the scale. At this point, a high and significant difference was found in the other items in the trial form ($p$= <.001). The differences observed in the desired direction between the groups were found to be significant, and this is considered an indicator of the internal consistency of the test (Büyüköztürk, 2014). In this context, the 66-item preliminary trial form was converted into a 63-item trial form.

Data (of 896 children) on the preliminary trial form consisting of 63 items created in the study were collected at this stage. The item-total correlation coefficients and distinctiveness capabilities of the scale items were considered

to determine whether the items in the dataset obtained through the trial form illustrated similar behaviors and to keep the items with high internal consistency in the scale.

The findings of the Pearson correlation analysis that was performed to determine the item-total correlation revealed that items 29, 33, and 34 were found to have values lower than .30, and were excluded from the scale. Thus, they were not used in the analysis. The findings of the *t*-test analysis for independent groups that was conducted between 27% sub (n= 242) and super (n= 242) groups to determine the capability of item distinctiveness revealed that items 35, 37, 66, and 68 did not have significant differences and were excluded from the scale before the analysis. Consequently, 56 items were kept in the scale. At this stage, the validity and reliability studies were conducted on the scale.

**Data Analysis**

The data collected through the study were transferred to the Statistical Package for the Social Sciences (SPSS version 20.0) and made ready for the validity and reliability analysis. The following steps were followed to analyze the data at hand:

In this context, the item-total correlation and the capability of item distinctiveness were considered to demonstrate the item's validity. The item-total correlation was calculated using the Pearson product-moment correlation coefficient, and the capability of item distinctiveness was evaluated by comparing the top and bottom 27% subgroups through an independent groups *t*-test. The values of the Kaiser-Meyer-Olkin (KMO) test for sampling adequacy and Bartlett's test of sphericity were analyzed to determine whether the data at hand were suitable for factor analysis. An exploratory factor analysis (EFA) was conducted to determine the scale's construct validity. The contribution of each factor to the total variance (eigenvalues), their percentages to variance contribution, and their cumulative percentages to variance contribution were reviewed. Cronbach's alpha coefficient of reliability was considered to determine the reliability of the total scale's dimensions.The relationship between the two sets of scores that were obtained at different times was analyzed through thee Pearson product-moment correlation coefficient to determine the test-retest reliability of the scale.

## Findings and Comments

This section contains the findings of the validity and reliability of the SOSAS–TF scale for preschool children. In this context, the findings of studies based on validity and reliability analyses are presented and interpreted.

**Validity Studies**

The success of the measurement instrument in predicting children's social skills depends highly on its validity and reliability. Validity is a concept that tries to measure to what extent the measurement instrument accurately captures the desired characteristic of the individual. One of the characteristics that should be taken into account while determining the validity of the measurement instrument is construct validity. The capability of the measurement instrument to capture an abstract concept accurately in the context of the desired behavior represents the construct validity. In this study, a large number of measurable and observable items were created to measure the social skills of the individuals. The results reveal to what extent these items measure the characteristics of social skills are related to the construct validity. Factor analysis, cluster analysis, internal consistency, and hypothesis testing techniques can be used to determine the construct validity (Çokluk et al., 2014; Kline, 2014; McDonald, 2014).

Factor analysis aims to express measurement with a small number of factors, aggregating the variables that measure the same structure or qualification. Factor analysis is the process of revealing new variables called factorization or common factor, or in the process of obtaining functional definitions of the concepts, using factor load values of the items. There are two types of factor analysis: exploratory factor analysis (EFA) and confirmatory factor analysis (CFA).

Exploratory factor analysis contains an activity to find a factor based on the relations among variables. Thus, EFA is a technique to understand the existing construct. However, CFA contains an activity to test a hypothesis or theory about the relationship among the study variables. Exploratory factor analysis (EFA) is used to determine the construct validity of the scale that is developed as a data collection instrument in social sciences (Büyüköztürk, 2014; Erkuş, 2012; Finch, 2019). Under these circumstances, it was first evaluated whether the obtained dataset was suitable for factor analysis and the data had a multivariate normal distribution. Before starting factor analysis,

the Kaiser-Meyer-Olkin (KMO) test for sampling adequacy and Bartlett's test of sphericity values were reviewed to determine whether the data at hand were suitable for factor analysis. As a result of the analysis, it was determined that the KMO value, which analyzed the suitability of the group for the factor analysis in terms of the size of the sample, was .96 which is the threshold for adequate sample size, had a value between 0 and 1. When the KMO value is lower than .50, it means that the dataset is not suitable for factor analysis (Cerny & Kaiser, 1977).

When the KMO value is lower than .50 in terms of its suitability for factor analysis, it means it is an "unacceptable" situation. The value .50 represents "weak," .60 represents "medium," .70 represents "good," .80 represents "very good," and .90 represents "perfect" (Sharma, 1995). Hence, the closer the KMO value to 1.00, the higher the suitability of the data for analysis (Tabachnick & Fidell, 2013). The KMO value of the study was found to be .96 which indicates that the sample size of the study is perfectly suitable for factor analysis. Similarly, according to the result of the Bartlett test, the approx. chi-square ($X_2$) value was significant at the significance level of .01 [$X^2(1711) = 27060.610$; $p < .001$]. This result showed that the data originated from the multivariate normal distribution, and another premise for the factor analysis was met (Çokluk et al., 2014). The data are considered suitable for factor analysis when the KMO value is higher than .60, and the result of the Bartlett test is found to be significant. These results suggest that the data at hand could be factorized (Büyüköztürk, 2014; Pett et al., 2003; Tabachnick, & Fidell, 2013). Therefore, it was decided that the dataset was suitable for factor analysis. Accordingly, 56 items were subjected to EFA to determine the construct validity of the scale, and the results of the total explained variance were analyzed. At this point, each factor's contribution to the total variance (eigenvalues), percentages to the variance contribution, and cumulative percentages to the variance contribution were examined. There was no limitation to the number of the factors in EFA and the varimax orthogonal rotation technique was used to find a more readable or suitable factor construct without damaging the explained variance.

As a result of the varimax rotation performed to determine the number of factors that constituted the scale and what these dimensions were, it was found that there were nine factors with eigenvalues higher than 1.00, and the nine factors explained 57.01% of the variance. However, it was remarkable that the contribution to the variance from the sixth component was not important. At this stage, the scree plot related to the factor eigenvalues was analyzed, and it was found that there was no change in the graphic curve from the sixth component. This suggests that the items in the scale could be categorized under five factors.

The load values of the items in the factor they are involved, which are generated as a result of EFA, are considered a good score for selection when they have values equal to or more than .40, according to Tavşancıl (2005) and .45 or more according to Büyüköztürk (2014). At this point, it is stated that the presence of a cluster constituted by items, which yield a high-level relationship with the factor, expresses that the items together measure a construct. Considering the factor load value was .45, within the scope of the study, the analysis was continued. Therefore, five items that were below the threshold (items 9, 26, 27, 50, and 65) were excluded from the scale. Afterward, it was observed that five items with acceptable load values in more than one dimension overlapped (items 3, 5, 28, 32, and 59). This shows that these items were related to more than one factor and cannot be collected under only one factor. It is recommended that the difference between the highest load value of an item in the factor and the second highest load value be at least .10 (Büyüköztürk, 2014). Therefore, considering the situation where the difference among the factor loadings was at the lowest level, these items were excluded from the scale items one by one. At this point, two items that were not adequate to create a factor in terms of quantity and that were collected under the same factor were excluded from the scale (items 10 and 66), then the analysis was repeated. Hence, the common variance loads of the remaining items in the scale were examined, and it was determined that 44 items that could be explained by five factors, would remain in the scale.

At this point, the explained variance and the contribution to the total variance by each factor were analyzed. According to Kalaycı (2014), in case the contribution of each additional factor to the explanation of the total variance decreases below 5%, it indicates that the maximum number of factors is reached. Hence, it was determined that the first factor explained 15.54%, the first two factors explained 27.01% together, three factors explained 37.61%, four factors explained 47.04%, and five factors explained 54.57% of the total variance. It was then concluded that the contribution of the first five components to the variance was at an adequate ratio.

The variance rates varying between 40% and 60% in the multifactor patterns are accepted to be adequate (Scherer et al., 1988; Tavşancıl, 2005). In this framework, it appears that the contribution of the five-factor construct to the total variance is adequate. Here, it was observed that the first factor with the eigenvalue of 6.83 explained 15.54%, the second factor with the eigenvalue of 5.04 explained 11.47%, the third factor with the eigenvalue of 4.66 explained 10.59%, the fourth factor with the eigenvalue of 4.15 explained 9.43%, and the fifth factor with the

eigenvalue of 3.31 explained 7.52% of the total variance. Table 1 shows the EFA results of the five-factor construct.

Table 1. Results of the EFA related to the SOSAS-TF scale and the result of the *t*-test between 27% of sub-super groups

| Draft scale | Final scale | The first factor | The second factor | The third factor | The fourth factor | The fifth factor | Common variance | Result of t-test between 27% of sub-super groups |
|---|---|---|---|---|---|---|---|---|
| m8 | m1 | .719 | | | | | .658 | 19.81*** |
| m20 | m2 | .676 | | | | | .636 | 23.98*** |
| m13 | m3 | .675 | | | | | .572 | 21.75*** |
| m4 | m4 | .644 | | | | | .557 | 21.86*** |
| m31 | m5 | .640 | | | | | .565 | 22.49*** |
| m12 | m6 | .630 | | | | | .574 | 18.83*** |
| m56 | m7 | .624 | | | | | .517 | 19.66*** |
| m2 | m8 | .623 | | | | | .501 | 18.72*** |
| m22 | m9 | .604 | | | | | .577 | 24.88*** |
| m38 | m10 | .583 | | | | | .512 | 15.27*** |
| m1 | m11 | .528 | | | | | .501 | 19.31*** |
| m30 | m12 | .487 | | | | | .482 | 15.30*** |
| m49 | m13 | | .725 | | | | .666 | 18.98*** |
| m48 | m14 | | .724 | | | | .694 | 17.03*** |
| m43 | m15 | | .693 | | | | .662 | 14.69*** |
| m42 | m16 | | .657 | | | | .639 | 18.89*** |
| m61 | m17 | | .618 | | | | .550 | 13.65*** |
| m55 | m18 | | .599 | | | | .610 | 20.53*** |
| m41 | m19 | | .587 | | | | .504 | 12.43*** |
| m52 | m20 | | .550 | | | | .625 | 25.86*** |
| m47 | m21 | | .522 | | | | .536 | 18.70*** |
| m11 | m22 | | | .742 | | | .621 | 16.97*** |
| m54 | m23 | | | .719 | | | .562 | 12.58*** |
| m16 | m24 | | | .641 | | | .519 | 15.50*** |
| m37 | m25 | | | .641 | | | .503 | 9.22*** |
| m45 | m26 | | | .628 | | | .529 | 13.04*** |
| m14 | m27 | | | .596 | | | .484 | 15.70*** |
| m19 | m28 | | | .564 | | | .516 | 21.94*** |
| m63 | m29 | | | .532 | | | .476 | 12.71*** |
| m23 | m30 | | | .525 | | | .597 | 21.53*** |
| m25 | m31 | | | | .628 | | .564 | 19.06*** |
| m58 | m32 | | | | .621 | | .579 | 19.53*** |
| m17 | m33 | | | | .603 | | .621 | 21.02*** |
| m36 | m34 | | | | .583 | | .597 | 19.63*** |
| m53 | m35 | | | | .580 | | .502 | 15.60*** |
| m51 | m36 | | | | .571 | | .546 | 19.12*** |
| m18 | m37 | | | | .557 | | .553 | 21.31*** |
| m15 | m38 | | | | .515 | | .482 | 18.84*** |
| m21 | m39 | | | | .462 | | .424 | 17.45*** |
| m69 | m40 | | | | | .733 | .649 | 14.80*** |
| m24 | m41 | | | | | .661 | .563 | 16.76*** |
| m64 | m42 | | | | | .613 | .468 | 8.51*** |
| m6 | m43 | | | | | .586 | .527 | 10.73*** |
| m7 | m44 | | | | | .550 | .514 | 15.45*** |

*** $p$ <.001

Table 1 shows that the factor loadings in the first factor vary between .49 and .72, the factor loadings in the second factor vary between .52 and .73, the factor loadings in the third factor vary between .53 and .74, the factor loadings in the fourth factor vary.46 and .63, and the factor loadings in the fifth factor vary between .55 and .73. Thus, it was observed that the factor loadings of all of the items in the scale varied between .46 and .74, and the common factor variances, which represented the capability of each item to explain the total variance related to the scale

together with the other items, varied between .42 and .69. According to this, it is remarkable that the factor loadings of all of the items remained in the scale, and they all had .45, which is recommended as a good threshold to measure the construct; and the common factor variances were higher than .30, which is accepted as an adequate value (Büyüköztürk, 2014; Kline, 2014). These findings show that the items on the scale would suggest the phenomenon of social skills well.

At this stage, the content of the items collected under the same factor and the factor construct represented by them were examined, which led to the opinion that the items under a common factor were the ones that measured the characteristics, which were in a similar construct. At this point, naming the resulting five factors was emphasized. For this, as suggested by Kalaycı (2014), the items of the same factor and the items that had major weight under a factor were examined. According to this, the first dimension was named as "communication" dimension as it included items such as "give right answers to the questions about other's feelings," "expresses their feelings clearly in the face of an event or situation," "arranges their gestures and facial expressions for the situation by an appropriate way while talking," and "makes eye contact with the listener while talking."

The second dimension was named as "adaptation" dimension as it includes items such as "follow the given instructions," "follow the rules in his/her environment," and "wait for his/her turn in the situations that require moving in turn." In the meantime, the third dimension was named as "self-control" dimension as it contained items such as "show aggressive behaviors when s/he gets angry," "respond in the same way when others pushed/hit," and "damage the objects in his/her class/room." The fourth dimension was named as "prosocial behaviors" as it contained items such as "appreciates the success of others," "express his/her love by hugging or verbally expressing his/her love," and "voluntarily help someone whom s/he feels needs help." Additionally, the fifth dimension was named as "assertiveness" as it contained items such as "abstain from joining other children's play,'' "has difficulty in making new friends,'' and "is shy and withdrawn.'' After the researcher named the factors, the opinions of five experts, three in the field of preschool education and two in the field of child development and education, were obtained to determine the appropriateness of the factor names. All experts found the factor names appropriate, and, thus, the names were accepted as the dimension names in the scale.

**Reliability Studies**

The consistency of the items in the scale with each other and the extent to which the scale reflects the addressed skills are related to the reliability of the scale. Reliability, in one respect, refers to the extent to which the measurement instrument accurately captures the desired characteristics. At this point, it is recommended that an item prepared to form the scale should be examined in terms of its capability to be consistent and stable in itself and cause desired reactions to be collected. The *t*-test results about the difference between the item averages of the sub 27% and super 27% groups, which were established according to the coefficient of item-total correlation and the total scores of the measurement instrument, was taken into consideration while determining the measuring capacity related to an item, and the statistical significance was considered the criteria to interpret the difference among them (Büyüköztürk, 2014; Kayış, 2014; Tezbaşaran, 2008).

In this context, item-total correlations were analyzed to reveal the distinctiveness capability of the items in the scale. Also, the significance of the difference between the average scores of the 27% sub (n= 242) and super (n= 242) groups was evaluated, which were established according to the scores related to the dimensions and total score. At this point, it was found as a result of the Pearson product-moment correlation coefficient analysis conducted for the item-total correlation that each item in the scale was significantly relevant to the total score of the scale positively (+) at .001 level ($r$> .30 and $p$< .001 for the 44 items). The correlation coefficient ($r$) defines a low-level relation if it is between .00 and .30 as an absolute value, a medium-level relation if it is between .30 and .70, a high-level relation if it is between .70 and 1.00. These results revealed that the items and dimensions in the scale illustrated similar behaviors, and the internal consistency of the trial was high (Büyüköztürk, 2014). According to these findings, it was observed that the item-total score correlation of the items in the scale was between .37 and .78, and item 20 (participates in group work actively) had the highest item correlation, while item 42 (is shy and introverted) had the lowest item correlation.

Besides, when the correlation between each dimension and the total score was examined, the scores were as follows: $r$= .89 in the "communication" dimension, $r$= .82 in the "adaptation" dimension, $r$= .70 in the "self-control" dimension, $r$= .86 in the "prosocial behaviors" dimension, and r= .86 in the "assertiveness" dimension ($p$ <.001). These results revealed that each dimension in the scale was positively correlated with the total score ($r$> .30 and $p$> .001 for the five dimensions. In this scope, it was observed that the "communication," "adaptation,"

"self-control," and "prosocial behaviors" dimensions in the scale were highly correlated with ($r$> .70), while the "assertiveness" was correlated with the total score at a medium-level ($r$> .30). When the correlation of the dimensions with each other was examined, it was observed that all of the dimensions were significantly correlated with each other ($p$< .001), and the coefficients of this correlation varied between .33 and .89 ($r$> .30). This is also supported by the *t*-test independent groups results about the difference between the item mean scores of the 27% sub (n=242) and super (n=242) groups.

To reveal the distinctiveness capacity of the items and dimensions in the scale, these groups were formed according to the scores related to the dimensions and total items. As a result, it was determined that the mean scores of the super-group were significantly higher than the mean scores of the sub-group at the level of .001 ($p$ <.001 for 44 items and five dimensions). At this point, Table 1 shows the t-test independent group results for each item. This result showed that the internal consistency of the trial was quite good, the internal consistency of the scale was ensured, and the items were distinctive for the children in terms of social skills. In addition, the Cronbach's alpha ($\alpha$) reliability coefficient was also calculated to determine the reliability of the scale. It is recommended to use the Cronbach's alpha coefficient when there are more than three scores for items in a scale (Alpar, 2006). In this sense, as the scores obtained in the scale varied from one to five (1= never, 2= rarely, 3= sometimes, 4= often, and 5= always), the Cronbach's alpha reliability coefficient was considered to determine the reliability related to the dimensions and total scale.

When the Cronbach's alpha reliability coefficients of the scale were examined, the calculation results were as follows: α=.89 for the "communication", $\alpha$= .90 for the "adaptation," $\alpha$=.86 for the "self-control," $\alpha$= .87 for the "prosocial behaviors", and $\alpha$= .76 for the "assertiveness." The score for the total scale was $\alpha$= .94. If .00 ≤ α < .40, it is not reliable; if .40 ≤ α < .60, it is low reliable; if .60 ≤ α < .80, it is quite reliable; if .80 ≤ α < .1.00, it is highly reliable for the criteria of the reliability based on the alpha (α) coefficient (Kayış, 2014). According to these values, it is clear that the scale is highly reliable for the "communication," "adaptation," "self-control," and "prosocial behaviors" dimensions and for the total scale, while it is quite reliable for the "assertiveness" dimension. The test-retest reliability was also considered another criterion for the reliability of the scale. The test-retest reliability reveals the consistency between the scores obtained from the scale at different times, and is determined according to the Pearson correlation results about the relationship between both sets of scores (Büyüköztürk, 2014). For the test-retest reliability of the scale, the teachers who previously had filled out the form were revisited four weeks later and asked to fill out the scale one more time for the same children for whom they had filled out the form before. It is recommended for this process that the time after the first practice should not exceed one month, as this period should not be too short (Aiken, 1997). In this context, the test-retest reliability was calculated using forms related to the 263 children, which were completely filled out and returned by the teachers.

The Pearson product-moment correlation coefficient was used to examine the relationship between the two sets of scores. The findings of the analysis revealed that the relationship between the two sets of scores was $r$= .82 in the "communication", $r$= .86 in the "adaptation," $r$= .75 in the self-control," $r$= .86 in the "prosocial behaviors", $r$= .63 in the "assertiveness", and $r$= .89 in the total ($p$ <.001). In general, it would be safe to say that there was a positive and highly significant correlation in the dimensions and total scale. Nevertheless, the findings revealed that all of the items in the scale showed significant correlations between the scores of the two implementations ($r$> .70 and $p$ <.001). This suggests that the test-retest reliability of the scale was sufficient and shows a stable construct depending on the time. At this point, the Cronbach's alpha reliability coefficient of the scale and the test-retest reliability analysis results indicated that the scale was reliable.

The findings of the study revealed that the psychometric values of the "SOSAS–TF" scale showed that the scale was a valid and reliable measurement instrument. Henceforth, a measurement instrument based on the assessment of the social skills of preschool children evaluated by the teachers has been developed; hence, the study made a contribution to the literature in this respect. Table 2 shows the descriptive information of the scale.

Table 2. Descriptive information on the SOSAS–TF scale

| Dimensions | Scale item numbers | The number of items | The lowest value | The highest value |
|---|---|---|---|---|
| Communication | 1-2-3-4-5-6-7-8-9-10-11-12 | 12 | 12.00 | 60.00 |
| Adaptation | 13-14-15-16-17-18-19-20-21 | 9 | 9.00 | 45.00 |
| Self-control* | 22*-23*-24*-25*-26*-27*-28*-29*-30* | 9 | 9.00 | 45.00 |
| Prosocial behaviors | 31-32-33-34-35-36-37-38-39 | 9 | 9.00 | 45.00 |
| Assertiveness* | 40*-41*-42*-43*-44* | 5 | 5.00 | 25.00 |
| TOTAL | | 44 | 44.00 | 220.00 |

***Reverse scoring will be used for these items.*

Table 2 shows the descriptive characteristics of the SOSAS-TF scale. This scale consists of five dimensions and 44 items. While 30 of the items (1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 31, 32, 33, 34, 35, 36, 37, 38, and 39) contain positive expressions, 14of them contain (22, 23, 24, 25, 26, 27, 28, 29, 30, 40, 41, 42, 43, and 44) negative expressions. The dimensions of the SOSAS-TF scale have a minimum of five and a maximum of 12 items. The "communication" dimension has the maximum number of items (12 items), while the "assertiveness" dimension has the minimum number of items (5 items).

The "communication," "self-control," and "prosocial behaviors" dimensions in the scale have the same number of items (9 items). The social skills items in the scale were evaluated through a 5-level rating system according to how frequently the children exhibit them. Accordingly, when the status of a positively expressed social skill item to be exhibited by the children is "never," it was considered 1 point, "rarelyc 2 points, "sometimes" 3 points, "often" 4 points, and "always" 5 points. Reverse scoring (recoding) was applied for the negatively expressed items, when they were exhibited as "never" it was considered 5 points, "rarely" 4 points, "sometimes" 3 points, "often" 2 points, and "always" 1 point.

The probable score to be obtained from the dimensions in the scale is between 5 and 60. In addition, the probable score to be obtained from the total scale varies from 44 to 220. Evaluation of the scale takes an average of 15 minutes. The higher the scores obtained from the dimensions and the total, the higher the social skills. However, the lower the scores, the lower the social skills. It shows that there is a positive relationship between social skills and the scores of the scale.

## Conclusions and Recommendations

In this study, the scale titled "Social Skills Assessment Scale-Teacher Form" for preschool children was developed and referred to as "SOSAS–TF". The findings of the study revealed valid and reliable the scale that was developed in the study is a valid and reliable measurement instrument. During the development of the scale (SOSAS–TF), teachers were consulted as the source person to evaluate the children's social skills. This scale consists of 44 items and five dimensions. These dimensions are named "communication," "adaptation," "self-control," "prosocial behaviors," and "assertiveness." The five factors of the scale explain 54.57% of the total variance. The factor loadings of all the items in the scale varied.46 and .74, and their common factor variances varied between .42 and .69. The item-total score correlations of the items in the scale varied between .37 and .78. Each dimension in the scale is positively and significantly correlated with the total score and with each other, and the coefficients of the correlation of the dimensions varied between .33 and .89.

According to the item average score comparison between 27% sub-super groups that was performed for the capability of distinctiveness of the items and dimensions in the scale, the score averages of the super-group were found to be significantly higher than the score averages of the sub-group. The Cronbach's alpha reliability coefficient ($\alpha$) for the total scale was .94. The reliability coefficient for the dimensions in the scale is .89 for the "communication" dimension, .90 for the "adaptation" dimension, .86 for the "self-control" dimension, .87 for the "prosocial behaviors," and .76 for the "assertiveness" dimension.

The coefficient of test-retest reliability ($r$) for the total scale was .89. According to the test-retest reliability analysis performed for the dimensions in the scale the scores were as follows: $r$= .82 in the "communication" dimension, $r$= .86 in the "adaptation" dimension, $r$= .75 in the "self-control" dimension, $r$= .86 in the "prosocial behaviors" dimension, and $r$= .63 in the "assertiveness" dimension. The findings of the test-retest reliability for the dimensions and the total scale revealed that there is an overall positive and highly significant correlation. Thus, the results obtained in relation to the validity and reliability of the scale show that the scale can be used to evaluate preschool children's social skills.

The actions taken during the development of this scale were performed based on the data obtained from the preschool children. When the scale is used for groups other than preschool children, new validity and reliability studies with the data obtained from the relevant groups should be performed. Further studies can be conducted to test the validity and reliability of the SOSAS–TF scale for various age groups. Data for the children from the preschools and kindergarten classes in districts with different socioeconomic levels, in a city center in the Black Sea Region in Turkey, were obtained to increase the validity and ensure variety.

The study was conducted on the largest possible sample. Considering the sample size of the study, further comparative studies can be conducted for the validity and reliability of the scale in different regions and countries.

As an important step toward eliminating social skills deficiencies of children, it is recommended to operate processes for evaluating children’s existing social skills through a valid and reliable data collection instrument. The measurement instrument developed in this study can be used as a data collection instrument in descriptive or experimental studies for preschool children’s social skills.

The number of scales to measure social skills in Turkey and in the world is currently limited. Also, the SOSAS–TF scale will lead to filling a gap in the field. In this context, further studies having larger samples can measure the relationship between children’s social and other skills such as self-regulation, anger control, social adaptation, and communication to reassert the criterion validity of the scale. Studies on development of the social skills assessment scales for preschool children are considered to be useful not only for researchers and educators but also for decision makers. At this point, the information and findings about the social skills assessment scale can also be used to determine the effectiveness of intervention programs applied in educational institutions and their effects on children’s social-emotional development areas, including social skills.

The outcomes of this study affirm that the SOSAS–TF scale is a valid and reliable measurement instrument. To further extend its applicability, it is recommended that the scale be tested across different cultural and educational contexts. Future studies could explore the application of the scale in a broader context by examining its use in diverse regions, educational settings, and cultural backgrounds. Additionally, conducting longitudinal studies to assess the scale's stability over time would facilitate the tracking of changes in children's social skills, offering a more comprehensive understanding of their developmental processes.

## Acknowledgements or Notes

This article is derived from the corresponding author’s doctoral dissertation entitled “Examination of the Effect of Story Telling Based and Play Based Social Skills Training on the Social Skills of Children Attending to Kindergarten,” supervised by the second author. The authors would like to express their sincere gratitude to the preschool teachers who supported the scale development process, as well as to the parents who kindly provided consent for their children's participation in the study. The authors also wish to declare that they received no financial support for this research.

## Author(s) Contributions

The first and the second author were involved in designing the study. The first author was responsible for data collection, organizing the database, conducting the statistical analysis, and writing the original draft of the manuscript. The second author, as the supervisor, contributed to manuscript editing. Both authors reviewed and approved the final version of the manuscript.

## Ethical Approval

Since the data for this study were collected before 2020, no Ethical Approval Form was obtained.

## References


Aiken, L. R. (1997). *Psychological testing and assessment* (6th ed.). Allyn and Bacon.

Alpar, R. (2006). *Applied statistics in sports science*. Nobel Publications.

Arnold, D. H., Kupersmidt, J. B., Voegler-Lee, M. E., & Marshall N. (2012). The association between preschool children's social functioning and their emergent academic skills. *Early Childhood Research Quarterly, 27*(3), 376-386. https://doi.org/10.1016/j.ecresq.2011.12.009

Avcıoğlu, H. (2007). Reliability and validity study of the social skill evaluation scale (age 4-6). *Bolu Abant Izzet Baysal University Journal of Faculty of Education, 7*(2), 93-103.

Bacanlı, H. (2008). *Social skills training* (3rd ed.). Pegem Academy Publications.

Bandura, A. (1972). Modeling theory: Some traditions, trends, and disputes. In R. D. Parke (Ed.), *Recent trends in social learning theory* (pp. 35-62). Academic Press.

Bellini, S. (2008). *Building social relationships: A systematic approach to teaching social interaction skills to children and adolescents with autism spectrum disorders and other social difficulties.* Autism Asperger Publishing Company.

Boisjoli, J. A., & Matson, J. L. (2009). General methods of assessment. In Matson, J. L. (Ed.), *Social behavior and skills in children* (pp. 60-75). Springer Science+Business Media.

Büyüköztürk, Ş. (2014). *Data analysis handbook for social sciences: Statistics, research design, SPSS applications and interpretation* (19th ed.). Pegem A Publishing.

Campbell, C., Hansen, D. J., & Nangle, D. W. (2010). Social skills and psychological adjustment. In D. W. Nangle, D. J. Hansen, C. A. Erdley, & P. J. Norton (Eds.), *Practitioner's guide to empirically based measures of social skills* (pp. 51–67). Springer Publishing Company. https://doi.org/10.1007/978-1-4419-0609-0_4

Cerny, B. A., & Kaiser, H. F. (1977). A study of a measure of sampling adequacy for factor- analytic correlation matrices. *Multivariate Behavioral Research, 12*(1), 43-47. https://doi.org/10.1207/s15327906mbr1201_3

Ceylan, Ş. (2009). *Validity-reliability study of vineland social-emotional early childhood scale and examination of effects of creative drama education on social-emotional behavior of 5-year old pre-school children attending preschool educational institutions* [Unpublished doctoral thesis]. Gazi University.

Clayton, R. J., Hein, S., Keller-Margulis, M. A., & Gonzalez, J. E. (2021). Associations between social skills, inattention, and english vocabulary skills of preschool latinx dual language learners. *Journal of Research in Childhood Education*, *36*(2), 219–238. https://doi.org/10.1080/02568543.2021.1934200

Comrey, A. L., & Lee, H. B. (1992). *A first course in factor analysis* (2th ed.). Lawrence Erlbaum Associates.

Conger, J. C., & Keane, A. P. (1981). Social skills intervention in the treatment of isolated or withdrawn children. *Psychological Bulletin, 90*(3), 478-495.

Connolly, J., & Doyle, A. B. (1981). Assessment of social competence in preschoolers: Teachers versus peers. *Developmental Psychology, 17*(4), 454–462. https://doi.org/10.1037/0012-1649.17.4.454

Cooke, T. & Apolloni, T. (1976). Developing positive social-emotional behaviors: A study of training and generalization effects. *Journal of Applied Behavior Analysis, 9*(1), 65-78. https://doi.org/10.1901/jaba.1976.9-65

Cornish, U. & Ross, F. (2004). *Social skills training for adolescents with general moderate learning difficulties.* Jessica Kingsley Publishers.

Çağlar, D. (1981). *Incompatible children and their education* (Extended 2nd ed.). Ankara University Printing House.

Çokluk, Ö., Şekercioğlu, G., & Büyüköztürk, Ş. (2014). *Multivariate statistics SPSS and LISREL applications for social sciences* (3rd ed.). Pegem Academy Publications.

Deutsch, F. (1974). Observational and sociometric measures of peer popularity and their relationship to egocentric communication in female preschoolers. *Developmental Psychology, 10*(5), 745–747. https://doi.org/10.1037/h0037019

Dong, X., Burke, M. D., Ramirez, G., Xu, Z., & Bowman-Perrott, L. (2023). A meta-analysis of social skills interventions for preschoolers with or at risk of early emotional and behavioral problems. *Behavioral Sciences, 13*(11), 940. https://doi.org/10.3390/bs13110940

Elliott, S. N., & Busse, R. T. (1991). Social skills assessment and intervention with children and adolescents: Guidelines for assessment and training procedures. *School Psychology International, 12*(1-2), 63–83. https://doi.org/10.1177/0143034391121006

Erkul, R., & Sonmez, S. (2020). Relationship among social skills, problem behaviors and social competence of preschoolers. *i-manager's Journal on Educational Psychology*, 14(1), 49-61. https://doi.org/10.26634/jpsy.14.1.17189

Erkuş, E. (2012). *Measurement and scale development in psychology-I: Basic concepts and operations*. Pegem Academy Publications.

Erwin, P. G. (1994). Effectiveness of social skills training with children: A meta-analytic study. *Counselling Psychology Quarterly*, *7*(3), 305–310. https://doi.org/10.1080/09515079408254154

Finch, W. H. (2019). *Exploratory factor analysis.* SAGE Publications.

Foster, S. L., Inderbitzen, H. M., & Nangle, D. W. (1993). Assessing acceptance and social skills with peers in childhood: Current issues. *Behavior Modification, 17*(3), 255-286. https://doi.org/10.1177/01454455930173003

Gresham F. M. (2001). Assessment of social skills in children and adolescents. In J. Andrews, D. Saklofske, & H. Janzen (Eds.), *Handbook of psychoeducational assessment* (pp. 325–355). Academic Press.

Gresham, F. M. (1981). Social skills training with handicapped children: A review. *Review of Educational Research, 51*(1), 139-176. https://doi.org/10.2307/1170253

Gresham, F. M. (2002). Teaching social skills to high-risk children and youth: Preventive and remedial strategies. In M. R. Shinn, H. M. Walker, & G. Stoner (Eds.), *Interventions for academic and behavior problems II: Preventive and remedial approaches* (pp. 403–432). National Association of School Psychologists.

Gresham, F. M. (2016). Social skills assessment and intervention for children and youth. *Cambridge Journal of Education, 46*(3), 319-332. https://doi.org/10.1080/0305764X.2016.1195788

Gresham, F. M. & Elliott, S. N. (1984). Assessment and classification of children's social skills: A review of methods and issues. *School Psychology Review, 13,* 292-301.

Gresham, F. M. & Elliott, S. N. (1987). The relationship between adaptive behavior and social skills: Issues in definition and assessment. *The Journal of Special Education, 21*(1), 167-181. https://doi.org/10.1177/002246698702100115

Gresham, F. M., & Elliott, S. N. (1990). *Social skills rating system.* American Guidance Service.

Gresham, F. M., Van, M. B., & Cook, C. R. (2006). Social skills training for teaching replacement behaviors: remediating acquisition deficits in at-risk students. *Behavioral Disorders, 31*(4), 363-377. https://doi.org/10.1177/019874290603100402

Gülay, H. (2004). *Comparing with the social skills of children living with their parents and orphans who are six years old* [Unpublished master's thesis]. Hacettepe University.

Gülay, H., & Akman, B. (2009). *Social skills in preschool period.* Pegem Academy Publications.

Günindi, Y. (2023). The effect of online education on children's social skills during the covid-19 pandemic. *International Electronic Journal of Elementary Education, 14*(5), 657–665. https://orcid.org/0000-0001-5192-5466

Hosp, J. L., Howell, K. W., Hosp, M. K. (2003). Characteristics of behavior rating scales: implications for practice in assessment and behavioral support. *Journal of Positive Behavior Interventions, 5*(4), 201-208. https://doi.org/10.1177/10983007030050040301

Jones, W. H., Hobbs, S. A., & Hockenbury, D. (1982). Loneliness and social skill deficits. *Journal of Personality and Social Psychology, 42*(4), 682–689. https://doi.org/10.1037/0022-3514.42.4.682

Kalaycı, Ş. (2014). Factor analysis. In Kalaycı, Ş. (Ed.), *SPSS applied multivariate statistical techniques* (pp. 321-345), (6th ed.). Asil Publication Distribution.

Kalutskaya, I., Archbell, K. A., Rudasill, K. M., & Coplan, R. J. (2015). Shy children in the classroom: From research to educational practice. *Translational Issues in Psychological Science, 1*(2), 149-157. https://doi.org/10.1037/tps0000024

Kamaraj, I. (2004). *The adaptation teacher form and parent form of preschool period (4-6 years old) social skill measurement scale into Turkish and the effect of educational drama program in acquiring assertive social skills of five years old children* [Unpublished doctoral thesis]. Marmara University.

Kapıkıran, N., İvrendi, A. B., & Adak, A. (2006). Social skills in preschool children: Detection of the situation. *Pamukkale University Journal of Education, 19*(1), 20-28.

Kavale, K. A., Forness, S. R., & Bender, M. (1988). *Handbook of learning disabilities: Methods and interventions*. Little Brown and Company.

Kayış, A. (2014). Reliability analysis. In Kalaycı, Ş. (Ed.), *SPSS applied multivariate statistical techniques* (pp. 403-419), (6th ed.). Asil Publication Distribution.

Kılıç, M., Tutkun, C., & Tezel-Şahin, F. (2023). The mediating role of social skills in the relationship between preschool children's academic self-esteem and problem behaviours. *Journal of Innovative Research in Teacher Education, 4*(3), 393-409. https://doi.org/10.29329/jirte.2023.616.3

Kline, P. (2014). *An easy guide to factor analysis.* Routledge.

Koçyiğit, S., & Kayılı, G. (2008). Comparison of the social skills of kindergarten students who received and did not receive Montessori education. *The Journal of Selcuk University Social Sciences Institute, 20*, 511-516.

Kutlu, M., & Kaya, A. (2005). Personal guidance and psychological counseling. In Kaya, A. (Ed.), *Psychological advice and guidance* (pp. 203-320) (2nd ed.). Anı Publications.

Leary, M. R., & Kowalski, R. M. (1995). *Social anxiety.* The Guilford Press.

Liberman, R. P., DeRisi, W. J., & Mueser, K. T. (1989). *Psychology practitioner guidebooks: Social skills training for psychiatric patients.* Pergamon Press.

Lodder, G. M. A., Goossens, L., Scholte, R. H. J., Engels, R. C. M. E., & Verhagen, M. (2016). Adolescent loneliness and social skills: Agreement and discrepancies between self-, meta-, and peer-evaluations. *Journal of Youth and Adolescence, 45*(12), 2406-2416. https://doi.org/10.1007/s10964-016-0461-y

Malecki, C. K., & Elliot, S. N. (2002). Children's social behaviors as predictors of academic achievement: A longitudinal analysis. *School Psychology Quarterly, 17*(1), 1–23. https://doi.org/10.1521/scpq.17.1.1.19902

McDonald, R. P. (2014). *Factor analysis and related methods.* Lawrence Erlbaum Associates, Inc.

McFall, R. M. (1982). A review and reformulation of the concept of social skills. *Behavioral Assessment, 4*(1), 1-33. https://doi.org/10.1007/BF01321377

Merrell, K. W. (1996). Social-emotional assessment in early childhood. The preschool and kindergarten behavior scales. *Journal of Early Intervention, 20*(2), 132-145. https://doi.org/10.1177/105381519602000205

Merrell, K. W. (1999). *Behavioral, social, and emotional assessment of children and adolescents*. Lawrence Erlbaum Associates, Inc.

Merrell, K. W. (2001). Assessment of children's social skills: Recent developments, best practices, and new directions. *Exceptionality, 9*(1&2), 3–18. https://doi.org/10.1207/S15327035EX091&2_2

Merrell, K. W., & Gimpel, G. (2014). *Social skills of children and adolescents: Conceptualization, assessment, treatment.* Psychology Press.

Meuwissen, A. S. (2022). Social skill development of young children amid the pandemic. *Zero to Three*, 42(3), 37-43.

Ministry of National Education [MoNE] (2013). *Okul öncesi eğitim programı [Preschool education program]*. Ministry of National Education.

Mulvey, N., Jenkins, L., & Jenkins, L. (2020). Language skills as predictors of social skills and behaviors in preschool children. *Contemporary School Psychology*. https://doi.org/10.1007/S40688-020-00281-1

Offer-Boljahn, H., Hövel, D. C., & Hennemann, T. (2022). Learning behaviors, executive functions, and social skills: A meta-analysis on the factors influencing learning development in the transition from kindergarten to elementary school. *Journal of Pedagogical Research, 6*(1), 1-17. https://dx.doi.org/10.33902/JPR.20221175398

Parker, G., & Asher, S. R. (1987). Peer relations and later personal adjustment: Are low-accepted children at risk?. *Psychological Bulletin, 102*(3), 357-389. http://dx.doi.org/10.1037/0033-2909.102.3.357

Pett, M. A., Lackey, N. R., & Sullivan, J. J. (2003). *Making sense of factor analysis: The use of factor analysis for instrument development in health care research*. Sage Publication.

Quinn, M. M., Kavale, K. A., Mathur, S. R., Rutherford, R. B., & Forness, S. R. (1999). A meta-analysis of social skill interventions for students with emotional or behavioral disorders. *Journal of Emotional and Behavioral Disorders, 7*(1), 54-64. https://doi.org/10.1177/106342669900700106

Rademacher, A., Zumbach, J., & Koglin, U. (2020). Cross-lagged effects of self-regulation skills and behaviour problems in the transition from preschool to elementary school. *Early Child Development and Care, 192*(4), 631–637. https://doi.org/10.1080/03004430.2020.1784891

Rotter, J. B. (1982). *The development and applications of social learning theory.* Praeger.

Scherer, R. F., Wiebe F. A., Luther, D. C., & Adams, J. S. (1988). Dimensionality of coping: Factor stability using the ways of coping questionnaire. *Psychological Reports, 62*(3), 763-770. http://dx.doi.org/10.2466/pr0.1988.62.

Schneider, B. H. & Byrne, B.M. (1985). Children's social skills training: A meta-analysis. In B. H. Schneider, K. H. Rubin, & J. E. Ledingham (Eds), *Children's peer relations: Issues in assessment and internetin* (pp. 175-192). Springer. https://doi.org/10.1007/978-1-4684-6325-5_11

Segrin, C. (2000). Social skills deficits associated with depression. *Clinical Psychology Review, 20*(3), 379-403. http://dx.doi.org/10.1016/S0272.

Segrin, C., & Flora, J. (2006). Poor social skills are a vulnerability factor in the development of psychosocial problems. *Human Communication Research, 26*(3), 489-514. https://doi.org/10.1111/j.1468-2958.2000.tb00766.x.

Sharma, R., Goswami, V., & Gupta, P. (2016). Social skills: Their impact on academic achievement and other aspects of life. *International Journal for Innovative Research in Multidisciplinary Field, 2*(7), 219-224.

Sharma, S. (1995). *Applied multivariate techniques*. John Wiles & Sons, Inc.

Sheridan, S.M., & Walker, D. (1999). Social skills in context: Considerations for assessment, intervention, and generalization. In C. R. Reynolds & T. B. Gutkin (Eds.), *The handbook of school psychology* (3rd ed.), (pp. 686–708). Wiley & Sons.

Strain, P. S., Odom, S. L., & McConnell, S. (1984). Promoting social reciprocity of exceptional children: Identification, target behavior selection, and intervention. *Remedial and Special Education, 5*(1), 21-28.

Tabachnick, B. G., & Fidell, L. S. (2013). *Using multivariate statistics* (6th ed.). Pearson Publications.

Takahashi, Y., Okada, K., Hoshino, T., & Anme, T. (2015). Developmental trajectories of social skills during early childhood and links to parenting practices in a Japanese sample. *PLoS ONE, 10*(8), e0135357. https://doi.org/10.1371/journal.pone.0135357

Tavşancıl, E. (2005). *Measuring attitudes and data analysis with SPSS* (2nd ed.). Nobel Publishing Distribution.

Tezbaşaran, A. A. (2008). *Likert type scale preparation guide (e-book)* (3rd version). Turkish Psychological Association Publications.

Warnes, E. D., Sheridan, S. M., Geske, J., & Warnes, W. A. (2005). A contextual approach tothe assessment of social skills: Identifyingmeaningful behaviors for social competence. *Psychology in the Schools, 42*(2), 173–187. http://dx.doi.org/10.1002/pits.20052

Welsh, M., Parke, R. D., Widaman, K., & O'Neil, R. (2001). Linkages between children's social and academic competence: A longitudinal analysis. *Journal of School Psychology, 39*(6), 463–482. https://doi.org/10.1016/S0022-4405(01)00084-X

Whirter, J. M. & Voltan Acar, N. (1998). *Communication with the child.* National Education Press.

Wilson, M. J., & Bullock, L. M. (1989). Psychometric characteristics of behavior rating scales: Definitions, problems, and solutions. *Behavior Disorders, 14*(3), 186-200. https://doi.org/10.1177/019874298901400305

Zöggeler-Burkhardt, L., Embacher, E. M., & Smidt, W. (2023). Social relationships, interactions and learning in early childhood – theoretical approaches, empirical findings and challenges. *Early Child Development and Care, 193*(11–12), 1199–1203. https://doi.org/10.1080/03004430.2023.2260976

Zsolnai, A. (2002). Relationship between children’s social competence, learning motivation and school achievement. *Educational Psychology, 22*(3), 317–329. https://doi.org/10.1080/01443410220138548

International Journal of Contemporary Educational Research

Volume 12, Number 1, March 2025, Page 56-70 Article Type: Research Article

# Women's Leadership in South African Higher Education: A Systematic Review (2010-2024)

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**Abstract**

This systematic review examines research trends on women's leadership in South African higher education from 2010 to 2024, analyzing 98 academic works comprising 15 doctoral dissertations, 28 master's theses, and 55 journal articles. Using content analysis, the study identifies key themes, methodological approaches, and findings related to women's leadership advancement in academia. The analysis reveals five primary themes: leadership experiences, institutional transformation, leadership development, power and decision-making, and intersectionality. Results indicate a significant increase in research output during 2020-2024, comprising 60% of all studies. Qualitative methodologies dominated the research landscape (60%), while mixed methods approaches were least utilized (15%). Major findings highlight persistent institutional barriers, gaps between policy and implementation, resistance to cultural transformation, and inadequate enforcement of gender equity policies. The review identifies critical research gaps in rural institutions, technical universities, and departmental-level leadership experiences. Recommendations emphasize the need for longitudinal studies, diverse methodological approaches, and stronger policy implementation mechanisms to advance women's leadership in South African higher education.

**Keywords:** Women's leadership, Higher education, South Africa, Gender equity, Institutional transformation, Academic leadership, Systematic review

**Citation**

Pillay, P. (2025). Women's leadership in South African higher education: a systematic review. *International Journal of Contemporary Educational Research, 12*(1), 56-70. https://doi.org/10.52380/ijcer.2025.12.1.736

| | |
|---|---|
| Received | 20.12.2024 |
| Accepted | 03.03.2025 |
| Publication | 28.03.2025 |
| Peer-Review | Double anonymized - Double Blind |
| Plagiarism Checks | Yes – iThenticate |
| Conflicts of Interest | The author(s) has no conflict of interest to declare. |
| Complaints | ijceroffice@gmail.com |
| Grant Support | The author(s) acknowledge that they received no external funding in support of this research. |


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International Journal of Contemporary Educational Research | ISSN: 2148-3868

## Introduction

The main motivational factor for examining women's leadership in higher education stems from the persistent underrepresentation of women in senior academic positions, particularly in the African context where gender disparities are notably pronounced (Mabokela & Mlambo, 2015). The significance of examining women's leadership in South African higher education stems from several critical factors. First, despite progressive legislation and policy frameworks established since 1994, women remain significantly underrepresented in senior academic leadership positions. Recent statistics from Universities South Africa (2019) indicate that while women constitute 54% of university staff, they occupy only 27% of senior management positions and 33% of professorships. This persistent disparity suggests deeply embedded structural and cultural barriers that require systematic investigation (Moodley & Toni, 2017).

The problem is further complicated by the intersectional nature of gender discrimination in South African academia. Kiluva-Ndunda (2001) found that women of color face compounded challenges in accessing leadership positions, with only 15% of women in executive leadership positions being Black African women, despite this demographic representing 46% of academic staff. This underrepresentation not only reflects systemic inequities but also impacts institutional decision-making and policy formation (Gadebo, 2010).

Additionally, research by Moodley and Toni (2017) demonstrates that existing leadership development programs often fail to address the unique challenges faced by women in academic leadership. Their longitudinal study of 45 women leaders across 15 South African universities revealed that 78% of participants experienced persistent barriers to advancement despite institutional transformation policies. These findings are corroborated by Mabokela and Mlambo (2017), who identified significant gaps between policy intentions and practical implementation in promoting women's leadership.

The urgency of addressing these challenges is heightened by the changing landscape of higher education. Akala (2018) argues that the COVID-19 pandemic has exacerbated existing gender inequities in academic leadership, with women bearing disproportionate burdens of increased administrative responsibilities and care duties. Their survey of 200 women academics across 12 institutions found that 65% reported decreased research productivity and leadership advancement opportunities during this period.

Furthermore, the Department of Higher Education and Training's Gender Transformation Policy Framework (2019) emphasizes that achieving gender equity in academic leadership is crucial for institutional effectiveness and innovation. Research by Muyambo (2023) demonstrates that diverse leadership teams are more effective in driving institutional transformation and improving academic outcomes. However, as Moorosi (2020) notes, current approaches to promoting women's leadership often focus on individual capacity building while neglecting systemic barriers and institutional culture change.

Systematically reviewing research on women's leadership in South African higher education is therefore crucial for several reasons. First, it helps identify patterns in how leadership challenges and opportunities have evolved since the implementation of major policy reforms. Second, it enables the evaluation of intervention effectiveness and highlights successful transformation strategies. Third, it reveals gaps in current understanding and areas requiring further investigation. As Brunner and Grogan (2007) argue, comprehensive analysis of existing research is essential for developing evidence-based approaches to advancing women's leadership in academia.

The social context that shapes leadership opportunities for women in academia is deeply rooted in both cultural and institutional frameworks. Penn (2000) indicated that social context fundamentally affects who accesses leadership positions, how leadership is conceptualized, and what barriers persist in the advancement of women to senior roles. Furthermore, traditional thoughts about society, norms, gender stereotypes, roles, and behaviors generate differences between men and women that manifest as both visible and invisible barriers to leadership advancement.

When the concept of women's leadership is conceived as a cultural construction within higher education institutions, the crucial role of institutional policies and practices in either perpetuating or dismantling gender barriers becomes even more evident. As Moomba (2023) noted, higher education leadership is shaped by the broader societal culture that produces it, and therefore, in a sense, leadership patterns often reflect deeply embedded societal gender norms. In South African universities, gender role stereotypes are conveyed through

implicit or explicit messages in institutional processes, from recruitment to promotion (Maodzwa-Taruvinga & Divala, 2014).

Since institutional transformation is a long-term investment, evaluating the effect of national and international policies implemented to achieve gender equality in higher education leadership requires systematic analysis over time. Scientific research in this field demonstrates that gender inequality in academic leadership persists despite legislative regulations and transformation policies (Moodley & Toni, 2017). These research findings can provide crucial insights into whether gender equality policies developed in the higher education sector are sufficient and effectively implemented.

Studies in this field play a vital role in determining the causes of gender inequality in academic leadership and identifying current problem areas, thereby informing policies, regulations, and further studies to address these challenges. For this reason, it is important to analyse the subject areas deeper by examining findings and recommendations of the studies conducted in the field of women's leadership in South African higher education. While there are other review studies exploring gender in academia, this systematic review specifically focuses on women's leadership in South African higher education institutions, providing a comprehensive assessment of both thematic and methodological trends in the existing literature.

In this context, this systematic review aims to:

1. To identify and analyse key themes and patterns in research on women's leadership in South African higher education between 2010-2024.
2. To examine and evaluate the various methodological approaches that have been employed to study women's leadership in South African higher education.
3. To identify and analyse barriers and enablers to women's leadership advancement as documented in existing literature.
4. To synthesize recommendations from existing studies for advancing women's leadership in South African higher education.

**Gender Inequality and Leadership in African Higher Education**

Leadership in higher education is shaped by discourse, power dynamics, institutional practices, behaviors, and relationships that reflect deeply embedded socialization processes (Penn, 2000). Within South African universities, women who reach senior academic positions often arrive with already internalized perceptions of leadership shaped by family and societal influences. After entering academia, the institutional construction of leadership roles continues to be influenced by traditionally masculine paradigms (Moodley & Toni, 2017).

Through both formal and informal processes, the organizational culture of higher education institutions serves as an effective tool in perpetuating and reproducing dominant gendered leadership stereotypes. Research demonstrates that leadership opportunities and recognition are not distributed equally between men and women in South African universities, particularly at the executive level. Studies have shown that women face unique challenges in accessing and maintaining leadership positions, with barriers manifesting through institutional policies, promotion criteria, and daily workplace interactions (Kiluva-Ndunda, 2001; Akala, 2018).

Socio-cultural norms, societal perceptions of leadership, traditional organizational structures, and economic factors all contribute to gender discrimination in academic leadership. Additionally, the attitudes and behaviors of existing university leaders and senior academics significantly influence women's advancement opportunities (Maodzwa-Taruvinga & Divala, 2014). Gender-based leadership expectations are reproduced through official institutional discourses and hidden organizational practices. Department heads and deans can either serve as positive role models for gender-inclusive leadership or perpetuate marginalization and stereotypes, whether consciously or unconsciously (Brunner & Grogan, 2007).

The expectations placed on women leaders can profoundly impact their career trajectories, leadership styles, and even their willingness to pursue senior positions. Moorosi (2020) found that implicit gender stereotypes regarding leadership capability and academic achievement further reinforce discrimination, especially in traditionally male-dominated fields like STEM. This highlights the urgent need for leadership development programs and mentoring initiatives specifically designed to support women's advancement in academia.

Universities South Africa (2019), a national higher education organization, has emphasized that gender equality in leadership should be actively promoted within institutions because it is crucial for institutional transformation and plays a key role in developing the sector's human potential. However, studies indicate that existing leadership development programs often fail to adequately address gender-specific challenges and barriers (Mabokela & Mlambo, 2015). Research has shown that even progressive institutional policies may unconsciously perpetuate biases and stereotypes that support patriarchal leadership structures (Mabokela & Mlambo, 2017; Muyambo, 2023). To achieve genuine transformation, higher education policies must move beyond simple numerical representation to address systemic barriers to women's leadership advancement. Gender equality in academic leadership refers not only to equal access to leadership positions but also to fair treatment in decision-making processes and equal opportunities for influence and impact. To achieve this, the entire higher education system - including governance structures, institutional policies, leadership development programs, and organizational cultures - must become genuinely gender-sensitive, inclusive, and transformative (Perold et al., 2012).

**Women's Leadership in African Higher Education: International and National Initiatives**

Many significant policy frameworks and legislative commitments have been established to strengthen women's leadership representation in South African higher education, ensure equal opportunities, and improve the situation of women in academic leadership positions. A foundational document in this journey was the South African Constitution of 1996, which established equality as a fundamental right. According to Section 9 of the Constitution, "The state may not unfairly discriminate directly or indirectly against anyone on one or more grounds, including race, gender, sex, pregnancy, marital status, ethnic or social origin, color, sexual orientation, age, disability, religion, conscience, belief, culture, language and birth."

The Employment Equity Act of 1998 further strengthened this commitment by requiring higher education institutions to implement affirmative action measures to ensure equitable representation of women in all occupational categories and levels of leadership. Following this, the Department of Higher Education and Training (DHET) convened its first national conference on women in leadership in higher education in 2000, which marked the beginning of concentrated efforts to address gender disparities in academic leadership.

One of the most impactful initiatives in promoting women's leadership in South African higher education was the Higher Education Leadership and Management (HELM) program launched by Universities South Africa in 2015. The program specifically includes components focused on advancing women into senior academic and management positions. Additionally, the National Research Foundation (NRF) established the Women in Research (WiR) initiative in 2018, which provides leadership development support and funding opportunities for women researchers advancing toward leadership positions.

The Council on Higher Education (CHE) adopted comprehensive gender transformation guidelines in 2020 that specifically address leadership representation. These guidelines mandate universities to develop clear targets for women's representation in senior positions and implement mentorship programs. Furthermore, institutions must address institutional culture barriers through comprehensive policy reform, while creating family-friendly workplace environments. Annual reporting requirements ensure continuous monitoring of progress toward gender transformation goals.

South Africa has also aligned itself with international frameworks such as the African Union's Agenda 2063, which emphasizes gender equality in leadership positions. The country participated in the 2019 Regional Conference on Women in Leadership in Higher Education in Africa, which produced the "Cape Town Declaration on Women in African Academia." This declaration set specific targets for women's representation in university leadership positions across the continent.

The Department of Higher Education and Training's Gender Policy Framework (2020) represents one of the most comprehensive national approaches to advancing women in academic leadership. This framework establishes mandatory leadership development programs for women academics and introduces funding allocations tied to gender transformation targets. The policy further strengthens requirements for gender-sensitive recruitment and promotion processes, while supporting research on women's leadership in academia. A significant component includes the establishment of institutional gender equity offices across all universities.

However, implementation of these initiatives has faced considerable challenges. Mabokela and Mawila (2004) reported that while policies exist, practical implementation often falls short. The COVID-19 pandemic further highlighted and exacerbated existing inequalities, with women academics facing additional barriers to leadership advancement during this period (Carducci et al., 2024).
Recent developments include the launch of the South African Higher Education Gender Equality Forum (SAHEGEF) in 2021, which monitors and reports on women's leadership representation across South African universities. Individual universities have begun implementing targeted programs, exemplified by the University of Cape Town's "Next Generation Professoriate" initiative and the University of Pretoria's "Women in Leadership" mentorship program.

Despite these various initiatives, qualitative research indicates that structural barriers and institutional culture challenges persist (Moodley & Toni, 2017). Steely and Heller (2002) emphasize that achieving genuine transformation in leadership requires moving beyond numerical targets to address deeper systemic issues of power, privilege, and institutional culture in South African universities. Furthermore, the report highlights the need for sustained commitment to implementation and regular evaluation of existing programs to ensure their effectiveness in creating meaningful change.

## Method

### Research Model

"A research literature review is a systematic, explicit, and reproducible method for identifying, evaluating, and synthesizing the existing body of completed and recorded work produced by researchers, scholars, and practitioners" (Fink, 2014, p.3). The central aim of this literature review was to identify trends in research on women's leadership in higher education in South Africa, examining patterns in leadership development, institutional barriers, policy implementations, and outcomes. This method was chosen because it enables identification of critical patterns in how women's leadership in academia has been studied, summarizes methodological approaches used to examine leadership challenges and successes, and allows for systematic analysis of intervention strategies and their effectiveness.

### Study Group of the Research

The study group of this research consists of master's theses and doctoral dissertations completed on women's leadership in higher education and relevant articles published in peer-reviewed journals between 2010 and 2024. Criterion sampling, one of the qualitative sampling methods, was used to determine the research's study group. The criteria determined by the researchers are listed as follows: (1) It is required that the study examines women's leadership experiences or outcomes in South African higher education institutions. (2) It is required that the study has been permitted for open-access in relevant databases and full-length access to its content. (3) It is required that the study focuses specifically on leadership aspects rather than general gender issues. (4) It is required that the study provides empirical data about women's leadership experiences or outcomes. (5) It is required that the study is not a book summary, policy brief, or theoretical discussion. (6) It is required that only the most comprehensive version is examined in cases where both thesis and article versions exist.

After applying the selection criteria, the analysis period was established from 2010, marking the date of the first comprehensive study, through to 2024. The year 2010 was selected as the starting point for this systematic review for several compelling reasons. First, it marked a significant shift in South African higher education policy following the 2009 establishment of the Department of Higher Education and Training as a separate ministry, which led to increased focus on institutional transformation. Second, 2010 coincided with the implementation of the first comprehensive monitoring framework for gender equity in higher education leadership, providing more systematic data collection and reporting mechanisms. Third, this timeframe captures the effects of major policy interventions, including the 2014 Policy Framework on Gender Equality in Higher Education and subsequent reforms. Additionally, focusing on post-2010 research ensures the analysis reflects contemporary challenges and transformation efforts in the post-apartheid era, particularly as institutions began implementing more structured approaches to gender equity in leadership positions. This 14-year period (2010-2024) provides sufficient temporal scope to identify trends, patterns, and the evolution of research approaches while maintaining focus on current and relevant challenges in women's leadership in higher education

A total of 98 research outputs were identified, comprising 15 doctoral dissertations, 28 master's theses, and 55 journal articles. The analysis reveals a notable evolution in research productivity on women's leadership in South African higher education across three distinct periods. The chronological distribution shows a clear progression: In 2010-2014, research output totaled 25 studies (5 doctoral dissertations, 8 master's theses, and 12 articles). During 2015-2019, productivity increased to 31 studies (4 doctoral dissertations, 9 master's theses, and 18 articles). The period 2020-2024 witnessed the most substantial growth with 42 studies (6 doctoral dissertations, 11 master's theses, and 25 articles), representing approximately 60% of the total research output.

This pattern demonstrates escalating academic interest in women's leadership in higher education, particularly evident in the most recent period. Journal articles constitute the majority of publications (55 out of 98), suggesting a preference for rapid dissemination of research findings through peer-reviewed journals over longer-format academic works. The comparatively lower number of doctoral dissertations (15) likely reflects both the time-intensive nature of doctoral research and the limited pool of scholars pursuing advanced degrees in this specialized field.

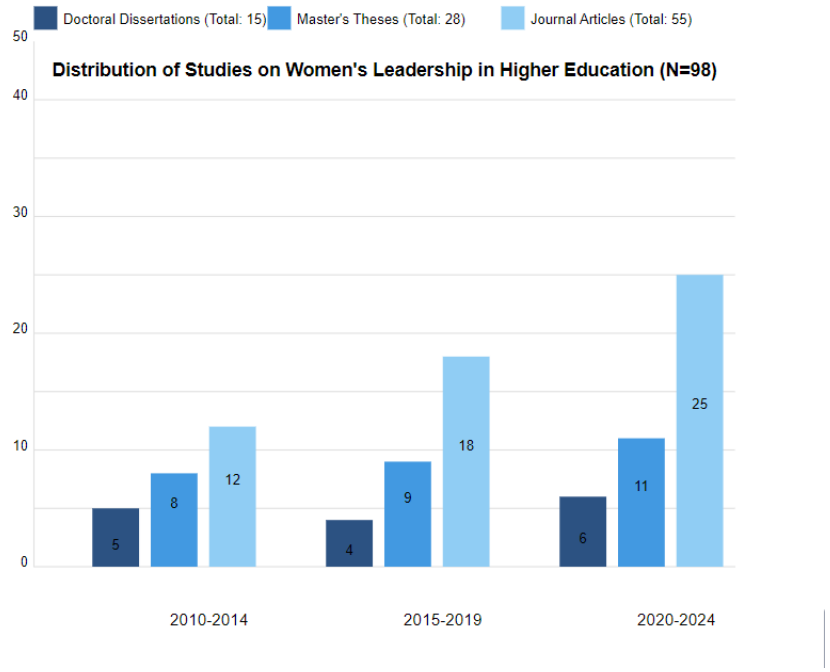


Figure 1. Distribution of studies on women's leadership in higher education in South Africa according to years

**Data Collection**

Data in the research were collected by using document analysis technique. In the first stage, the researchers conducted a literature review in the Sabinet African Journals, African Journals Online (AJOL), EBSCOhost Africa-Wide Information, South African National ETD Portal, and Google Scholar databases to access studies specifically focused on women's leadership in higher education. The reason for preferring these databases is that they contain the most comprehensive collection of African scholarship on leadership in higher education and provide reliable access to full-text academic works.

Due to the complex nature of leadership studies and varying terminologies used in the field, searches were conducted using multiple keyword combinations. These keywords included "women leadership higher education South Africa," "female academic leaders' university," "gender transformation leadership tertiary education," and "women senior management higher education South Africa." The initial search yielded 186 potential sources. After applying the higher education leadership filter, this number decreased to 142. Following detailed screening for

content relevance and removing studies that did not meet the inclusion criteria or lacked full-text access, 98 studies were included in the final analysis.

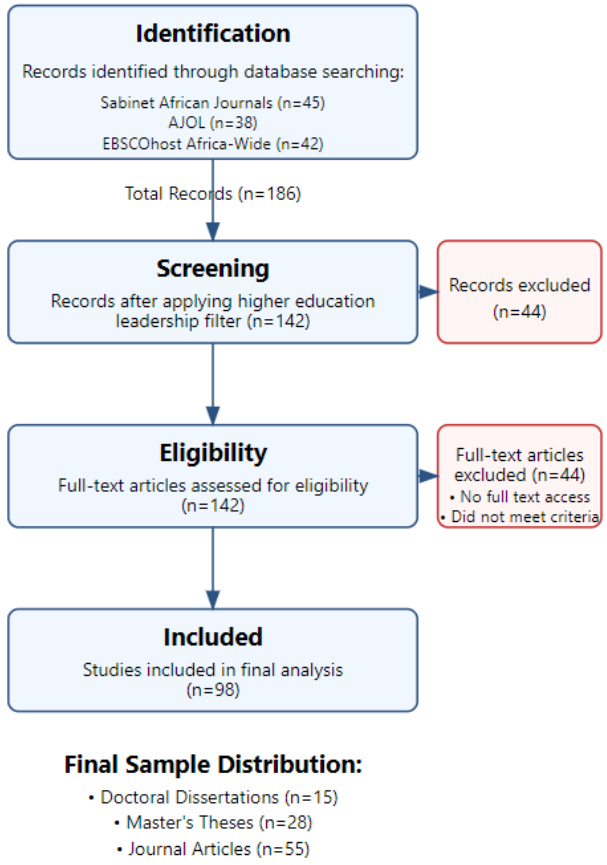


Figure 2. PRISMA flow chart for the critical review of the literature (Page et al., 2021)

**Data Analysis**

The content analysis method was used to analyse data obtained in the research. In content analysis, excerpts from written texts, interviews, and case studies are selected and converted into standard codes that capture leadership themes, challenges, and outcomes. After the codes created for the research problem are classified systematically, the relationships among data are explored to create meaning about women's leadership experiences and institutional transformation (Marvasti, 2004). In this study, a scoring matrix was created in the first phase of data analysis to prepare the research data for analysis, and each document was coded (e.g., D1 for doctoral dissertations, M1 for master's theses, A1 for articles) and ordered chronologically.

In the scope of analysis, the studies were systematically classified under the titles of leadership approaches, institutional barriers, policy implementation, transformation strategies, and leadership outcomes. The data regarding leadership experiences and institutional responses were collected under subthemes in terms of meaning similarities, and the main themes were created after the relationships among the subthemes were determined. Data related to leadership development programs, institutional policies, and transformation outcomes were interpreted using frequency values by considering the frequency of use of word groups. The leadership challenges and success factors were analysed using an inductive approach.

**Validity and Reliability**

Validity in qualitative research is related to the proper collection and interpretation of data about women's leadership experiences and also related to the fact that the phenomenon studied and research results reflect and

represent the real world of higher education leadership properly. Reliability is that the findings obtained after repeating the same research are consistent, and the research results are objective and unbiased in representing women's leadership experiences (Merriam, 2009; Yin, 2011).

To ensure the internal validity of the research, the identity of documents analysed in the scope of the research was recorded to be checked by other researchers. In addition, the data were reviewed multiple times during the content analysis, and agreement was reached among the researchers when creating themes about leadership patterns and institutional responses. For the external validity of the research, the information about how the research was conducted was conveyed in detail.

To increase the internal validity of the research, intercoder reliability was carried out. Two experts in higher education leadership who have doctoral degrees conducted the coding, and then the coding procedures were compared. The reliability of the coding was calculated using the formula "Reliability = Agreement / (Agreement + Disagreement) x 100" (Miles & Huberman, 1994) and was found to be 91%. In this context, it can be said that the coding carried out is reliable.

**Limitations of the Study**

The scope of this study is limited to 98 academic works (15 doctoral dissertations, 28 master's theses, and 55 articles) published on women's leadership in South African higher education between 2010 and 2024. The study excludes institutional reports, policy documents, and conference proceedings that might contain relevant information but were not peer-reviewed. The generalizability of the results is limited to formal academic research on women's leadership within South African higher education institutions. Additionally, the study focuses exclusively on English-language publications, potentially missing insights from works published in other South African languages. The results of this study were obtained through content analysis of formal academic publications and may not capture all aspects of women's leadership experiences in higher education.

## Results

This section presents results related to the studies on women's leadership in higher education examined by content analysis in the order and title specified in the sub-objectives.

**Distribution of the Studies on Women's Leadership in Higher Education According to Subject Areas**

The 98 studies included in the study were analysed in terms of subject areas and the findings obtained are presented in Table 1.

| Themes | Subthemes | Publication Codes | Total |
|---|---|---|---|
| Leadership Experiences | Career progression pathways | D3, D7, M5, M12, A15, A22, A38 | 32 |
| | Institutional barriers | D1, D8, M3, M15, A7, A25, A41 | |
| | Work-life balance | D5, M8, M20, A12, A33, A45 | |
| | Leadership styles | D12, M11, A8, A28, A52 | |
| Institutional Transformation | Policy implementation | D4, D15, M2, M18, A5, A31 | 28 |
| | Gender equity initiatives | D9, M7, A11, A27, A44 | |
| | Organizational culture | D2, M14, A3, A19, A36 | |
| | Institutional support mechanisms | D13, M22, A17, A42 | |
| Leadership Development | Mentorship programs | D6, M6, A4, A23, A47 | 21 |
| | Professional development | D11, M16, A9, A29 | |
| | Networking opportunities | M25, A16, A35 | |
| | Leadership training | D14, M19, A21 | |
| Power and Decision-making | Governance structures | D10, M9, A2, A32 | 11 |
| | Decision-making processes | M17, A14, A39 | |
| | Authority challenges | M23, A26, A49 | |
| Intersectionality | Race and gender | M4, M21, A6, A37 | 6 |
| | Cultural factors | M10, A13, A43 | |

Table 1. Subject areas of the studies on women's leadership in higher education

Table 1 demonstrates the thematic analysis of 98 studies examining women's leadership in South African higher education, revealing five distinct themes with corresponding subthemes and publication patterns.
Leadership Experiences emerged as the most extensively researched theme (N = 32), encompassing four key subthemes. Career progression pathways and institutional barriers received the most scholarly attention within this theme, reflecting the complex challenges women face in advancing to leadership positions. Work-life balance studies explored the intersecting demands of professional advancement and personal responsibilities, while research on leadership styles examined how women navigate traditionally masculine leadership paradigms in academic contexts.

Institutional Transformation represented the second most prominent theme (N = 28), with research distributed across four subthemes. Policy implementation studies investigated how institutions translate equity policies into practice, while gender equity initiatives research examined specific programs designed to promote women's leadership advancement. Studies of organizational culture explored deeply embedded institutional practices that either facilitate or hinder women's leadership progression. Research on institutional support mechanisms evaluated the effectiveness of various structural interventions designed to promote gender equity in leadership.

Leadership Development constituted the third major theme (N = 21), with research focusing on formal and informal development pathways. Mentorship programs emerged as a key area of investigation, examining both structured and informal mentoring relationships. Professional development studies analysed various capacity-building initiatives, while research on networking opportunities explored how women leaders build and maintain professional connections. Leadership training studies evaluated the effectiveness of formal development programs specifically designed for women leaders.

Power and Decision-making (N = 11) emerged as a distinct theme focusing on structural and systemic aspects of leadership. Research on governance structures examined how institutional hierarchies impact women's leadership opportunities, while studies of decision-making processes investigated women leaders' participation in and influence over institutional governance. Authority challenges research explored how women leaders navigate power dynamics within traditionally masculine academic environments.

Intersectionality, though represented by fewer studies (N = 6), provided crucial insights into how gender intersects with other identity factors in leadership contexts. Research examining race and gender highlighted the unique challenges faced by women of color in leadership positions, while studies of cultural factors investigated how traditional cultural norms influence women's leadership experiences and opportunities.

This comprehensive thematic analysis reveals not only the breadth of research in women's leadership in higher education but also highlights areas requiring further investigation. The predominance of studies on leadership experiences and institutional transformation suggests these are well-documented areas, while the relatively smaller number of studies on intersectionality indicates an important direction for future research. The distribution of publication codes across doctoral dissertations (D), master's theses (M), and journal articles (A) demonstrates sustained scholarly interest across different levels of academic inquiry.

**Distribution of the Studies on Women's Leadership in Higher Education According to Methods**

Findings regarding the research method of the studies on women's leadership in higher education are presented below:

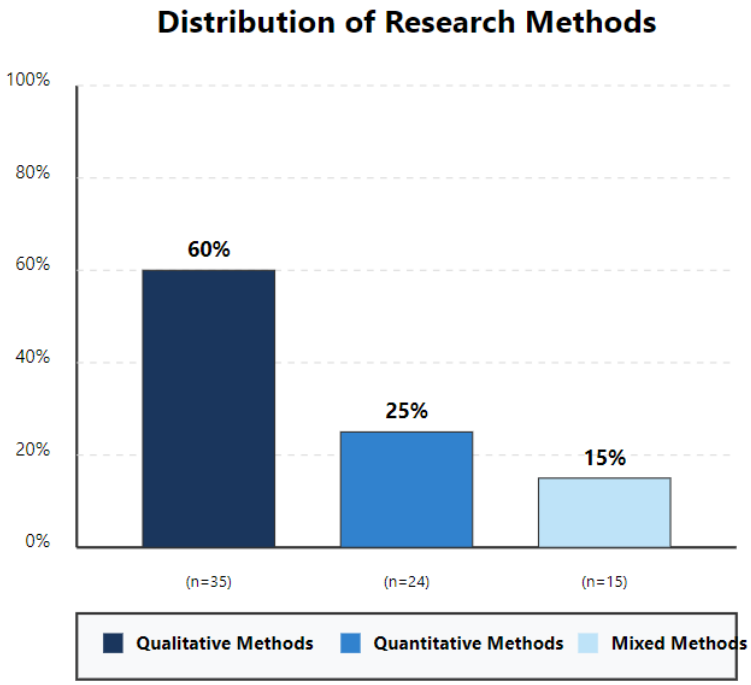


Figure 2. Distribution of the studies on women's leadership in higher education according to research methods

Figure 2 illustrates that the qualitative research method (60%) was predominantly used in the studies on women's leadership in higher education. The analysis of research methodologies employed in studies on women's leadership in higher education reveals distinct patterns in research approaches. The predominant methodology was qualitative research, accounting for 60% of all studies, reflecting researchers' preference for in-depth, exploratory approaches to understanding women's leadership experiences. Within qualitative studies, case studies (N = 18) emerged as the most frequently used approach, enabling detailed examination of specific leadership contexts. This was followed by phenomenological studies (N = 12) focusing on lived experiences of women leaders, narrative inquiry approaches (N = 8) capturing personal leadership journeys, and feminist methodology (N = 6) providing critical gender-focused analysis. It is noteworthy that some qualitative studies (N = 35) did not specify their exact methodological framework.

Quantitative research represented the second most common methodological approach, comprising 25% of the studies. Within this category, survey research (N = 12) was most frequently employed, facilitating broader data collection across institutions. This was complemented by correlational designs (N = 8) examining relationships between leadership variables, and descriptive research approaches (N = 4) providing statistical analysis of leadership patterns. Mixed methodology studies, while representing the smallest proportion at 15%, employed three main designs: sequential explanatory designs (N = 6) combining initial quantitative data with follow-up qualitative exploration, explanatory sequential approaches (N = 5) building on qualitative findings with quantitative analysis, and convergent parallel designs (N = 4) simultaneously collecting and analyzing both types of data. This methodological distribution suggests a strong preference for qualitative approaches in understanding the complex nature of women's leadership in higher education, while also recognizing the value of quantitative and mixed methods in providing complementary perspectives on this important topic.

**Distribution of the Studies on Women's Leadership in Higher Education According to Sample/Study Groups**

Findings regarding the sample/study groups obtained from the analysis of the studies on women's leadership in higher education were presented in Figure 3.

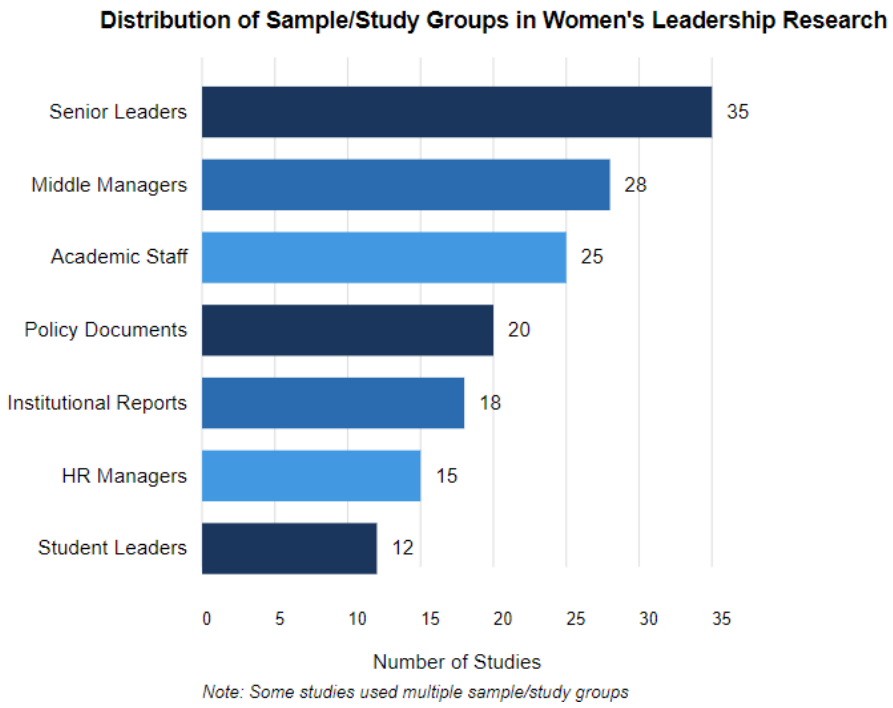


Figure 3 illustrates that the sample/study groups most frequently selected in studies on women's leadership in higher education were senior leaders (N = 35), middle managers (N = 28), and academic staff (N = 25), respectively. These were followed by policy documents (N = 20), institutional reports (N = 18), HR managers (N = 15), and student leaders (N = 12). Note: In some studies, more than one sample or study group was used.

**Distribution of the Findings of the Studies on Women's Leadership in Higher Education According to Themes**

The findings of the studies on women's leadership in higher education were thematically analysed and classified. Findings revealed as a result of analysis are presented in Table 2.

| Themes | Sub-themes | Concepts | *Codes | Total |
|---|---|---|---|---|
| **Institutional Barriers** | Organizational Culture | Glass ceiling effect, Patriarchal structures, Masculine leadership norms | D1, D8, M3, M15, A7, A25, A41, A52 | 28 |
| | Policy Implementation | Policy-practice gap, Inadequate enforcement, Resistance to change | D4, D15, M2, M18, A5, A31, A44 | |
| **Leadership Journey** | Career Progression | Mentorship needs, Networking challenges, Work-life balance | D3, D7, M5, M12, A15, A22, A38, A49 | 25 |
| | Professional Development | Limited opportunities, Resource constraints, Training gaps | D6, M6, A4, A23, A47, A51 | |
| **Power Dynamics** | Decision-making | Exclusion from key decisions, Limited authority, Token representation | D10, M9, A2, A32, A46 | 22 |
| | Governance Structures | Male-dominated boards, Informal power networks | M17, A14, A39, A48 | |
| **Transformation Strategies** | Support Mechanisms | Mentorship programs, Leadership development initiatives | D13, M22, A17, A42, A50 | 15 |

| | | | |
|---|---|---|---|
| | Policy Reform | Gender mainstreaming, Equity targets | D9, M7, A11, A27 |

Table 2. Distribution of the findings according to themes
Notes: *The most frequently repeated findings in the studies were included. The criterion for inclusion was a frequency of 10 or more occurrences.

Table 2 presents the thematic analysis of findings from studies on women's leadership in higher education, revealing four major themes with corresponding sub-themes, concepts, and frequency of occurrence across different publication types. The most prominent theme was Institutional Barriers (N = 28), which emerged through two main sub-themes: organizational culture and policy implementation. Under organizational culture, studies highlighted persistent challenges including the glass ceiling effect, patriarchal structures, and masculine leadership norms (D1, D8, M3, M15, A7, A25, A41, A52). The policy implementation sub-theme revealed significant gaps between policy formulation and practice, inadequate enforcement mechanisms, and resistance to change (D4, D15, M2, M18, A5, A31, A44).

Leadership Journey emerged as the second most frequent theme (N = 25), encompassing career progression and professional development. Career progression studies emphasized mentorship needs, networking challenges, and work-life balance issues (D3, D7, M5, M12, A15, A22, A38, A49), while professional development research highlighted limited opportunities, resource constraints, and training gaps (D6, M6, A4, A23, A47, A51).

Power Dynamics constituted the third major theme (N = 22), focusing on decision-making processes and governance structures. The decision-making sub-theme revealed patterns of exclusion from key decisions, limited authority, and token representation (D10, M9, A2, A32, A46). Studies examining governance structures identified challenges related to male-dominated boards and informal power networks (M17, A14, A39, A48).

Transformation Strategies emerged as the fourth theme (N = 15), examining both support mechanisms and policy reform initiatives. Support mechanism studies focused on mentorship programs and leadership development initiatives (D13, M22, A17, A42, A50), while policy reform research examined gender mainstreaming efforts and equity targets (D9, M7, A11, A27).

The analysis included findings that appeared ten or more times across the research corpus, representing the most significant and recurring themes in women's leadership studies in South African higher education.

**Conclusion and Discussion**

In this study, the distributions of subject areas, methodological trends, and findings of studies on women's leadership in South African higher education were analysed, yielding several significant results.

When analysing women's leadership studies in terms of distribution by year of publication, a notable increase in research output was observed from 2010 to 2024. This surge in scholarly interest can be attributed to several factors, including the Higher Education Amendment Act of 2016, the Department of Higher Education and Training's Gender Transformation Policy (2020), and increased institutional focus on leadership equity. Particularly significant is the concentration of studies between 2020-2024, constituting approximately 60% of all research, suggesting heightened attention to women's leadership during and after the COVID-19 pandemic. This finding is supported by similar observations in other research (Penn, 2000; Maodzwa-Taruvinga & Divala, 2014). Five primary themes emerged from the content analysis of studies on women's leadership in higher education: leadership experiences (N = 32), institutional transformation (N = 28), leadership development (N = 21), power and decision-making (N = 11), and intersectionality (N = 6). The most frequently studied topics in recent years (2020-2024) were leadership experiences (N = 18), institutional transformation (N = 15), and leadership development (N = 12). According to Moodley and Toni (2017), this thematic evolution reflects growing recognition of systemic barriers in academic leadership.

Under the theme of leadership experiences, 22 of the 32 studies focused on career progression pathways and institutional barriers. A significant portion of these studies examined senior leadership positions (N = 15) and middle management roles (N = 12). Notably, there was limited research examining leadership experiences at

departmental levels or among emerging leaders. Muyambo (2023) emphasizes that this gap in understanding departmental leadership dynamics may hinder comprehensive transformation efforts.

The distribution of studies by research methods revealed a predominance of qualitative approaches (60%), with mixed methods being the least utilized (15%). This methodological preference aligns with the need to understand complex leadership experiences and institutional dynamics, as noted by Brunner and Grogan (2007). However, the limited use of mixed methods and longitudinal studies suggests a gap in understanding long-term transformation impacts (Kiluva-Ndunda, 2001).

Based on the analysis of findings, four main problem areas emerged in women's leadership in higher education. First, persistent institutional barriers continue despite policy interventions, as documented by Akala (2018). Second, a significant gap exists between leadership development programs and practical outcomes, reflecting findings from Moodley and Toni (2017). Third, resistance to cultural transformation in academic leadership remains strong, supporting observations by Mabokela and Mlambo (2017). Fourth, inadequate implementation of gender equity policies continues to hinder progress, as noted in Mabokela and Mawila (2004).

Analysis of institutional responses reveals recurring patterns in policy implementation. Mabokela and Mlambo (2015) found that while institutions have formal commitments to gender equity, practical implementation faces significant obstacles. This aligns with findings showing uneven implementation of equity policies and limited effectiveness of leadership development programs (Moorosi, 2020).

The results of leadership development studies show varied effectiveness. While formal programs exist in most institutions (N = 25), their impact on actual leadership advancement remains limited (N = 12). Studies by Maodzwa-Taruvinga and Divala (2014) demonstrate that successful women leaders consistently emphasize the importance of informal networks and mentorship over formal development programs. Future research directions should focus on examining successful transformation initiatives and evaluating long-term program impacts. As suggested by Penn (2000), more attention should be given to intersectional experiences and the role of institutional culture. The development of South African-specific leadership models, as advocated by Muyambo (2023), represents another crucial area for investigation.

The findings of this review suggest that while progress has been made in understanding women's leadership challenges in South African higher education, significant work remains. As noted by Moodley and Toni (2017), achieving meaningful transformation requires sustained attention to both structural and cultural dimensions of academic leadership. The continuation of these challenges, despite numerous policy interventions and institutional commitments, indicates that current approaches may require fundamental reconceptualization to achieve lasting change in academic leadership demographics and institutional cultures.

**Recommendations**

In consideration of the obtained results of this study, the following recommendations can be made.

(i) Studies on women's leadership in South African higher education should be systematically reviewed at regular intervals using comprehensive content analysis methods. This would enable tracking of transformation progress and identification of emerging trends in leadership development. Such regular analysis would also help identify gaps in current research and areas requiring more focused investigation.

(ii) Given the limited number of longitudinal studies identified in this review, there is a pressing need for extended temporal research examining women leaders' career trajectories in higher education. Such studies should track leadership development from early career stages through to senior positions, documenting barriers, enablers, and transformation strategies over time.

(iii) Research gaps were identified regarding rural institutions, technical universities, and emerging leaders at departmental levels. Future studies should prioritize these underexplored contexts to provide a more complete

understanding of women's leadership experiences across the entire higher education sector. Additionally, more research is needed on successful leadership development initiatives and their implementation strategies.

(iv) The findings revealed limited integration between institutional policies and practical outcomes. It is recommended that institutions develop more robust monitoring and evaluation frameworks to assess the effectiveness of their leadership development programs and transformation initiatives. These frameworks should incorporate both quantitative metrics and qualitative assessments of cultural change.

(v) Understanding the intersection of gender with other identity factors emerged as an underdeveloped research area. Future studies should examine how various demographic and cultural factors influence leadership experiences and opportunities. This would provide more nuanced insights for policy development and program design.

(vi) Given the prevalence of qualitative studies, there is a need to diversify methodological approaches. Mixed-methods research combining institutional data with personal narratives could provide more comprehensive insights into leadership development and institutional transformation processes.

(vii) Policy makers should utilize the findings from this systematic review to inform the development of evidence-based interventions addressing the identified barriers to women's leadership advancement. This should include attention to both structural and cultural aspects of institutional transformation.

(viii) Higher education institutions should strengthen their implementation mechanisms for gender equity policies, particularly focusing on the gap between policy formulation and practical outcomes identified in this review. This includes developing more effective monitoring systems and accountability measures.

(ix) Leadership development programs should be redesigned to incorporate the insights gained from successful women leaders' experiences, particularly regarding the importance of informal networks and mentorship. These programs should be contextualized to reflect South African higher education realities rather than relying solely on imported models.

(x) Regular evaluation of gender transformation progress should be conducted at institutional and national levels, using standardized metrics developed from this review's findings. This would enable more effective tracking of change and identification of successful intervention strategies.

These recommendations are aimed at addressing the key gaps and challenges identified in this systematic review, with the goal of accelerating progress toward gender equity in South African higher education leadership. Implementation of these recommendations requires sustained commitment from all stakeholders and regular monitoring of outcomes to ensure effectiveness.

## Acknowledgements or Notes
This study is self-financed.

## Author (s) Contribution Rate
The author contributed fully to the completion of the study.

## Conflicts of Interest
No potential conflict of interest was reported by the author.

## Ethical Approval
Ethics committee approval is not required as it does not involve clinical researches on humans as well as it does not contain Retrospective studies in accordance with the Law on Protection of Personal Data.

## References


Akala, B. (2018). Challenging gender equality in South African transformation policies - A case of the White Paper: A programme for the transformation of higher education. *South African Journal of Higher Education*, 32(3), 226-248. https://doi.org/10.20853/32-3-1521

Brunner, C. C., & Grogan, M. (2007). *Women leading school systems: Uncommon roads to fulfillment*. Rowman & Littlefield Education.

Carducci, R., Harper, J., & Kezar, A. (2024). *Higher education leadership*. Routledge.

Davis, D. (1997). The Constitution of the Republic of South Africa, 1993, Act 108 of 1996. *South African Journal on Human Rights*, 13(1), 151-156.

Employment Equity Act. (1998). Act No. 55 of 1998. Government Gazette.

Fink, A. (2014). *Conducting research literature reviews: From the internet to paper* (4th ed.). SAGE Publications.

Gadebo, J. O. (2010). Gendered leadership dynamics and rural community development in Nigeria: The case study of Iyaloja and lyalaje women leaders in Ekiti State. *The Academic Leadership Journal*, 8(3), 177-185.

Kiluva-Ndunda, M. M. (2001). *Women's agency and educational policy: The experiences of the women of Kilome, Kenya*. State University of New York Press.

Mabokela, R. O., & Mawila, K. F. N. (2004). The impact of race, gender, and culture in South African higher education. *Comparative Education Review*, 48(4), 396-416.

Mabokela, R. O., & Mlambo, Y. A. (2015). The older women are men: Navigating the academic terrain, perspectives from Ghana. *Higher Education*, 69(5), 759-778. https://doi.org/10.1007/s10734-014-9804-3

Mabokela, R. O., & Mlambo, Y. A. (2017). Women, leadership, and organizational culture in higher education: Lessons learned from South Africa and Ghana. *Journal of International Studies in Educational Administration*, 45(2), 3-21.

Maodzwa-Taruvinga, M., & Divala, J. J. (2014). Experiences of black women teacher educators in the South African higher education system: Being and belonging in South African higher education: The voices of black women academics. *South African Journal of Higher Education*, 28(6), 1961-1971.

Marvasti, A. (2004). *Qualitative research in sociology*. SAGE Publications.

Merriam, S. B. (2009). *Qualitative research: A guide to design and implementation*. Jossey-Bass.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook* (2nd ed.). SAGE Publications.

Moomba, I. (2023). *Exploring management experiences of female heads of department: The case of social sciences heads of department in selected secondary schools in Lusaka urban district*. The University of Zambia.

Moorosi, P. (2020). Constructions of leadership identities via narratives of African women school leaders. *International Journal of Leadership in Education*, 23(2), 259-277. https://doi.org/10.1080/13603124.2018.1512668

Moodley, A., & Toni, N. M. (2017). Accessing higher education leadership: Towards a framework for women's professional development. *South African Journal of Higher Education*, 31(3), 138-153. https://doi.org/10.20853/31-3-917

Muyambo, T. (2023). The leadership of Ndau women in healing the earth utilizing religio-cultural resources: An African ecofeminist perspective. In *Palgrave studies in African leadership*. Palgrave Macmillan.

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., ... Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *BMJ*, 372, n71. https://doi.org/10.1136/bmj.n71

Penn, M. P. (2000). Common science?: Women, science, and knowledge, and: Feminist science education (review). *NWSA Journal*, 12(1), 183-186.

Perold, H., Cloete, N., & Papier, J. (2012). *Shaping the future of South Africa's youth: Rethinking post-school education and skills training*. African Minds eBooks.

Remuneration Tribunal. (1991). *Remuneration Tribunal inquiry into the remuneration of vice-chancellors, principals, and other chief executive officers of higher education institutions and their deputies*. Australian Government Publishing Service.

South Africa. Department of Education. (1999). *Higher Education Amendment Act*. Government Printer.

Steely, M. T., & Heller, D. E. (2002). The states and public higher education policy: Affordability, access, and accountability. *Academe*, 88(4), 79-80.

Universities South Africa. (2019). *Public universities in South Africa*. Universities South Africa.

Yin, R. K. (2011). *Qualitative research from start to finish*. The Guilford Press.

International Journal of Contemporary Educational Research
Volume 12, Number 1, March 2025, Page 71-89 Article Type: Research Article

# Determination of Middle School Students' Alternative Concepts in the Structure and Motion of Celestial

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**Abstract**
This study aims to determine the alternative conceptions that middle school students may have about the structure of celestial bodies, celestial events and the motions of celestial bodies. Since qualitative and quantitative methods were used in the study, the study method is mixed. Since quantitative data were collected first and qualitative data were collected after the quantitative data analysis, the study was designed as an explanatory design. The study group of the research consists of 332 students studying in the 5th, 6th, 7th, and 8th grades of a secondary school in a province in Türkiye in the 2022-2023 academic year. The sample in the study was determined by the monographic sampling method, which is one of the non-probability-based methods. The Alternative Concept Identification Test (ACIT), the quantitative data collection tool of the study, was created to identify alternative concepts. The test development stages were followed for ACIT, and the KR-20 value was found to be 0.82 after the necessary validity and reliability studies were conducted. There are 20 items in ACIT, each consisting of three stages. The alternative concepts of the students to whom ACIT was applied were identified, and frequency tables were created; then, semi-structured interview forms were prepared for 16 students randomly selected among the students determined by the typical case sampling method, and interviews were conducted with the students. The necessary validity and reliability studies were conducted for the semi-structured interview forms, which were the qualitative data collection tools of the study. As a result of the study, it was determined that students had alternative concepts in the subjects of the structure and motions of celestial bodies.

**Keywords:** Alternative Concepts, Astronomy education, Celestial events, Structure of celestial bodies, Three-stage tests

**Citation**
Şensoy, Ö. & Kocakuşak, M. (2025). Determination of middle school students' alternative concepts in the structure and motion of celestial. *International Journal of Contemporary Educational Research, 12*(1), 71-89. https://doi.org/10.52380/ijcer.2025.12.1.665

| | |
|---|---|
| Received | 31.05.2024 |
| Accepted | 15.03.2025 |
| Publication | 28.03.2025 |
| Peer-Review | Double anonymized - Double Blind |
| Ethical Statement | * This article is extracted from my master thesis entitled “Determining the Achievement and Alternative Concepts of Secondary School Students on Subjects About the Structure and Motions of Celestial Bodies and Comparing Them According to Some Variables”, supervised by Assoc. Prof. Dr. Önder Şensoy (Master’s Thesis, Gazi University, Ankara/Türkiye, 2024). |
| Plagiarism Checks | Yes - iThenticate |
| Conflicts of Interest | The author(s) has no conflict of interest to declare. |
| Complaints | editor@ijcer.net |
| Grant Support | The authors acknowledge that they received no external funding in support of this research. |
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## Introduction

Astronomy is an important discipline that emerged due to human curiosity about the universe and supports scientific discoveries. Throughout human history, the endeavor to understand the sky has been one of the cornerstones of advances in science and technology. In today's world, astronomy is not only a means of discovering the universe but also a field that contributes to individuals' development of scientific thinking skills, observation and questioning nature. Therefore, including astronomy in the education process is of great importance in increasing scientific literacy and supporting students' interest in science.

Astronomy education is one of the basic components of science education and plays a critical role in helping students understand nature and gain scientific thinking skills (Percy, 2006). The Science Curriculum aims to encourage students' interest and curiosity in natural phenomena and to develop a scientific perspective (MNE "Ministry of National Education", 2018). When international science education programmes are examined, it is seen that astronomy education is associated with standards in developed countries, and students are trying to gain astronomy education from primary school (Kahraman, 2006). In this context, the correct transfer of astronomy topics as a part of science education contributes to developing students' scientific process skills and their growth as science-literate individuals.

Students make sense of scientific concepts by associating their knowledge with newly learnt information. However, students can misunderstand scientific concepts from time to time due to their abstract structure, which leads to the emergence of alternative concepts (Ayas, 2016). Unlike scientifically verified knowledge, alternative concepts are conceptual structures that students form based on their own experiences, observations and prior knowledge (Baxter, 1989). Since students try to make sense of natural phenomena with the information they have acquired from their environment before receiving science education, they may develop concepts based on false associations (Koyuncuer, 2014). This situation becomes more evident, especially in fields such as astronomy, which cannot be directly observed or contain abstract concepts.

Since the subjects related to astronomy include abstract and complex concepts such as the structures of celestial bodies, movements and celestial events, the possibility of alternative concepts among students is quite high (Smith, 2002). Students may understand these subjects in ways different from scientific facts due to misinformation, myths and false beliefs among the people they encounter in their daily lives (Göncü, 2013). As a result, they may develop various alternative concepts about basic astronomy concepts, such as the formation of day and night, the shape and movements of the Earth, and the positions of the Sun and the Moon. Studies have also shown that alternative conceptions held by teachers and pre-service teachers directly affect students' misconceptions (Kurnaz et al., 2016). Therefore, identifying and eliminating alternative conceptions is crucial for an effective astronomy education.

Many different methods are used to determine alternative concepts. In the literature, it is seen that in addition to methods such as prediction-observation-explanation, interview, drawing technique, and word association, progressive misconception tests give very valid and reliable results (Çetinkaya &Taş, 2016; Demirci & Efe, 2007; Elmas & Pamuk, 2021; Güneş, 2020; Hestenes & Wells, 1992; Kaltakçı, 2012; Karslı & Ayas, 2013; Meşin, 2019; Novak & Gowin, 1984; Peker & Taş, 2019; Peşman,2005; Şenyiğit & Sılay, 2019; Zengin, 2018). Studies conducted to determine the alternative concepts that students have shown that using such tests helps to better understand the learning process (Büyüköztürk et.al., 2016). In particular, in the study conducted by Bolat et al. (2014), 5th-grade primary school students' alternative concepts about the Sun, Earth and Moon were determined through drawings and open-ended questions and analysed with the special case study method. These and similar studies provide important data in understanding students' misconceptions and making teaching processes more effective (Alın & İzgi 2017; Babaoğlu, 2019; Göncü, 2013; Kurnaz & Değermenci,2012; Ülker & Kacakülah, 2020; Tarakçı & Şensoy, 2019).

Considering the role of astronomy education in developing scientific thinking skills, the formation of correct conceptual structures in students is a great necessity. Identifying and correcting alternative concepts early will enable students to progress on more solid scientific foundations. In today's world, where the importance of space sciences is increasing with the developing science and technology, astronomy education should inevitably be given the necessary importance to educate future scientists and science-literate individuals. In this direction, studies on determining and eliminating misconceptions will be an important step to make astronomy education more effective.

This study is an important step towards better understanding students' scientific thinking processes and contributing to science education by identifying alternative concepts in astronomy subjects. Secondary school students are in a critical period in making sense of abstract concepts, and early identification of misconceptions in this age group is important for correctly constructing scientific knowledge. Since astronomy contains abstract concepts frequently encountered in daily life but difficult to observe and comprehend, the possibility of alternative concepts among students is high (Türk & Kalkan, 2017). Therefore, examining students' conceptions and revealing alternative conceptions in the astronomy education process is critical for developing effective teaching strategies. This study aims to shed light on future teaching processes by evaluating the conceptual understanding of secondary school students in astronomy subjects.

## Method

The aim of this study is to determine the alternative conceptions of secondary school students about the structure of celestial bodies, motions of celestial bodies and celestial events. The researcher developed the alternative Concept Identification Test (ACIT) to identify the alternative concepts in secondary school students, and a survey model, one of the quantitative research methods, was used. In cross-sectional survey research, which is one of the types of survey research, the skills of large samples are measured at one time (Büyüköztürk et al., 2016). After the determination of alternative concepts with the cross-sectional survey research method, the case studies model, one of the qualitative research methods, was used with a group randomly selected from among the students with misconceptions. Situation analysis, one of the case studies types, was used to examine the different perspectives of the students. In this study, quantitative data were collected first, and qualitative data were collected to complete the analysis of these quantitative data. Since qualitative and quantitative methods were used together in this way, the method of the study is Explanatory Design. In the explanatory design, which is one of the mixed research types, quantitative data are collected first, and then qualitative data are collected in line with the information obtained from the analysis of quantitative data (Karagöz, 2017). For these reasons, an explanatory design of mixed research types was used in the study. In the study, the determination of alternative concepts in secondary school students was found with quantitative data and supported with qualitative data.

### Study Group of the Research

The study group of the research consists of students studying in the 5th, 6th, 7th and 8th grades of some secondary schools in a province in Türkiye in the 2022-2023 academic year. In this study, since the sample to be selected from the universe was not determined by the lottery method and since each unit in the universe did not have an equal chance of being included in the sample, the non-probability-based method was used. The target group of the researcher's study is the 5th, 6th, 7th, 8th grade secondary school students across Türkiye. The students were selected from schools, and the test was applied to 332 students, taking into account that equal numbers of students from each grade level were represented in the sample. In studies where the chances of each unit to be included in the sample are not equal to each other, when the researcher makes a selection by using initiative, this is called non-probability-based sampling. In Monographic Sampling, which is one of the non-probability-based sampling methods, the sample is determined by selecting a group or unit that is accepted to be a representative of the researched population based on the available information. The determined sample is examined in detail and interpreted by generalizing the results to the whole population (Karagöz, 2017). Due to its suitability for of the study, the researcher determined the sample using monographic sampling type and criteria. The use of non-probability-based sampling methods instead of probability-based sampling methods in qualitative research provides advantages in terms of time, cost and labour force. In typical case sampling, which is one of the non-probability-based sampling methods, the situation or event desired to be revealed is revealed and studied (Karagöz, 2017). The alternative concepts of the students to whom ACIT was applied were identified, and frequency tables were created; then, semi-structured interview forms were prepared for 16 students randomly selected among the students determined by the typical case sampling method, and interviews were conducted with the students.

**Table 1. Demographic information of the students participating in the alternative concept identification test**

| | Participant | N | % |
|---|---|---|---|
| Gender | Female | 170 | 51 |
| | Male | 162 | 49 |
| | Total | 332 | 100 |
| Grade level | 5th grade | 61 | 18 |
| | 6th grade | 79 | 24 |
| | 7th grade | 91 | 27 |
| | 8th grade | 101 | 31 |

| | | | |
|---|---|---|---|
| | Total | 332 | 100 |

Table 1 shows the demographic information of the students participating in the study.

**Data Collection Tools of the Research**

In the study, the Alternative Concept Identification Test (ACIT) developed by the researcher was used as a data collection tool to determine the alternative concepts of the students in the subjects of the structure of celestial bodies, celestial events and the motions of celestial bodies. Semi-structured interviews were conducted with students randomly selected from among the students determined by typical case sampling. These interviews were aimed at deepening the data obtained from the screening. In the semi-structured interview technique, different questions were asked to the students according to their alternative concepts.

*Quantitative Data Collection Tool*

This study used a three-stage test due to the limitations of classical multiple-choice tests in identifying students' alternative conceptions. While developing three-stage diagnostic tests to identify alternative conceptions, researchers were mostly inspired by the methods developed by Treagust (1988) (Güneş, 2020). While developing the ACIT, the researcher utilised the test development stages and was inspired by Güneş's (2020) studies. The researcher prepared a specification table for ACIT and prepared 29 original items after reviewing the literature. In the first stage of each item, the question is asked; in the second stage, the options that can be considered as the reason for the answer given to the first question; and in the third stage, it is asked whether they are sure of the answer given. While developing ACIT, expert opinions were obtained from 1 language expert and 5 science experts. After the expert opinions were received, the necessary corrections were made, and a pilot study was carried out with a total of 63 5th, 6th, 7th and 8th-grade students studying in a different school in the same province. Based on the item difficulty indices and discrimination indices of the data obtained from the pilot study, 9 items that were not suitable were removed from the test, and corrections were made to the items deemed necessary. According to the item difficulty index, five items determined to be easy, two items determined to be difficult, and two items whose item discrimination index was not appropriate were removed from the test. The reliability analysis of the 20 items in the final version of the test was performed, and the KR-20 value was found to be 0.82. After the pilot application, adjustments were made in 2 items that were thought to be misunderstood by the students and therefore could not be answered correctly, and after the validity and reliability studies, the test was made suitable for the actual application phase.

Expert opinion was taken to ensure the content validity of the test. In addition, the criterion and construct validity of the Alternative Concept Identification Test were examined. Since confidence scores and reasoning questions can be examined separately in tests consisting of more than one stage, it is recommended to calculate the correlation between confidence scores and reasoning questions (Kaltakçı, 2012). In his study, Güneş (2020) investigated the relationship between the students' scores at the initial, reasoning and confidence stages of the answers separately and in combinations to determine the construct validity of the scale. In this study, the construct validity of each item in the test was analyzed by looking at the correlation between the 1st and 2nd stage questions and then between the 1st and 3rd stage questions. In the 1st and 2nd stages of the test, the presence of knowledge about the subject is questioned in the 3rd stage and the state of certainty is questioned in the 3rd stage. In this study, correlations were analyzed separately for the trust questions in Stage 3 and for Stages 1 and 2. Pearson correlations (r), if r = 0.10 to r = 0.29, there is a small correlation; if r = 0.30 to r = 0.49, there is a medium correlation; and if r = 0.50 to r = 1.0, a large correlation can be mentioned (Pallant, 2011, p. 134).

**Table 2. Correlations between the correct scores of the phases of the items in the test**

| | | |
|---|---|---|
| 1. Phases | Phase 2 | |
| | Pearson Correlation | 0,946 |
| | Sig. (2-tailed) | 0,000 |
| | N | 332 |
| 2. Phases | Phase 3 | |
| | Pearson Correlation | 0,384 |
| | Sig. (2-tailed) | 0,000 |
| | N | 332 |
| 3. Phases | Phase 1 | |

| | | |
|---|---|---|
| | Pearson Correlation | 0,391 |
| | Sig. (2-tailed) | 0,000 |
| | N | 332 |

When Table 2 is analyzed, it is seen that the Pearson correlation between the correct scores of the 1st and 2nd stages is r = 0,946, which indicates a very high level of positive relationship. The values of r = 0,384 between the correct scores of the 2nd and 3rd stages and r = 0,391 between the correct scores of the 1st and 3rd stages indicate a moderate positive relationship.

*Qualitative Data Collection Tool*

A semi-structured interview technique was used in the qualitative part of the study. The aim was to facilitate the researcher's in-depth evaluation and analysis of the data with the questions during the semi-structured interviews conducted after the Alternative Concept Identification Test. A semi-structured interview form was used as a qualitative data collection tool in the study. The researcher created the semi-structured interview forms by using the answers containing alternative concepts that the students could give. The forms included fifteen questions, and each interview lasted approximately one hour. The interviews were conducted face-to-face and individually in the classrooms by providing students with a comfortable environment. Extra questions were added to the interview at the points deemed necessary, and questions that were not deemed necessary were removed. A total of 16 students were interviewed, selecting four students from each grade level. In addition, the validity and reliability of the scale were increased by means of the voice recordings taken during the semi-structured interviews and the care taken during the evaluation.

**Data Collection Process of the Research**

The Alternative Concept Identification Test was applied to a total of 332 students attending secondary school. The duration of the test was 40 minutes. The answers given by 332 students to the 20-item test, each of which consists of three stages, were recorded as data.

In the process of collecting qualitative data, only the students who were willing to be interviewed were interviewed from the students selected among the students who were found to have alternative concepts after the analysis of ACIT. A total of 16 students, four students in each grade level, were interviewed. Of these students, six were female, and ten were male. Each student was interviewed separately and reminded of their answers, and asked to explain them.

**Data Analysis of the Research**

*Analyzing the Quantitative Data of the Research*

In this study, the answer options given by the participants for each stage were entered into the MS Excel program. The answers of the participants who chose option E, i.e. 'None', were read by the researcher, and the correct answers were coded as 'E1', while the wrong answers were coded as 'E0'. After these processes, values were entered for each option in the data transferred to the SPSS programme according to the answer key; correct answers were coded as 1 and incorrect answers as 0. For the 3rd stage of each item, the answer 'I am sure' was coded as 1 and 'I am not sure' as 0. In order to be able to talk about the existence of an alternative concept in a student in the test, he/she must choose the wrong option at the 1st stage of the item, the wrong option at the 2nd stage, and the 'I am sure' option at the 3rd stage. Alternative concepts were identified accordingly, and only the frequencies and percentages of the options for the items in which alternative concepts were identified were included. When the literature was examined, it was determined that the alternative concepts preferred by more than 10% of the sample were considered important, and these alternative concepts were included in the results (Kaltakçı, 2012; Önsal, 2016). In this study, the alternative concepts preferred by more than 10% of the sample were listed.

*Analyzing the Qualitative Data of the Research*

Descriptive analysis was used to analyze the qualitative data. The data obtained in the descriptive analysis are described according to appropriate themes. In descriptive analysis, quotations are often included (Karagöz, 2017). In the study, an MS Word file was created for each student by compiling the audio recordings taken during the semi-structured interviews with the students and the notes taken during the interview. The interviews were re-examined, and the answers containing alternative concepts repeated by the students were selected. The alternative concepts identified through semi-structured interviews were described under the appropriate item. A coding

indicating the number of students participating in the research was used in the samplings made from the student answers: first student S-1, second student S-2.

## Findings

In this part of the study, the analyses and findings obtained from the alternative concepts identified by using ACIT prepared on the subjects of the structure of celestial bodies, celestial events and the motions of celestial bodies are given. In addition to the alternative concepts identified in the ACIT, the findings obtained from the interviews with the students using the semi-structured interview technique are also included. Each of the 20 questions in the ACIT consists of 3 stages. In the findings section of the study, as stated in the data analysis section, alternative concepts were identified, and only the frequencies and percentages of the options for the items in which more than 10% of the sample had an alternative concept and semi-structured interviews were included.

For item 3, 89 of the 332 students who participated in the ACIT at the first and second stages selected the options containing alternative concepts and chose 'I am sure' at the 3rd stage; therefore, it can be said that 89 students have the alternative concepts contained in item 3.

**Table 3. Frequency table of the answers in which alternative concepts were detected in students in item 3**

| Item 3 | | A* | C | D | E0 | Total |
|---|---|---|---|---|---|---|
| Phase 1 | F | 74 | 1 | 9 | 5 | 89 |
| | % | 83,1 | 1,1 | 10,1 | 5,6 | 100 |
| Phase 2 | F | 76 | 5 | 7 | 1 | 89 |
| | % | 85,4 | 5,6 | 7,9 | 1,1 | 100 |

* Indicates the answers given by more than 10 per cent of the sample.

The most repeated alternative concept in the 1st and 2nd stages of item 3 was option 'A'. In the 1st stage of the item 'Why night and day occur', the statement 'Night and day occur when the Earth moves around the Sun.' was chosen by 74 out of 89 students (83.1%). In the 2nd stage, among the options containing alternative concepts, the statement 'One side of the Earth is illuminated, and the other side remains in darkness due to the rotation of the Earth around the Sun.' was chosen by 76(85.4%) of 89 students who chose the statements indicating alternative concepts.

After the application of the Alternative Concept Identification Test, it was seen that students S-234 and S-26, who were randomly selected among the students who were found to give answers containing alternative concepts, had the alternative concepts that Item 3 aimed to identify. The interviews with S-234 and S-26 are given below.
Interview with S-234;
Researcher: I wanted to get more detailed information from the answers you gave in the study you participated in. When I asked you, 'Why do day and night occur?', you answered as follows: 'As the Earth travels around the Sun, one side of the Earth is illuminated, and the other side remains in darkness. Why do you think that day and night are formed when the Earth travels around the Sun?
S-234: Because the Sun's rays always come in a different way when the Earth is travelling around, the side that the Sun hits is bright, and the other side is dark. That is why day and night occur.
Researcher: Are you sure about your answer?
S-234: Yes, I am sure.
Interview with S-26;
Researcher: When you were asked, 'How do day and night occur?' in the test, you answered ', One side of the Earth is illuminated, and one side is in darkness as the Earth moves around the Sun.' Why do you think day and night occur? Why do you think that day and night are formed by the rotation of the Earth around the Sun?
S-26: If we talk about day and night events, it is due to the rotation of the Earth around the Sun.
Researcher: How does the Earth's orbiting around the Sun cause day and night?
S-26: In general, when the light of the whole Earth is coming from the Sun, that is, when the Sun is rising, now, for example, the light of the Sun is received by those on one side, and it comes from the Sun as it travels around. It does not go to one side; the two sides are different, that is, one side is daytime, and the other side is dark.
Researcher: Are you sure of your answer?
S-26: Yes, yes.

For item 4, 101 of the 332 students who participated in the ACIT at the first and second stages selected the options containing alternative concepts and chose 'I am sure' at the 3rd stage; therefore, it can be said that 101 students have the alternative concepts contained in item 4.

**Table 4. Frequency table of the answers in which alternative concepts were detected in students in item 4**

| Item 4 | | A* | C | D | E0 | Total |
|---|---|---|---|---|---|---|
| Phase 1 | F | 86 | 4 | 10 | 1 | 101 |
| | % | 85,1 | 4,0 | 9,9 | 1,0 | 100 |
| Phase 2 | F | 85 | 5 | 10 | 1 | 101 |
| | % | 84,2 | 5,0 | 9,9 | 1,0 | 100 |

* Indicates the answers given by more than 10 per cent of the sample.

The most repeated alternative concept in the 1st and 2nd stages of item 4 was option 'A'. The statement 'The Earth rotates around its axis in 365 days and 6 hours' among the options containing alternative concepts in the 1st stage of the item 'Which of the information about the rotation and circulation times of the Sun, the Earth and the Moon is true?' was chosen by 86 (85.1%) of 101 students who chose the statements indicating alternative concepts. In the 2nd stage, among the options containing alternative concepts, 'The Earth completes its rotation around its axis in 365 days and 6 hours. This period is called a year.' was chosen by 85(84,2%) of 101 students who chose the statements indicating alternative concepts.

After the application of the Alternative Concept Identification Test, it was seen that student S-5, who was randomly selected among the students who were found to give answers containing alternative concepts, had the alternative concepts that Item 4 aimed to identify. The interview with S-5 is given below.
Interview with S-5;
Researcher: In the test, you participated in before, when you were asked, 'Which of the information about the rotation and circulation times of the Sun, the Earth and the Moon is correct?' you answered, 'The Earth rotates around its axis in 365 days and 6 hours.'. Why do you think the Earth rotates around its axis in 365 days and 6 hours?
S-5: I know, so that's how we learnt it. The Earth rotates around its axis in 365 days and 6 hours. So, it takes a year.
Researcher: Are you sure about your answer?
S-5: Yes, it is 365 days.

For item 5, 81 out of 332 students who participated in the ACIT, it was seen that 81 of them selected the options containing alternative concepts in the 1st and 2nd stages and selected 'I am sure' in the 3rd stage. Therefore, it can be said that 81 students have alternative concepts contained in item 5.

**Table 5. Frequency table of the answers in which alternative concepts were detected in students in item 5**

| Item 5 | | B* | C | D | E0 | Total |
|---|---|---|---|---|---|---|
| Phase 1 | F | 65 | 3 | 13 | 0 | 81 |
| | % | 80,2 | 3,7 | 16,0 | 0 | 100 |
| Phase 2 | F | 58 | 12 | 10 | 1 | 81 |
| | % | 71,6 | 14,8 | 12,3 | 1,2 | 100 |

* Indicates the answers given by more than 10 per cent of the sample.

The most repeated alternative concept in the 1st and 2nd stages of item 5 was option 'B'. 'When we observe the Sun during the day, we observe it in different positions from sunrise to sunset. What is the reason for this?' was selected by 65 (80.2%) out of 81 students who chose statements indicating alternative concepts. The statement 'The Sun is seen in different places in the sky when the Earth is travelling around the Sun' was chosen by 58(71.6%) of 81 students who selected the statements indicating alternative concepts.

After the application of the Alternative Concept Identification Test, it was seen that students S-234 and S-52, who were randomly selected among the students who were found to give answers containing alternative concepts, had the alternative concepts that Item 5 aimed to identify. The interviews with S-234 and S-52 are given below.
Interview with S-234;
Researcher: When we observe the Sun during the day, we observe it in different positions from sunrise to sunset. When I asked you what the reason for this was, 'Because the Earth revolves around the Sun, the Sun is seen in different places in the sky'. You gave an answer as follows. Do you think the reason why the Sun is observed in different positions during the day could be the Earth's rotation around the Sun?

S-234: Because as the Earth moves, for example, as it rotates, the Sun also rotates, so its position changes. As the Earth rotates around the Sun, the Sun also rotates because the Sun stays in its position.
Researcher: Why do you think the Sun staying in place will change its position in the sky?
S-234: The Sun revolves around itself. But we see it that way because the Earth revolves around it.
Researcher: I see. Are you sure of your answer?
S-234: Yes, I am sure.
Interview with S-52;
Researcher: In the test you participated in before, I asked you, 'When we observe the Sun during the day, we observe it in different positions from sunrise to sunset. What is the reason for this?' You answered as follows: 'Because the Earth revolves around the Sun, the Sun appears in different places in the sky'. Why do you think the Sun is observed in different positions during the day due to the Earth's orbit around the Sun?
S-52: Since the Earth revolves around the Sun, the position of the Sun is constantly changing. That's why I gave such an answer.
Researcher: Are you sure about your answer?
S-52: Yes, I am sure.

For item 6, 101 out of 332 students who participated in the ACIT selected the options containing alternative concepts at the 1st and 2nd stages and selected 'I am sure' at the 3rd stage; therefore, it can be said that 101 students have the alternative concepts contained in item 6.

**Table 6. Frequency table of the answers in which alternative concepts were detected in students in item 6**

| Item 6 | | A | C* | D* | E0 | Total |
|---|---|---|---|---|---|---|
| Phase 1 | F | 5 | 48 | 39 | 9 | 101 |
| | % | 5,0 | 47,5 | 38,6 | 8,9 | 100 |
| Phase 2 | F | 6 | 48 | 39 | 8 | 101 |
| | % | 5,9 | 47,5 | 38,6 | 7,9 | 100 |

* Indicates the answers given by more than 10 per cent of the sample.

The most repeated alternative concept in the 1st and 2nd stages of item 6 was option 'C'. 'The statement 'When the Earth rotates on its axis, the Moon is observed in different ways.' was chosen by 48 (47.5%) out of 101 students who chose the statements indicating alternative concepts. The statement 'When the Earth rotates around its axis, the Moon is observed in different ways because it is out of the Earth's field of view.' was chosen by 48(47,5%) of 101 students who selected the statements indicating alternative concepts.

After the application of the Alternative Concept Identification Test, it was seen that students S-228, S-94, S-67 and S-52, who were randomly selected among the students who were found to give answers containing alternative concepts, had the alternative concepts that Item 6 aimed to identify. The interviews with S-228, S-94, S-67 and S-52 are given below.
Interview with S-228;
Researcher: When I asked you, 'Why is the Moon seen differently when looking at the night sky on different dates?' you answered ', The Earth's shadow falls on the Moon'. Why do you explain that the Moon appears in different ways because of the Earth's shadow?
S-228: The Moon is already travelling around in 30 days, and since it rotates in 30 days, its visible face cannot change. It looks like that because only one region remains visible, and I think it looks like that because the Earth's shadow falls.
Researcher: Does the Earth's shadow always fall on the Moon?
S-228: The Earth's shadow falls every day of the month. Let me think for a minute. It does not fall when the Moon is full.
Researcher: Are you sure about your answers?
S-228: Yes, I am sure.
When the interview researcher asked the same question to S-94,
S-94: Because it falls. When the Earth enters between the Moon and the Sun, the Earth's shadow is seen in different ways because it falls on the Moon.
Researcher: Are you sure about your answer?
S-94: Yes.
Interview with S-67;

Researcher: When I asked you in the sixth question, 'Why is the Moon seen differently when looking at the night sky on different dates?' you answered, 'When the Earth rotates around its axis, we see the Moon in different ways. Why do you think the reason why we see the Moon in different shapes is the rotation of the Earth around its axis?
S-67: We see the Moon in different shapes because the Moon is out of the Earth's field of view.
Researcher: Why do you think the Moon comes out of the Earth's field of view?
S-67: Because when the Earth rotates on its axis, the Moon should also rotate, and when the Moon rotates, both of them rotate, so we see it differently.
Researcher: Are you sure?
S-67: Yes.
Interview with S-52;
Researcher: In another question in the test, when I asked, 'Why is the Moon seen differently when looking at the night sky on different dates?' you answered, 'When the Earth rotates around its axis, we see the Moon in different ways. Why do you think the reason why we see the Moon in different shapes is the rotation of the Earth around its axis?
S-52: Because when the Earth rotates, the Moon falls in the Earth's shadow and out of sight, so it looks different.
Researcher: Why do you think the reason for the different shapes of the Moon is the shadow of the Earth?
S-52: Since we are constantly rotating, we cannot see the Moon all the time. For example, when it turns in the opposite direction, some of it can be in the shadow.
Researcher: Are you sure about your answer?
S-52: Yes, I am sure.

For item 10, 93 out of 332 students who participated in the ACIT for item 10, it was seen that 93 of them selected the options containing alternative concepts at the 1st and 2nd stages and selected 'I am sure' at the 3rd stage; therefore, it can be said that 93 students have the alternative concepts contained in item 10.

**Table 7. Frequency table of the answers in which alternative concepts were detected in students in item 10**

| Item 10 | | A* | B | C | E0 | Total |
|---|---|---|---|---|---|---|
| Phase 1 | F | 42 | 21 | 23 | 7 | 93 |
| | % | 45,2 | 22,6 | 24,7 | 7,5 | 100 |
| Phase 2 | F | 42 | 22 | 24 | 5 | 93 |
| | % | 45,2 | 23,7 | 25,8 | 5,4 | 100 |

* Indicates the answers given by more than 10 per cent of the sample.

The most repeated alternative concept in the 1st and 2nd stages of item 10 was option 'A'. Among the options containing alternative concepts in the 1st stage of the item 'How can the celestial phenomenon called shooting star be explained?', the expression 'It is the movement of comets.' was selected by 42 (45.2%) of 93 students who chose expressions indicating alternative concepts. In the 2nd stage, the statement 'This celestial phenomenon is observed as a result of the movement of comets.' was chosen by 42(45,2%) of 93 students who chose the statements indicating alternative concepts.

After the application of the Alternative Concept Identification Test, it was seen that students S-240, S-165, S-104, S-67 and S-52, who were randomly selected among the students who were found to give answers containing alternative concepts, had the alternative concepts that Item 10 aimed to identify. The interviews with -240, S-165, S-104, S-67 and S-52 are given below.
Interview with S-240;
Researcher: When I asked, 'How can the celestial event called shooting star be explained?' in the tenth question in the test, your answer was 'It is the movement of stars in space'. Why do you think so?
S-240: Stars move so fast from one place to another in space. This is how we observe it from Earth.
Researcher: Why do you think that shooting stars are the rapid movement of stars?
S-240: Because stars move fast and fast.
Researcher: Are you sure about your answer?
S-240: I am sure, yes.
Interview with S-165;
Researcher: In the tenth question, I asked you, 'How can you explain the celestial phenomenon called a shooting star?'. You said, 'It is a large cloud of gas and dust that comes out of the stars as they move. Can you explain why you think this way?
S-165: We had studied it in science class. That's how I remembered it as the cloud of gas and dust they emit while moving, so I expressed it that way.
Researcher: In the explanation part, you said that you thought, 'It is a celestial event observed from the Earth because they change their places quickly'. Why do you think the stars move quickly?

S-165: I mean, I think it happens quickly because it is an event that happens in a short time.
Researcher: Are you sure?
S-165: Yes
Interview with S-104;
Researcher: When I asked, 'How can the celestial event called shooting star be explained?' in the tenth question, you answered, 'It is the death of a star. It is the disappearance of the stars whose life is over in the depths of space. Why do you think that shooting stars are the death of stars and their disappearance in the depths of space?
S-104: Teacher, I think that a dying star falls at that speed because it cannot stand in space and has no energy left.
Researcher: Are you sure?
S-104: I am sure it makes sense.
Interview with S-67;
Researcher: When I asked, 'How can the celestial phenomenon called shooting star be explained?' in the tenth question, you said, 'It is the movement of comets. This celestial phenomenon is observed as a result of the movement of comets. Why do you think shooting stars are the movement of comets?
S-67: I think so because the stars are shooting. The ones with comets are shooting. There are other stars and other normal stars.
Researcher: Are you sure about your answer?
S-67: I am sure.
Interview with S-52;
Researcher: When I asked you, 'How can the celestial phenomenon called shooting star be explained?' you said, 'It is the movement of comets. This celestial phenomenon is observed as a result of the movement of comets. Why do you think shooting stars are the movement of comets?
S-52: Now, comets are formed because of shooting stars. Shooting stars turn into comets.
Researcher: Are you sure?
S-52: Yes.

For item 13, 136 out of 332 students who participated in the ACIT for item 13, it was seen that 136 students selected the options containing alternative concepts in the 1st and 2nd stages and selected 'I am sure' in the 3rd stage. Therefore, it can be said that 136 students have alternative concepts included in item 13.

**Table 8. Frequency table of the answers in which alternative concepts were detected in students in item 13**

| Item 13 | | A* | C | D | E0 | Total |
|---|---|---|---|---|---|---|
| Phase 1 | F | 108 | 7 | 2 | 19 | 136 |
| | % | 79,4 | 5,1 | 1,5 | 14,0 | 100 |
| Phase 2 | F | 106 | 6 | 5 | 19 | 136 |
| | % | 77,9 | 4,4 | 3,6 | 14,0 | 100 |

* Indicates the answers given by more than 10 per cent of the sample.

The most repeated alternative concept in the 1st and 2nd stages of item 13 was option 'A'. In the 1st stage of the item 'How often does a solar eclipse occur?', the statement 'It occurs once every year' was chosen by 108 (79.4%) of the 136 students who chose the statements indicating alternative concepts. In the 2nd stage, among the options containing alternative concepts, the statement 'It occurs once every year because the Earth goes around the Sun in 1 year.' was chosen by 106 (77.9%) out of 136 students who selected the statements indicating alternative concepts.

After the application of the Alternative Concept Identification Test, it was seen that students S-228, S-240, S-169 and S-7, who were randomly selected among the students who were found to give answers containing alternative concepts, had the alternative concepts that Item13 aimed to identify. The interviews with S-228, S-240, S-169 and S-7 are given below.
Interview with S-228;
Researcher: In the thirteenth question, I asked you 'How often does a solar eclipse occur?'. You stated, 'It occurs once every month and a solar eclipse occurs when the moon is in the full moon phase. Why do you think there will be a solar eclipse every full moon phase?
S-228: Since the phases of the moon are when the moon is full, that's how I remembered the solar eclipse. I think it happens every full moon phase.
Researcher: Are you sure?
S-228: I am sure.
Interview with S-240;

Researcher: In the thirteenth question, I asked you 'How often does a solar eclipse occur?'. You answered 'It happens once every year. Since the Earth goes round the Sun in 1 year, it happens only once every year. Why do you think there will be a solar eclipse once every year?
S-240: Because the Earth goes round the Sun. Because it rotates in one year.
Researcher: What is the relation between the solar eclipse and the movement of the Earth around the Sun?
S-240: The Earth goes round in a year. The Earth also coincides with the Moon, and at that time there is a solar eclipse.
Researcher: Are you sure?
S-240: Yes.
Interview with S-169;
Researcher: In another question, when I asked you 'How often does a solar eclipse occur?' you said 'It happens once every year. Because the Sun, Moon and Earth line up once a year. You answered as follows. Why do you think a solar eclipse will occur every year?
S-169: Once every year, the order is Earth, Moon, and Sun, so there is a solar eclipse.
Researcher: Are you sure?
S-169: Yes.
Interview with S-7;
Researcher: When you were asked 'How often does a solar eclipse occur?', you said 'It happens once every year'. Why do you think the solar eclipse happens once every year?
S-7: As the earth rotates around the sun, one year passes in each rotation. It comes to the same position only once, so it happens once.
Researcher: Why do you think they come to the same position once a year?
S-7: The sequence is between the Sun and the Earth, so the Moon enters.
Researcher: Are you sure of your answer?
S-7: I am sure, yes.

For item 14, 53 of the 332 students who participated in the ACIT for item 14, it was seen that 53 of them selected the options containing alternative concepts at the 1st and 2nd stages and chose 'I am sure' at the 3rd stage; therefore, it can be said that 53 students have the alternative concepts contained in item 14.

**Table 9. Frequency table of the answers in which alternative concepts were detected in students in item 14**

| Item 14 | | B* | C | D | E0 | Total |
|---|---|---|---|---|---|---|
| Phase 1 | F | 38 | 8 | 6 | 1 | 53 |
| | % | 71,7 | 15,1 | 11,3 | 1,9 | 100 |
| Phase 2 | F | 37 | 9 | 6 | 1 | 53 |
| | % | 69,8 | 17,0 | 11,3 | 1,9 | 100 |

* Indicates the answers given by more than 10 per cent of the sample.

The most repeated alternative concept in the 1st and 2nd stages of item 14 was option 'B'. In the 1st stage of the item 'How does a lunar eclipse occur?', the statement 'It occurs when the Sun enters between the Earth and the Moon' was selected by 38 (71.7%) of 53 students who chose the statements indicating alternative concepts. In the 2nd stage, the statement 'Since the Moon is behind the Sun, we cannot observe the Moon from the Earth.' was chosen by 37(69.8%) of 53 students who selected the statements indicating alternative concepts.

After the application of the Alternative Concept Identification Test, it was seen that student S-234, who was randomly selected among the students who were found to give answers containing alternative concepts, had the alternative concepts that Item 14 aimed to identify. The interview with S-234 is given below.
Interview with S-234;
Researcher: In question 14, when I asked, 'How does a lunar eclipse occur?', you said, 'It occurs when the Sun enters between the Earth and the Moon. We cannot see the Moon from the Earth because the Sun is entering between the Earth and the Moon. ' Why do you think that the Sun enters between the Earth and the Moon for a lunar eclipse to occur?
S-234: Because when the Sun comes between the Earth and the Moon, we cannot see the Moon. The Moon cannot be seen because the Sun is too big.
Researcher: Are you sure about your answers?
S-234: Yes.

For item 15, 89 out of 332 students who participated in the ACIT for item 15, it was seen that 89 of them selected the options containing alternative concepts in the 1st and 2nd stages and chose 'I am sure' in the 3rd stage. Therefore, it can be said that 89 students have alternative concepts included in item 15.

**Table 10. Frequency table of the answers in which alternative concepts were detected in students in item 15**

| Item 15 | | B* | C | D | E0 | Total |
|---|---|---|---|---|---|---|
| Phase 1 | F | 51 | 6 | 19 | 13 | 89 |
| | % | 57,3 | 6,7 | 21,3 | 14,6 | 100 |
| Phase 2 | F | 47 | 11 | 20 | 11 | 89 |
| | % | 52,8 | 12,4 | 22,5 | 12,4 | 100 |

* Indicates the answers given by more than 10 per cent of the sample.

The most repeated alternative concept in the 1st and 2nd stages of item 15 was option 'B'. In the 1st stage of the item 'How often does a lunar eclipse occur?', the statement 'It occurs once every year' was selected by 51 (57.3%) of 89 students who chose the statements indicating alternative concepts. In the 2nd stage, among the options containing alternative concepts, the statement 'It occurs once a year since the Moon circles around the Sun with the Earth in 1 year.' was selected by 47(52.8%) of 89 students who chose the statements indicating alternative concepts.

After the application of the Alternative Concept Identification Test, it was seen that students S-228, S-129, S-165, S-104 and S-7, who were randomly selected among the students who were found to give answers containing alternative concepts, had the alternative concepts that Item15 aimed to identify. The interviews with S-228, S-129, S-165, S-104, S-7 are given below.
Interview with S-228;
Researcher: In question 15, when I asked, 'How often does the lunar eclipse occur?', you answered, 'The lunar eclipse occurs once every month. Why do you think the lunar eclipse occurs once every month?
S-228: Since the Moon comes between the Earth and the Sun every month, a shadow is constantly cast on the Moon. A shadow is cast on the Moon every time.
Researcher: Are you sure about your answer?
S-228: Yes.
Interview with S-129;
Researcher: In the 15th question, I asked, 'How often does a lunar eclipse occur?' and you answered, 'A lunar eclipse occurs once every month. Since the Sun, the Earth and the Moon are aligned in the same direction every month, it happens every month. Why do you think that a lunar eclipse occurs every month when the Earth and the Sun are aligned?
S-129: Because the Sun gives light and the Moon creates a shadow on the Earth by covering that light. They should not be random; they should be equal. It has to be in such a reciprocal way that it coincides once a month.
Researcher: Are you sure?
S-129: Yes.
Interview with S-165;
Researcher: When I asked, 'How often does a lunar eclipse occur?' in the question, you answered, 'It happens once every year. Since the Moon circles around the Sun with the Earth in 1 year, it happens once a year. Why do you think the lunar eclipse occurs once every year?
S-165: Because they occur once a year in the same order as in the solar eclipse.
Researcher: Are you sure?
S-165: Yes
Interview with S-104;
Researcher: In the 15th question, I asked, 'How often does a lunar eclipse occur?' and you answered, 'It occurs once every month. Since the directions of the Sun, the Earth and the Moon are aligned every month, it happens every month. Why do you think so?
S-104: Because it happens during the full moon phase of the Moon. In every full moon phase, an eclipse occurs because the same Moon, Earth and Sun are aligned. Because the Moon is behind the Earth.
Researcher: Are you sure of your answer?
S-104: Yes, I am sure.
Interview with S-7;
Researcher: In question 15, when I asked, 'How often does a lunar eclipse occur?', you answered, 'It happens once every year. You answered as follows. Why do you think a lunar eclipse occurs every year?
S-7: Now, while the Moon goes round the Earth, the Earth also goes round the Sun. Since it aligns with the Earth once, there is a lunar eclipse once every year.
Researcher: Are you sure?
S-7: Yes, I am very sure.

For item 16, 66 out of 332 students who participated in the ACIT for item 16, it was seen that 66 students selected the options containing alternative concepts at the 1st and 2nd stages and chose 'I am sure' at the 3rd stage, so it can be said that 66 students have the alternative concepts contained in item 16.

**Table 11. Frequency table of the answers in which alternative concepts were detected in students in item 16**

| Item 16 | | A* | B | C | E0 | Total |
|---|---|---|---|---|---|---|
| Phase 1 | F | 36 | 12 | 16 | 2 | 66 |
| | % | 54,5 | 18,1 | 24,2 | 3,0 | 100 |
| Phase 2 | F | 37 | 14 | 13 | 2 | 66 |
| | % | 56,1 | 21,2 | 19,7 | 3,0 | 100 |

* Indicates the answers given by more than 10 per cent of the sample.

The most repeated alternative concept in the 1st and 2nd stages of item 16 was option 'A'. 'The statement 'Stars are the smallest celestial bodies.' was selected by 36 (54.5%) out of 66 students who chose the statements indicating alternative concepts. In the 2nd stage, the statement 'When looking at the sky at night, the stars appear very small.' was chosen by 37(56.1%) of 66 students who chose the statements indicating alternative concepts.

After the application of the Alternative Concept Identification Test, it was seen that students S-234 and S-94, who were randomly selected among the students who were found to give answers containing alternative concepts, had the alternative concepts that Item 16 aimed to identify. The interviews with S-234 and S-94 are given below.
Interview with S-234;
Researcher: When I asked you, 'Which of the information about the stars is correct?' in Question 16 of the test you participated in, you said, 'The moon is a star'. Why do you think the Moon is a star?
S-234: Because all planets and objects are stars. We only see them as planets, for example. But they are actually stars. So they are all different types of stars.
Researcher: Why do you think all celestial bodies are stars?
S-234: They emit light, that is, they reflect. They give the reflection coming from the sun. The sun provides light because it is the biggest.
Researcher: Are you sure?
S-234: Yes.
Interview with S-94;
Researcher: In the question, I asked, 'Which of the information given about stars is correct?'. You said, 'Stars are the smallest celestial bodies. Why do you think stars are the smallest celestial bodies?
S-94: Actually, the big ones are small compared to the planets. They are big compared to us, but they are small compared to other celestial bodies.
Researcher: Are you sure?
S-94: Yes.

For item 18, 47 out of 332 students who participated in the ACIT for item 18, it was seen that 47 students selected the options containing alternative concepts at the 1st and 2nd stages and chose 'I am sure' at the 3rd stage. Therefore, it can be said that 47 students have alternative concepts contained in item 18.

**Table 12. Frequency table of the answers in which alternative concepts were detected in students in item 18**

| Item 18 | | A* | B | D | E0 | Total |
|---|---|---|---|---|---|---|
| Phase 1 | F | 34 | 8 | 5 | 0 | 47 |
| | % | 72,3 | 17,0 | 10,6 | 0 | 100 |
| Phase 2 | F | 32 | 10 | 5 | 0 | 47 |
| | % | 68,1 | 21,3 | 10,6 | 0 | 100 |

* Indicates the answers given by more than 10 per cent of the sample.

The most repeated alternative concept in the 1st and 2nd stages of item 18 was option 'A'. 'Why are constellations grouped by being likened to various animals, objects or figures?' was chosen by 34 (72.3%) out of 47 students who selected the statements indicating alternative concepts among the options containing alternative concepts in the 1st stage of the item 'Because they are clusters of stars close to each other, they have a common name'. In the 2nd stage, the statement 'These stars are the closest stars to each other in space, so they are named in common.' was chosen by 32(68.1%) out of 47 students who chose the statements indicating alternative concepts.

After the application of the Alternative Concept Identification Test, it was seen that students S-94 and S-26, who were randomly selected among the students who were found to give answers containing alternative concepts, had the alternative concepts that Item 18 aimed to identify. Interviews with S-94 and S-26 are given below.
Interview with S-94;
Researcher: In the eighteenth question, when I asked, 'Why are constellations grouped by likening them to various animals, objects or figures?', you answered, 'They are named in common because they are star clusters close to each other'. You answered. Why do you think stars are named in common because they are close?
S-94: They are close because they are close to each other, so they are common.
Researcher: Are you sure?
S-94: Yes
Interview with S-26;
Researcher: When I asked you, 'Why are constellations grouped by likening them to various animals, objects or figures?' you answered, 'Stars consisting of the same types of stars are named in common'. You answered. Why do you think the same types of stars will be named in common?
S-26: For example, when they look at the stars there, they have the same objects (talking about smartphone applications), and they name them the same. When some of them have the same shapes, they can also name them differently. Stars are generally similar in type and shape, so they are named in common.
Researcher: Are you sure?
S-26: I am sure.

For item 20, 99 out of 332 students who participated in the ACIT for item 20, it was seen that 99 of them selected the options containing alternative concepts at the 1st and 2nd stages and selected 'I am sure' at the 3rd stage. Therefore, it can be said that 99 students have alternative concepts contained in item 20.

**Table 13. Frequency table of the answers in which alternative concepts were detected in students in item 20**

| Item 20 | | B* | C | D | E0 | Total |
|---|---|---|---|---|---|---|
| Phase 1 | F | 61 | 15 | 20 | 3 | 99 |
| | % | 61,6 | 15,2 | 20,2 | 3,0 | 100 |
| Phase 2 | F | 62 | 14 | 20 | 3 | 99 |
| | % | 62,6 | 14,1 | 20,2 | 3,0 | 100 |

* Indicates the answers given by more than 10 per cent of the sample.

The most repeated alternative concept in the 1st and 2nd stages of item 20 was option 'B'. The statement 'Scientists who are interested in astronomy are called astrologers' among the options containing alternative concepts in the 1st stage of the item 'Which of the given comments about astronomy is correct?' was chosen by 61 (61.6%) of 99 students who chose the statements indicating alternative concepts. 62(62,6%) out of 99 students who selected alternative concept-containing options in the 2nd stage, the statement 'Astrologers are scientists who work on subjects such as the structure of celestial bodies and celestial events.' was selected by 62(62,6%) of 99 students who selected the statements indicating alternative concepts.

After the application of the Alternative Concept Identification Test, it was seen that student S-240, who was randomly selected among the students who were found to give answers containing alternative concepts, had the alternative concepts that Item 20 aimed to identify. The interview with S-240 is given below.
Interview with S-240;
Researcher: When I asked you, 'Which of the comments about astronomy is correct?' in our last question, you answered, 'Scientists who are interested in astronomy are called astrologers. Why do you think scientists interested in astronomy are called astrologers?
S-240: These names, experienced names, astrologers, interpreters, as far as I know, take videos of space with pictures or something like that.
Researcher: Why do you think astrologers make scientific interpretations?
S-240: They do not do exact science. They only bring evidence and interpret it from space. They create them in a scientific way.
Researcher: Are you sure?
S-240: I am sure.

**Ethics approval notification**
Ethical permission (04.04.2023-2023-500) was obtained from Gazi University Ethics Commission this research.

## Discussion and Conclusion

The frequencies and percentages of all alternative concepts determined by ACIT, which was created to determine the alternative concepts of secondary school students in the subjects of the structure of celestial bodies, celestial events and the motions of celestial bodies, are given in the findings. When the literature was examined, it was determined that the alternative concepts preferred by more than 10% of the sample were considered important, and these alternative concepts were included in the results (Kaltakçı, 2012; Önsal, 2016).

In this study, the alternative concepts preferred by more than 10% of the sample were listed. It is noteworthy that more than 30% of the students preferred the statements' A solar eclipse occurs once every year.' and 'Since the Earth revolves around the Sun in 1 year, a solar eclipse occurs only once every year.' which include the alternative concepts in item 13. Research shows that students' misunderstanding of the Sun, Earth and Moon positions leads to the spread of alternative conceptions about the occurrence of eclipses (LoPresto & Murrell, 2011). In particular, a significant number of students think that a solar eclipse occurs only once every year and that it is directly related to the motion of the Earth around the Sun. However, this misconception stems from incomplete or erroneous knowledge about the orbital motions and alignments of the Sun, Earth and Moon (Vosniadou & Skopeliti, 2017). Although studies in the literature support those alternative conceptions are frequently encountered in the subjects of solar eclipse and lunar eclipse, no alternative conceptions about the frequency of solar and lunar eclipse were found in these studies (Bostan, 2008; Harman, 2016; Küçüközer & Bostan, 2010; Trumper, 2001).

More than 25% of the students stated, 'The Earth rotates around its axis in 365 days and 6 hours.' and 'The Earth completes its rotation around its axis in 365 days and 6 hours. This period is called a year.' statements were repeated quite frequently. The alternative concepts identified in item 4 are also supported by studies in the literature (Uğurlu, 2005). Such misconceptions may result from deficiencies in the learning of basic astronomical concepts. For example, one complete rotation of the Earth around its axis takes approximately 24 hours (23 hours 56 minutes 4 seconds to be precise), while one complete revolution around the Sun takes approximately 365 days 6 hours. Confusing the durations of these two different motions may lead to misconceptions in students.

It was observed that more than 20% of the students repeated the statements 'When the Earth revolves around the Sun, there is day and night' and 'When the Earth revolves around the Sun, one side of the Earth is illuminated, and the other side remains in darkness', which contain alternative concepts. When the literature was examined, studies supporting the alternative concepts identified in item 3 were found (Frede, 2006; Trumper, 2003; Türk, 2010). For example, Bostan (2008) found that students thought that the motion of the Earth around the Sun caused the formation of day and night. Similarly, in Aygören's (2023) study, it was stated that 60% of the students thought that the Earth's rotation around the Sun effectively formed day and night.

The statements containing alternative concepts preferred by more than 10% of the students are given below:

- When we observe the Sun during the day, the reason why we observe it in different positions from sunrise to sunset is that the Earth moves around the Sun.
- As the Earth travels around the Sun, the Sun appears in different places in the sky.

When the literature was analyzed, results similar to the alternative concepts identified in item 5 were found (Göncü, 2013)

- When the Earth rotates on its axis, the Moon is observed in different ways.
- When the Earth's shadow falls on the Moon, the Moon is observed in different ways.
- When the Earth rotates around its axis, the Moon is observed in different ways because it is out of the Earth's field of view.
- When the Earth is between the Moon and the Sun, different shapes are observed when the Earth's shadow falls on the Moon.

When the literature was analyzed, it was seen that similar results were obtained to the alternative concepts identified in item 6 (Frede, 2006; Öztürk, 2011; Trumper, 2003; Ünsal et al., 2001).

- The celestial event called the shooting star is the movement of comets.
- The celestial phenomenon called the shooting star is observed as a result of the movement of comets.

When the literature was analysed, it was seen that the studies supported the alternative concepts identified in the 10th item (Bostan, 2008; Göncü, 2013; Küçüközer & Bostan).

- A lunar eclipse occurs when the Sun enters between the Earth and the Moon.

- Since the Moon is behind the Sun, we cannot observe the Moon from Earth.
- A lunar eclipse occurs once time every year.
- A lunar eclipse occurs once a year as the Moon orbits around the Sun with the Earth in 1 year.

When the literature was analyzed, it was seen that there were alternative concepts identified in the studies on topics such as the positions and order of the Moon, the Earth and the Sun during solar and lunar eclipses. Although the studies in the literature support that alternative concept involving the confusion of the positions of the Sun, Earth and Moon during the solar eclipse and lunar eclipse identified in the 14th item are frequently encountered, in these studies.

In item 15, no alternative concept was found regarding the frequency of solar and lunar eclipses (Bostan, 2008; Harman, 2016; Küçüközer et al., 2010).

- Stars are the smallest celestial bodies.
- When you look at the sky at night, the stars look very small.

When the literature was analyzed, it was found that the alternative concepts identified in the 16th item about the structure and properties of stars were supported (Emrahoğlu & Öztürk, 2009; Ercan et al., 2010; İyibil et al., 2010).

- Constellations are common names because they are clusters of stars close to each other.

When the literature was analyzed, the fact that the alternative concept related to the naming of constellations identified in item 18 was also observed in another study supports the result of the study (Kurnaz, 2012).

- Scientists interested in astronomy are called astrologers.
- Astrologers are scientists working on subjects such as the structure of celestial bodies and celestial events.

The results revealed that the developed Alternative Concept Identification Test is a valid and reliable measurement tool. This shows that the test can be used effectively to determine the alternative concepts of secondary school students in the subjects of the structure of celestial bodies, celestial events and the motions of celestial bodies. The test is a useful tool for determining students' misconceptions and revealing their learning deficiencies related to these concepts. In addition, comparing the correct scores obtained from the test with the alternative concept scores can be used to measure students' mastery of the subject and to analyze their achievement levels.

## Recommendations

The literature review revealed that there has not yet been a study that analyses the alternative conceptions of secondary school students in these specific topics at all grade levels together and compares them according to grade levels. This finding points to the need for a more comprehensive and detailed analysis of the structure of celestial bodies, celestial phenomena and the motions of celestial bodies across grade levels. Increasing research in this area will help to develop teaching strategies to eliminate students' conceptual misconceptions about these topics. In addition, such studies can make science education practices and teaching methodologies more effective so that students can better understand the basic concepts of science.

## Acknowledgements or Notes

The authors received no financial support for the research and/or authorship of this article.

## Author (s) Contribution Rate

The authors of the study contributed equally at all stages, from the planning of the research to the writing of the discussion part.

## Ethical Approval (only for necessary papers)

Ethical permission (04.04.2023-2023-500) was obtained from Gazi University Ethics Commission this research.

## References


Alın, G. & İzgi, Ü. (2017). an analysis of primary education students 'misconceptions about the stars. *The Journal of Social Sciences. 10*(4), 202-214.

Ayas, A. (2016). Science and technology teaching: From theory to practice (S. Çepni, Ed.). Ankara: PegemA.

Aymen Peker, E., & Taş, E. (2019). Three tier concept diagnostic test development and validity study: Let's travel and learn about the living world unit of fifth grade. *Journal of Computer and Education Research*, *7*(14), 515-539. https://doi.org/10.18009/jcer.602223

Babaoğlu, G. (2016). *Determination of 6th grade students' perceptions of the concepts of astronomy.* [Master's Thesis]. Aksaray University.

Babaoğlu, M. (2019). *Investigation of 6th grade students' perceptions of the concepts of moon phases*. [Doctoral Thesis]. Necmettin Erbakan University.

Bailey, J. M. (2006). *Development of a concept inventory to assess students' understanding and reasoning difficulties about the properties and formation of stars*. Doctoral dissertation, Arizona University, ABD.

Baxter, J. (1989). Children's understanding of familiar astronomical events. *International Journal of Science Education,* 11(5), 502-513. https://doi.org/10.1080/0950069890110503.

Bolat, A., Aydoğdu, R. Ü., Sağır, Ş. U., & Değirmenci, S. (2014). 5th grade students' misconceptions related to the subjects of "The Sun, The Earth and the Moon". *Journal of Research in Education and Teaching*, 3(1), 218-229.

Aygören, Ş.T., (2023). The conceptual understanding levels of secondary school students about astronomy [Master's Thesis]. Necmettin Erbakan University.

Bostan, A. (2008). Different age group students? ideas about some basic astronomy concepts. [Master Dissertation]. Balıkesir University.

Büyüköztürk, Ş., Kılıç Çakmak, E., Akgün, Ö. E., Karadeniz, Ş., & Demirel, F. (2016). Scientific research methods. (20. Press). Ankara: Pegem Akademi.

Çetinkaya, M., & Taş, E. (2016). Activity based and web supported measurement and assessment material development. *Journal of Research in Education and Teaching*, *5*(1), 21-28.

Demirci, N., & Efe, S. (2007). Determination of primary school students' misconceptions about sound subject. *Necatibey Faculty of Education Electronic Journal of Science and Mathematics Education*, *1*(1), 23-56.

Elmas, R., & Pamuk, S. (2021). Determining Misconceptions of Prospective Teachers with the Three-Tier Misconception Test. *Afyon Kocatepe University Journal of Social Sciences*, *23*(4), 1386-1403. https://doi.org/10.32709/akusosbil.916063

Emrahoğlu, N. & Öztürk, A. (2009). Longitudinal research on the analysis of the prospective science teachers' level of understanding the astronomical concepts and their misconceptions. *Çukurova University Social Sciences Institute Journal*, 18(1), 165-180.

Ercan, F., Taşdere, A., & Ercan, N. (2010). Observation of cognitive structure and conceptual change through word association test. *Journal of Turkish Science Education*, 7(2), 136 - 154.

Frede, V. (2006). Pre-service elementary teachers' conceptions about astronomy. *Advances in Space Research*, 38(10), 2237-2246. https://doi.org/10.1016/j.asr.2006.02.017

Göncü, Ö. (2013). *Determining of astronomical misconception in fifth and seventh grade students.* [Master Dissertation]. Mehmet Akif Ersoy University.

Güneş, H. (2020). *The effect of teaching methods based on different conceptual change approaches on alternative concepts of science and art center students on electric circuits.* [Doctoral Dissertation]. Gazi University.

Harman, G. (2016). Mental Models of Middle School Students on Solar and Moon Eclipse. *Uşak University Journal of Social Sciences*, 9(27/3), 297-314.

Hestenes, D., & Wells, M. (1992). A mechanics baseline test. *The Physics Teacher*, *30*(3), 159-166.

İyibil, Ü. & Sağlam Arslan, A. (2010). Pre-Service Physics Teachers' Mental Models about Stars. *Necatibey Faculty of Education Electronic Journal of Science and Mathematics Education*, 4(2), 5-46.

Kahraman, O. (2006). *A needs analysis to develop an astronomy program for Turkish elementary and secondary schools.* [Master Dissertation]. Middle East Technical University.

Kaltakçı, D. (2012). Development and application of a four-tier test to assess pre-service physics teachers' misconceptions about geometrical optics. [Doctoral Dissertation]. Middle East Technical University.

Karagöz, Y. (2017). SPSS and AMOS applied qualitative-quantitative-mixed scientific research methods and publication ethics. Sivas: Nobel.

Karslı, F. & Alipaşa, A. (2013). Is it possible to eliminate alternative conceptions and to improve scientific process skills with different conceptual change methods? 'An Example of Electrochemical Cells'. *Journal of Computer and Education Research,* 1(1), 1-26.

Koyuncuer, B. (2014). *Misconceptions about diffusion and osmosis concepts held by secondary education 9.th level students.* [Doctoral Thesis] Necmettin Erbakan University.

Küçüközer, H., & Bostan, A. (2010). Effects of instruction on pre-service mathematics teachers' ideas about some astronomy concepts. Ondokuz Mayıs University Journal of Education, 29(1), 105-124.

Kurnaz, M. A. (2012). Determining students' comprehension of the star, comet, and constellation concepts. *Bolu Abant Izzet Baysal University Journal of Faculty of Education*, *12*(1), 251-264.

Kurnaz, M. A., & Değermenci, A. (2012). Mental models of 7th grade students on Sun, Earth and Moon. *Elementary Education Online, 11*(1), 2-15.

Kurnaz, M., Bozdemir, H., Altunoğlu, B. & Ezberci Çevik, E. (2016). Analysis of national articles published in astronomy subject areas. *The Erzincan University Journal of Education Faculty, 18* (2). https://doi.org/10.17556/jef.02610

LoPresto, M. C., & Murrell, S. R. (2011). Astronomical misconceptions survey. *Journal of College Science Teaching, 40*(5), 14-22.

Ministry Of National Education (MNE) (2018). *Fen bilimleri dersi öğretim programı (ilkokul ve ortaokul 3, 4, 5, 6, 7 ve 8. sınıflar).*

Meşin, M. Z. (2019). *Determination of Misconceptions of Science Teacher Candidates about Conception of Gas Laws by Four-Tier Test. [Doctoral Thesis* Necmettin Erbakan University.

Novak, J. D., & Gowin, D. B. (1984). *Learning how to learn*. UK: Cambridge University.

Önsal, G. (2016). *Development and application of a four-tier test to assess misconceptions about special relativity theory*. [Master's Thesis] Gazi University.

Öztürk, D. (2011). Primary 6th and 8th grade students? misconceptions of the moon phases and investigation of conceptual change in cooperative learning environment. [Master Dissertation]. Çukurova University.

Pallant, J. (2011). Spss survival manual a step by step guide to data analysis using Ibm spss. Maidenhead, Berkshire: Open University.

Percy, J. R. (2006). Teaching astronomy: Why and how? Journal of the American Association of Variable Star Observers, 35(5), 248–254.

Peşman, H. (2005). Development of a three-tier test to assess ninth grade students' misconceptions about simple electric circuits. [Master's thesis] Middle East Technical University.

Şenyiğit, Ç., & Sılay, İ. (2019). a study on developing a three-tier concept test on simple electrical circuits. *The Journal of Buca Faculty of Education, 48*, 69-87.

Smith, M.K. (2002). What is a misconception? *Phi Delta Kappan, 84*(3), 182-186.

Tarakçı, B., & Şensoy, Ö. (2019. March). Determination of 5th grade secondary school students' alternative views on the sun, earth and moon. Paper presented at 3rd International Science and Education Congress, Afyon Kocatepe University, Afyonkarahisar.

Treagust, D. F. (1988). Development and use of diagnostic tests to evaluate students' misconceptions in science. *International Journal of Science Education*, *10*(2), 159-169.

Trumper, R. (2001). A cross-college age study of science and nonscience students' conceptions of basic astronomy concepts in preservice training for high-school teachers. *Journal of Science Education and Technology, 10*, 189-195.

Trumper, R. (2003). The need for change in elementary school teacher training—a cross-college age study of future teachers' conceptions of basic astronomy concepts. *Teaching and Teacher Education*, *19*(3), 309-323.

Türk, C. (2010). *Teaching of elementary education basic astronomy concepts.* [Master's Thesis], Ondokuz Mayıs University.

Türk, C., & Kalkan, H. (2017). The adaptation study of the astronomy attitude scale for the higher education students abstract. *Celal Bayar University Journal of Social Sciences/Celal Bayar Üniversitesi Sosyal Bilimler Dergisi, 15*(3), 69-95.

Uğurlu, N. B. (2005). Misconceptions of The Sixth Year Students of Primary Education on the Earth and the Universe. *Gazi University Gazi Faculty of Education Journal, 25* (1), 229-246.

Ülker, S., & Kacakülah, A. (2020). Determination and elimination of misconceptions of gifted 5th grade students about the concepts of sun, earth and moon. *Child and Civilization / Çocuk ve Medeniyet*, *5*(10), 447-471.

Ünsal, Y., Güneş, B. & Ergin, İ. (2001). A Study to Investigate the Fundamental Astronomy Knowledge Levels of Undergraduate Students. *Gazi University Gazi Faculty of Education Journal, 21*(3), 47-60.

Vosniadou, S., & Skopeliti, I. (2017). Is it the Earth that turns or the Sun that goes behind the mountains? Students' misconceptions about the day/night cycle after reading a science text. *International Journal of Science Education, 39*(15), 2027-2051.

Yener, D., Aksüt, P., Demir, N. S., Aydın, F., Fidan, H., Subaşı, Ö., & Aygün, M. (2017). Investigation of prospective teachers' cognitive structures towards the concepts of "Astronomy". *Journal of Amasya University Faculty of Education, 6*(2), 531-565.

Zengin, Y. (2018). *Developing A Three-Tier Concept Test Related to the Subject of 9. Grade Force and Motion and Creating Conceptual Change Texts.* [Doctoral Thesis], Necmettin Erbakan University.

International Journal of Contemporary Educational Research

Volume 12, Number 1, March 2025, Page 90-101 Article Type: Research Article

# Exploring the Dynamics of Academic Life Satisfaction of Undergraduate Students in Ghana: Confirmatory Factor and Latent Profile Analyses

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**Abstract**
This study examined the academic life satisfaction of undergraduate students at the University of Environment and Sustainable Development (UESD) in Ghana. It aimed to investigate the relationship between undergraduate students' personal satisfaction (PSA) and satisfaction with the academic environment (SAE) at UESD and to identify distinct latent classes based on these factors. A cross-sectional research design was adopted, with participants selected through convenience sampling. The sample consisted of 370 participants: 211 males (57.0%) and 159 females (43.0%), aged 16 to 37 years (M = 21.4, SD = 3.10). All participants completed the Students' Academic Life Satisfaction Scale (SALSS), and the data were analysed using confirmatory factor analysis (LPA) and latent profile analysis (LPA). The statistical analyses were carried out in two steps: first, CFA was used to assess the relationship between the satisfaction with academic environment and personal satisfaction. Second, LPA was applied to identify distinct subgroups based on their academic life satisfaction factors. The results obtained from CFA showed a statistically significant positive covariance between Satisfaction with Academic Environment (SAE) and Personal Satisfaction (PSA) factors, with an estimate of 0.579 (SE = 0.045, Z = 12.9, $p < .001$, standardised estimate = 0.579). The LPA identified subgroups of students with varying patterns of satisfaction regarding academic environment and personal satisfaction. Four distinct classes emerged: low satisfaction (12.6%), moderate satisfaction (15.7%), high satisfaction (54.9%) and mixed feelings (7.8%). The findings of this study will enable the university to enhance student support systems, including academic advising, counselling, and peer mentoring, to foster a more inclusive and supportive campus environment for all students, particularly those with lower satisfaction.

**Keywords:** Academic life satisfaction, Personal satisfaction, Satisfaction with the academic environment, Confirmatory factor analysis, Latent class analysis.

**Citation**
Bosomtwe, M. & Ampong, G. A. (2025). Exploring the dynamics of academic life satisfaction of undergraduate students in Ghana: Confirmatory factor and latent profile analyses. *International Journal of Contemporary Educational Research, 12*(1), 90-101. https://doi.org/10.52380/ijcer.2025.12.1.746

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|---|---|
| Received | 29.11.2024 |
| Accepted | 06.03.2025 |
| Publication | 28.03.2025 |
| Peer-Review | Double anonymized - Double Blind |
| Plagiarism Checks | Yes - iThenticate |
| Conflicts of Interest | The author(s) has no conflict of interest to declare. |
| Complaints | editor@ijcer.net |
| Grant Support | The author(s) acknowledge that they received no external funding in support of this research. |


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## Introduction

Research on academic life satisfaction (ALS) has received considerable attention in recent times. This is because ALS is a critical indicator of both academic success and well-being, reflecting students' overall experiences and adaptation to the academic environment (Santos et al., 2013). Therefore, it is essential for higher education institutions to strive to meet and surpass student expectations to maintain the long-term viability of their operations. This study aims to understand how students' academic life satisfaction can contribute to their development and success in higher education.

Student academic life satisfaction plays a crucial role in fostering self-confidence, enhancing skill development, and facilitating knowledge acquisition, which together contribute to better academic performance (Asadizaker et al., 2015). In a study conducted by Kwakwa et al. (2023), they found that students' satisfaction was linked to their academic performance in the College of Education in Ghana. In another study, Sam et al. (2015) investigated the relationship between life satisfaction, psychological symptoms, and factors like English language proficiency and discrimination among international students in Ghana. They found that students with higher life satisfaction and fewer psychological symptoms were more likely to report positive experiences with English language proficiency and less discrimination.

Studies exploring students' satisfaction with the academic environment and personal satisfaction among university students in Ghana are limited. To the best of our knowledge, no prior empirical research has explored the relationship between personal satisfaction and satisfaction with the academic environment in any Ghanaian university. Our comprehensive Google Scholar search conducted in November 2024 using the keywords "Personal Satisfaction," "Ghana University," And "Satisfaction with the Academic Environment" confirmed this research gap. Therefore, this study is among the first to explore the relationship between personal satisfaction and satisfaction with the academic environment using both confirmatory factor analysis and latent profile analysis.

This study employs confirmatory factor analysis (CFA) and latent profile analysis (LPA) to comprehensively examine the latent structures underlying personal satisfaction and satisfaction with the academic environment. CFA is primarily concerned with validating theoretical models, whereas LPA adopts an exploratory approach to identify naturally occurring subgroups. Both methods are valuable in different research contexts, providing insights into the latent structures (Steenkamp & Maydeu-Olivares, 2021) and profiles characterising complex datasets (Lanza & Bray, 2010). Both methods can complement each other in research, providing a comprehensive view of the data's underlying structure.

Many universities around the world conduct annual student surveys to measure satisfaction levels for the purposes of identifying institutional weaknesses as well as providing prospective students with information about the institutions they intend to enrol (Dattey et al., 2019). In other words, student satisfaction surveys are instrumental in helping universities navigate educational reforms and remain competitive in the market. According to Onditi and Wechuli (2017), students are the primary stakeholders of universities, and thereby assessing their satisfaction levels are paramount for accreditation and essential for maintaining a positive institutional image. Arambewela and Hall (2009) argue that while achieving student satisfaction is challenging, it is crucial for attracting students, as satisfied students promote the institution through positive word of mouth. They recommend that universities adopt a customer-centric approach, making student satisfaction a core part of their management strategy alongside teaching and research.

The University of Environment and Sustainable Development (UESD) is a newly funded public university established by the Act of Parliament of Ghana, ACT 898 in 2015. The University is mandated to teach and to conduct research in the area of environmental issues, agribusiness and sustainable education. Operationally, UESD admitted its first cohort of undergraduate students in 2019-2020 academic year and currently has a student population of 948 enrolled in the School of Sustainable Development and the School of Natural and Environmental Sciences (Academic Affairs Division, 2024). In line with the mandate of the university, management of the university has introduced quality education modules such as students' internship, blended learning platform and community-based experiential learning all aiming at meeting student satisfaction and churning out all-rounded graduates. According to Gloria-Barraza and Ortiz-Moreira (2012), universities should shift their focus to providing a supportive learning environment that promotes student well-being and facilitates knowledge acquisition. In summary, the broader trend of universities is to shift their focus towards creating supportive learning environments that promote student well-being and facilitate knowledge acquisition.

To improve the quality of education and implement effective policies, it is crucial to regularly assess student academic life satisfaction. Despite the importance of student academic life satisfaction for both universities and students, there seems to be a lack of empirical research on Ghanaian university students' academic life satisfaction in relation to their personal satisfaction and satisfaction with academic environment. There is a need for more research on Ghanaian university students' personal satisfaction and satisfaction with academic environment to inform the university management's efforts to promote a healthy learning environment and support student success.

Given the aforementioned considerations, the objective of this study is to employ confirmatory factor analysis (CFA) and latent profile analysis (LPA) to assess the relationship between satisfaction with the academic environment and personal satisfaction among undergraduate students at the UESD. This study is guided by two research questions:

1. Is there a significant relationship between undergraduate students' personal satisfaction and their satisfaction with the academic environment at University of Environment and Sustainable Development, UESD?
2. Can undergraduate students at UESD be classified into distinct profile memberships based on their levels of personal and academic satisfaction, and what are the characteristics of these memberships?

## Literature Review

### Student Academic Life Satisfaction

Academic life satisfaction (ALS) is a complex construct that reflects students' overall campus experiences and their adjustment to the academic environment (Nogueira, 2018). It is a dynamic concept shaped by personal attributes, relationships with peers and faculty, the quality of the curriculum and teaching, as well as the features and environment of the campus (Soares et al., 2011). For instance, Ghansah et al. (2021) underscored the critical role of classroom environment, textbook availability, tuition fees, student support, administrative efficiency, faculty relationships, expertise, staff assistance, feedback, and class size in shaping student satisfaction at Ghanaian private universities. These authors view student satisfaction as a complex concept influenced by a multitude of interconnected factors, including both personal and environmental elements, such as students' attributes, peer and faculty relationships, curriculum quality and campus features (Ghansah et al., 2021; Nogueira, 2018; Soares et al., 2011).

Academic life satisfaction is "operationally defined as the expected satisfaction in one's life in school by the fulfilment of his/her important academic goals or aspirations" (Kumar & Dileep, 2006, p.1). Academic satisfaction is a subjective evaluation of the overall educational experience, characterised as a psychological state that arises from the fulfilment or non-fulfilment of students' academic expectations (Santos et al., 2013). By understanding the range of student satisfaction levels, institutions can tailor strategies to better meet student needs and improve learning outcomes. This can lead to improvements in teaching, staff coordination, and efforts to align institutional offerings with student expectations, ultimately reducing the satisfaction gap (Soares & Almeida, 2011).

Academic satisfaction is strongly related to the quality of students' learning and is a complex interplay of institutional characteristics, the educational context, and individual students' perceptions and interpretations. For instance, Kumar and Dileep (2006) found ALS to be a significant predictor of academic achievement in social studies among secondary school pupils in Kerala. Student satisfaction is not limited to the lectures in class or guidance by tutors during the consultation hours but it includes the students' experiences while interacting with the non-academic staff, the physical infrastructure and other non-academic aspects of college life such as participation in sporting activities such as football. Thus, by understanding the range of student satisfaction levels, institutions can tailor strategies to better meet student needs and improve learning outcomes. This can lead to improvements in teaching, staff coordination, and efforts to align institutional offerings with student expectations, ultimately reducing the satisfaction gap (Soares & Almeida, 2011).

### Personal Satisfaction

There is an agreement among scholars that comparing one's actual accomplishments to one's planned results is a key determinant of perceived satisfaction (Pavot & Diener, 2008). This comparison can be applied to both general life satisfaction and specific domains such as work, family, or profession (Suldo et al., 2006). Student experiences contribute to personal fulfilment (Lent & Brown, 2008) but can also be associated with negative outcomes, including dysfunctional behaviours, stress, failure, and delayed starts. Academic satisfaction has been positively correlated with adjustment, social integration, perseverance, achievement, and overall life happiness (Lent et al., 2009; Suldo et al., 2008; Sisto et al., 2008; Suldo et al., 2006).

It can be deducted from the above discussion that personal satisfaction involves comparing one's actual achievements with desired outcomes and applies to various life domains (Sisto et al., 2008; Suldo et al., 2006). In the academic setting, personal satisfaction enhances student experiences but can be undermined by stress and failure, while academic satisfaction leads to positive outcomes like adjustment, persistence, and overall life satisfaction.

### Satisfaction with the Academic Environment

Numerous authors have examined students' satisfaction with their academic environment (Nogueira, 2018; Vanaki & Hakim, 2023; Wong & Chapman, 2023). Nogueira (2018) emphasised the importance of the academic environment in student satisfaction, highlighting factors such as course satisfaction and the overall state of the university campus. Importantly, Ramos et al. (2015) found that students who participated in leisure activities such

as football were more likely to be satisfied with their course and development opportunities compared to students who were less involved in extracurricular activities. In a similar context, Alhamad et al. (2024) found that organisational identification and institutional reputation significantly impact student satisfaction. They recommended that institutions focus on building student-university ties and enhancing their reputation.

Tarmizi and Aprillita (2024) conducted a study to evaluate the impact of academic environment satisfaction on student satisfaction. Their findings revealed a significant correlation between service quality and student satisfaction, with satisfied students indicating a willingness to recommend the institution to prospective students. The findings of Amoako and Asamoah-Gyimah (2020) indicate that the quality of instruction, availability of technology, and the overall psychological climate in the classroom are key factors influencing student satisfaction. In a recent study, Wong and Chapman (2023) found that student satisfaction with various aspects of their university experience, including the programme, teaching, facilities, support, learning, and overall life as a student, was associated with three types of interaction: formal student-student, informal student-student, and student-instructor. Contrary to earlier research suggesting the influence of the academic environment on student satisfaction, Vanaki and Hakim (2023) found that undergraduate nursing students were dissatisfied with their practical education, primarily attributing this to faculty and the educational environment.

Overall, these studies suggest that a positive academic environment, characterised by quality instruction, supportive facilities, strong student-university relationships, and opportunities for extracurricular involvement, is essential for fostering student satisfaction and success (Alhamad et al., 2024; Amoako & Asamoah-Gyimah, 2020; Nogueira, 2018; Tarmizi & Aprillita, 2024; Wong & Chapman, 2023). In other words, factors like organizational identification, institutional reputation, and service quality significantly influence student satisfaction with the course aspect of their education, but dissatisfied with the how-to education provided by academics/educators and the educational environment (Vanaki & Hakim, 2023).

## Methods

### Participants

The population of the study consisted of all undergraduate students enrolled at the University of Environment and Sustainable Development (UESD) in Ghana. At the time of the study, there were 946 students studying in the Schools of Natural and Environmental Resources, and Sustainable Development (Academic Affairs Division, 2024).

The participants of this study were 370 undergraduate students, comprising 211 males (57.0%) and 159 females (43.0%), with ages ranging from 16 to 37 years ($M = 21.4$, $SD = 3.10$). The participants were distributed across academic levels as follows: 135 (35.5%) first-year students, 85 (23.0%) second-year students, 98 (26.2%) third-year students, and 53 (14.3%) fourth-year students. Regarding accommodation, 63 students (17.0%) lived in the university hostel, 155 (41.9%) in private (accredited) hostels, 128 (34.6%) in rented houses, and 24 (6.5%) in their own homes.

### Study Design

A cross-sectional research design was employed to survey students' academic life satisfaction at a single point during the semester (Polit & Beck, 2014; Sedgwick, 2014). In line with the objectives of the study, participants were selected based on their availability in lecture rooms, making convenience sampling the most suitable method to recruit 370 undergraduate students (Sedgwick, 2014). Convenience sampling is a non-probability sampling method where participants are selected based on their availability, proximity and ease of access. It facilitates data collection when the target population is difficult to reach or when more robust sampling methods are impractical. While convenience sampling offers some advantages, it has notable limitations in terms of generalisability, as findings are often restricted to the specific sample population. Sedgwick (2014) emphasised that this method might limit the applicability of a study's findings beyond its immediate scope. In this study, researchers acknowledged that the convenience sampling approach restricted the generalisability of results, as the sample mainly consisted of university students, whose perspectives might not fully represent the broader student population's academic life satisfaction. Consequently, future studies should explore random sampling to enhance representativeness.

### Data Procedure and Instrument

Data were collected between July and August 2024 at UESD in Ghana. Participants were invited to complete a questionnaire in their respective lecture rooms for a duration of 10-15 minutes prior to the commencement of their lectures. The demographic data of the undergraduate students were computed for their gender, age, accommodation and year of study.

An eight-item academic life satisfaction scale (ALSS) was developed and tested on undergraduate students in Portugal (Nogueira et al., 2019) was adopted for this study based on the Cronbach's α internal consistency showed to be adequate (Cronbach's $\alpha = 0.80$). A two-dimensions structure construct validity was established by principal component analysis, explaining 42.90% of total variance.

To ensure that the Academic Life Satisfaction Scale (ALSS) is adapted to the Ghanaian context, a pilot test involving 25 students from the Department of Water Resources and Management at the University of Environment and Sustainable Development (UESD) confirmed the clarity, relevance and comprehensibility of the items, with a

100% item response rate and no reported difficulties or linguistic issues. Furthermore, the original eight-item ALSS, developed by Nogueira et al. (2019) for use in Portugal, was already in English, the official language of instruction in Ghana.

The psychometric evaluation of the adapted scale yielded robust reliability coefficients, with Cronbach's alpha (α) at 0.841 and McDonald's omega (ω) at 0.850. The scale exhibited satisfactory convergent validity, as demonstrated by an average variance extracted (AVE) of 0.537, as presented in Table 1. These values, exceeding the recommended thresholds of 0.7 for reliability (Hayes & Coutts, 2020) and 0.40 for AVE within each dimension (Huang et al., 2013), provide empirical support for the scale's reliability and validity. These results affirm the scale's effectiveness in the Ghanaian context, aligning with results from the original study by Nogueira et al. (2019).

Few modifications were therefore made to the scale by the authors to measure students' academic life satisfaction at UESD. For example, we introduced demographic data such as age, accommodation, level of study and gender to the questionnaire items. The ALSS includes items related to personal satisfaction and satisfaction with the academic environment. The ALSS was rated on a 4-point Likert-type scale with all items positively worded (1 = Very dissatisfied; 2 = Dissatisfied; 3 = Satisfied; 4 = Very satisfied). The instrument was adapted from Nogueira (2019) and modified to fit the Ghanaian context.

**Data Analysis**

In the present study, confirmatory factor analysis (CFA) and latent profile analysis (LPA) were performed using Jamovi 2.6.13 Version to examine and classify the relationships between personal satisfaction and satisfaction with the academic environment, as components of students' academic life satisfaction at UESD. Thus, CFA is primarily used to test hypotheses about the structure of latent variables, while LPA identifies subgroups within a population based on observed data patterns. The statistical analyses were carried out in two steps: first, CFA was used to assess the association between the variables by testing the measurement models. Second, LPA was applied to identify distinct subgroups of undergraduate students based on their academic life satisfaction. Together, these methods offer valuable insights into data validation and individual variation.

**Confirmatory Factor Analysis**

Confirmatory factor analysis (CFA) is used to validate a proposed measurement model by assessing how well observed variables represent the underlying theoretical factor variables they are intended to measure. To assess the model fit, we followed the criteria outlined by Memon et al. (2021), which included evaluating the standardised root mean square residual (SRMR), the root mean square error of approximation (RMSEA), the comparative fit index (CFI), and the Tucker-Lewis index (TLI). Models with RMSEA $\leq .05$, SRMR $\leq .05$, TLI and CFI $\geq .95$ demonstrate close fit, while RMSEA $\leq .08$, SRMR $\leq .08$, TLI and CFI $\geq .90$ indicate a reasonable fit (Steenkamp & Maydeu-Olivares, 2021). According to Hooper et al. (2008), SRMR and RMSEA values below 0.08, along with CFI and TLI values exceeding 0.90, are indicative of an acceptable model fit. In line with literature on evaluating model fit, the following indices including SRMR, RMSEA, CFI, and TLI were employed to understand how well Academic Life Satisfaction Scale (ALSS) represent the underlying theoretical factor variables.

**Latent Profile Analysis**

Latent profile analysis (LPA) is a model-based classification technique that groups individuals into homogeneous latent classes based on similarities in their scoring patterns (Lubke & Muthén, 2005), taking into account individual characteristics (Lanza & Bray, 2010). To assess the academic life satisfaction of undergraduate students at the University of Environment and Sustainable Development (UESD) in Ghana, LPA was conducted on data collected from all participants using the 8-item Academic Life Satisfaction Scale (ALSS) questionnaire.

When conducting LPA, a few issues relating to the assumptions of the statistical procedure must be met to ensure that the results obtained are valid and valuable. First, the researchers considered the sample of this study large enough for LPA since it is well above the 300 cases often advocated by previous studies. This sample size is largely in line with recommendations from Spurk et al.'s (2020) guide for using latent profile analysis and results from Nylund et al.'s (2007) simulation study, suggesting that approximately 300 - 500 participants provide a sufficient sample for LPA. Although small sample sizes are acceptable with simpler models (having fewer indicators and classes) and "well-separated" classes (Weller et al., 2020), it has been recommended that having at least 300 cases is ideal (Nylund-Gibson & Choi, 2018; Spurk et al., 2020).

The analysis was performed with the tidyLPA package in Jamovi Version 2.6.13, which allows for specifying different models to estimate parameters such as means, variances, and covariances (Rosenberg et al., 2018). It also allows for the comparison of different solutions based on the number of profiles extracted. In this study, models with one to five profiles were tested to determine the optimal number of profiles. Several criteria were used to evaluate the goodness of fit, including the Akaike Information Criterion (AIC), Adjusted Weight of Evidence (AWE), Bayesian Information Criterion (BIC), Classification Likelihood Criterion (CLC), and Kullback Information Criterion (KIC). Lower values of these criteria indicate better model fit (Ferguson et al., 2020). The best fit among the models was determined using the bootstrapped likelihood ratio test (BLRT). Additionally, model

entropy values were examined, with an entropy value above 0.8 indicating a good fit (Muthén, 2004; Tein et al., 2013). Finally, the criterion that the smallest profile should represent at least 5% of the sample was also considered (Marsh et al., 2009).

## Results and Discussion

### Reliability and Validity of Academic Life Satisfaction Scale

As presented in Table 1, reliability and validity analyses were computed for Cronbach's α, McDonald's ω, and Average Variance Extracted (AVE) for academic life satisfaction scale, which was measured using two dimensions: Satisfaction with Academic Environment (SAE) and Personal Satisfaction (PSA). These dimensions were rated on a four-point Likert scale, where 1 represented "Very dissatisfied" and 4 represented "Very satisfied".

**Table 1. Reliability and validity of academic life satisfaction scale**

| Item | Cronbach's α | McDonald's ω | AVE |
|---|---|---|---|
| SAE | 0.871 | 0.874 | 0.627 |
| PSA | 0.764 | 0.776 | 0.447 |
| Total | 0.841 | 0.850 | 0.537 |

The results showed a good reliability (α = 0.841, ω = 0.850) and an AVE of 0.537, indicating strong convergent validity. The reliability coefficients exceeded the 0.7 threshold (Hayes & Coutts, 2020), while the AVE of 0.537 was greater than 0.50 guideline outlined by Huang et al. (2013), confirming the scale's adequacy. The scale's adequacy is consistent with Nogueira et al. (2019), who also found the scale reliable and valid when assessing academic life satisfaction in Portuguese undergraduates. These consistent results across diverse settings support the scale's broader applicability in varied educational contexts, including career counselling and academic policy-making. Consequently, universities could implement routine surveys using this scale to identify areas of dissatisfaction among students and design targeted interventions (Dattey et al., 2019).

### Confirmatory Factor Analysis

*Fit measures for confirmatory factor analysis results*

To address the first research question, a confirmatory factor analysis was conducted to examine the relationship between students' satisfaction with their academic environment and their personal satisfaction fit the model. We followed the criteria outlined by Memon et al. (2021), which included evaluating the standardised root mean square residual (SRMR), the root mean square error of approximation (RMSEA), the comparative fit index (CFI), and the Tucker-Lewis index (TLI). The results of confirmatory factor analysis are shown in Table 2.

**Table 2. Fit measures for confirmatory factor analysis results**

| | | | | RMSEA 90% CI | | | | |
|---|---|---|---|---|---|---|---|---|
| CFI | TLI | SRMR | RMSEA | Lower | Upper | $\chi^2$ | df | p |
| 0.972 | 0.958 | 0.0387 | 0.0710 | 0.0493 | 0.0934 | 54.4 | 19 | <.001 |

The results indicated that the model achieved satisfactory fit indices: Comparative Fit Index (CFI = 0.972), Tucker-Lewis Index (TLI = 0.958), standardised root mean square residual (SRMR = 0.0387), and root mean square error of approximation (RMSEA = 0.071), supporting model acceptability. According to Hooper et al. (2008), SRMR and RMSEA values below 0.08, as well as CFI and TLI values exceeding 0.90, are indicative of an acceptable model fit. Similarly, Steenkamp and Maydeu-Olivares (2021) suggest that models with RMSEA ≤ .05, SRMR ≤ .05, and both TLI and CFI ≥ .95 demonstrate close fit.

The results of this study support the hypothesis that personal satisfaction and academic environment satisfaction significantly predict students' overall campus experience and academic adjustment (Nogueira, 2018; Ramos et al., 2015). These results align with Soares et al.'s (2011) assertion that personal attributes, peer and faculty relationships, curriculum quality, teaching, and campus features influence academic life satisfaction. Furthermore, universities and colleges can use these findings to design targeted interventions aimed at improving students' satisfaction with their personal and academic environments.

*Standardised Factor Loadings for Students Academic Life Satisfaction*

The results, as presented in Table 3 and Fig. 1, revealed that all factor loadings were statistically significant (p < .001). For the Satisfaction with Academic Environment (SAE) factor, standardised factor loadings ranged from 0.710 to 0.875, with SAE4 demonstrating the strongest association with the latent factor (Estimate = 0.454, SE = 0.0224, Z = 20.2, p < .001, Stand. Estimate = 0.875). Similarly, for the Personal Satisfaction (PSA) factor, standardised loadings ranged from 0.578 to 0.820, with PSA4 being the most robust indicator (Estimate = 0.407, SE = 0.0241, Z = 16.9, p < .001, Stand. Estimate = 0.820). These findings validate the proposed measurement model, highlighting significant loadings of observed variables on their respective latent factors.

The results support prior research by Kwakwa et al. (2023), who found a relationship between student satisfaction and academic performance in the College of Education in Ghana. Moreover, the findings align with Lent and Brown's (2008) assertion that personal satisfaction positively shapes student experiences. Nogueira (2018) also emphasised the role of academic environment factors, such as course satisfaction and campus quality, in enhancing student satisfaction. The findings suggest that universities and colleges should focus on improving both academic environments and personal satisfaction factors to enhance student experiences and academic performance. Practical steps could include refining academic programmes to ensure course satisfaction, establishing mentorship programmes to strengthen faculty-student relationships, and upgrading campus facilities to create a welcoming and conducive learning environment.

**Table 3. Standardised factor loadings for students' academic life satisfaction**

| | | | | 95% Confidence Interval | | | | |
|---|---|---|---|---|---|---|---|---|
| Factor | Indicator | Estimate | SE | Lower | Upper | Z | p | Stand. Estimate |
| SAE | SAE1 | 0.415 | 0.0276 | 0.361 | 0.469 | 15 | <.001 | 0.71 |
| | SAE2 | 0.477 | 0.026 | 0.426 | 0.528 | 18.4 | <.001 | 0.817 |
| | SAE3 | 0.477 | 0.0282 | 0.421 | 0.532 | 16.9 | <.001 | 0.776 |
| | SAE4 | 0.454 | 0.0224 | 0.41 | 0.498 | 20.2 | <.001 | 0.875 |
| PSA | PSA1 | 0.397 | 0.0288 | 0.34 | 0.453 | 13.8 | <.001 | 0.693 |
| | PSA2 | 0.326 | 0.0275 | 0.272 | 0.379 | 11.8 | <.001 | 0.619 |
| | PSA3 | 0.379 | 0.0344 | 0.311 | 0.446 | 11 | <.001 | 0.578 |
| | PSA4 | 0.407 | 0.0241 | 0.359 | 0.454 | 16.9 | <.001 | 0.82 |

*Factor Covariances for Academic Life Satisfaction*

As indicated in Table 4 and Figure 1, the results of the confirmatory factor analysis (CFA) revealed a statistically significant positive covariance between the Satisfaction with Academic Environment (SAE) and Personal Satisfaction with Academics (PSA) factors (Estimate = 0.579, SE = 0.045, Z = 12.9, $p < .001$, Stand. Estimate = 0.579). The 95% confidence interval for the covariance ranged from 0.491 to 0.667, demonstrating a moderate positive relationship between the two latent constructs. This result indicates that an increase in satisfaction with the academic environment is associated with an increase in personal satisfaction with academics.

The findings are consistent with previous research. For instance, Tarmizi and Aprillita (2024) identified a significant correlation between service quality and student satisfaction, highlighting that satisfied students were more likely to recommend their institution to prospective students. Similarly, Wong and Chapman (2023) emphasised that student satisfaction, across aspects such as program quality, teaching, facilities, support, learning, and the overall student experience, was influenced by formal student-student, informal student-student, and student-instructor interactions. The findings suggest that institutions should prioritise improving the quality of academic environments while fostering personal satisfaction through enhanced interaction opportunities. Practical measures could include student relationships both formal and informal interactions among students and improving service quality. These initiatives not only contribute to better academic outcomes but also encourage positive recommendations, enhancing the institution's reputation.

**Table 4. Factor covariances for academic life satisfaction**

| | | | | 95% Confidence Interval | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Estimate | SE | Lower | Upper | Z | p | Stand. Estimate |
| SAE | SAE | 1.000[a] | | | | | | |
| | PSA | 0.579 | 0.045 | 0.491 | 0.667 | 12.9 | <.001 | 0.579 |
| PSA | PSA | 1.000[a] | | | | | | |

[a] fixed parameter

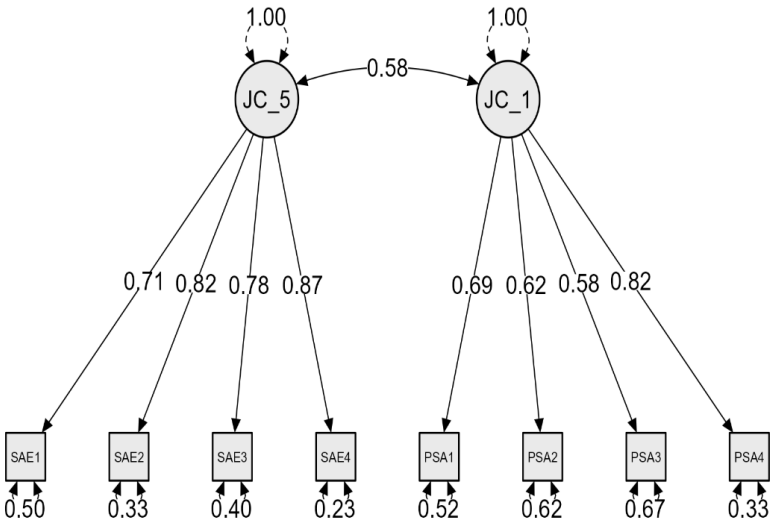


Figure.1. Path model of students' academic life satisfaction

**Latent Profile Analysis**

Latent Profile Analysis (LPA) was performed to determine the optimal number of profiles representing undergraduate students' academic life satisfaction, as displayed in Table 5. Models with two to five classes were evaluated using multiple fit indices, including the Akaike Information Criterion (AIC), Approximate Weight of Evidence (AWE), Bayesian Information Criterion (BIC), Classification Likelihood Criterion (CLC), and Kullback Information Criterion (KIC). Among these, the 4-class solution demonstrated the best fit, characterised by the lowest AIC (2703), BIC (2941), and CLC (2583) values, along with a high entropy value (1.00), which indicated clear and reliable classification of students into distinct groups. According to Akogul and Erisoglu (2017), prioritising models with better fit indices (AIC, AWE, BIC, CLC, KIC) led to the selection of the 4-class solution as the most appropriate representation of the data. The Bootstrapped Likelihood Ratio Test (BLRT) further supported this decision, showing the 4-class solution as significantly better than both the 3-class and 5-class models (BLRT = 544.49, p = .0099). Additionally, consistent with the recommendations of Marsh et al. (2009), a minimum class size of 5% was upheld, favouring the 4-class model over the 5-class model, as the latter included a profile with just 3% of cases. This approach is aligned with Spurk et al.'s (2020) recommendation to prioritise parsimonious models with adequately sized classes for greater statistical reliability and precision.

The results of this study identify distinct student profiles, offering valuable insights for developing tailored interventions to meet the diverse needs of students. Dattey et al. (2019), advocated that universities could implement routine surveys using this scale to identify areas of dissatisfaction among students and design targeted interventions to enhance students' satisfaction with their academic environment.

**Table 5. Fit indices for different models with number of latent profiles**

| Classes | AIC | AWE | BIC | CLC | KIC | BLRT_val | BLRT_p | Entropy |
|---|---|---|---|---|---|---|---|---|
| 2 | 3717 | 4036 | 3815 | 3669 | 3745 | 1370.22 | 0.0099 | 1 |
| 3 | 3536 | 3970 | 3669 | 3470 | 3573 | 198.99 | 0.0099 | 0.981 |
| 4 | 3010 | 3559 | 3178 | 2926 | 3056 | 544.49 | 0099 | 1 |
| 5 | 2985 | 3650 | 3189 | 2883 | 3040 | 42.54419 | 0.0099 | 0.998 |

**Percentage of Latent Profile**

To better understand the distribution of students across the 4- latent profiles, we calculated the percentage of participants falling into each group. This was done by analysing their responses to the 4-point Likert scale items used to construct the latent profile model.

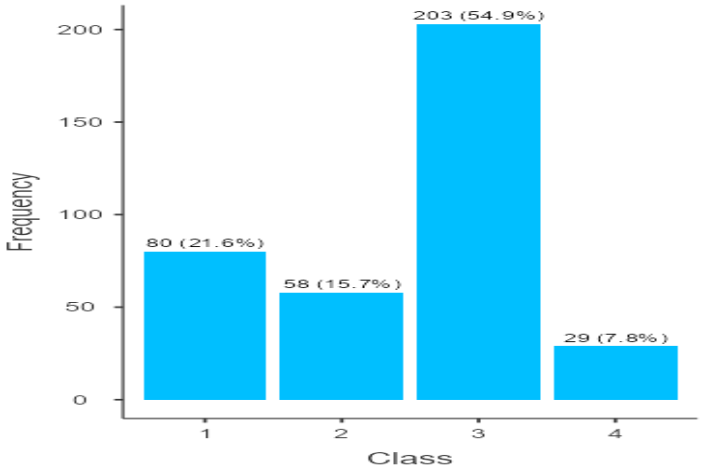


Figure. 2. Percentage of latent profile

Latent profile analysis, as depicted in Figure 2, revealed four distinct student profiles regarding academic life satisfaction: Class 1 (12.6%), Class 2 (15.7%), Class 3 (54.9%), and Class 4 (7.8%). All classes exceeded the recommended minimum of 5% of the sample, indicating adequate class sizes (Nylund-Gibson & Choi, 2018). Notably, Class 3 represented the largest and most satisfied group, highlighting significant variability in academic life satisfaction among the student population. The findings corroborate with Wong and Chapman's (2023) study. They grouped students' satisfaction with the university experience into three interaction as formal student-student, informal student-student, and student-instructor. Consistent with the findings of the study, the results show the distribution of the student population amongst the four classes. For example, students in Class 4, representing the lowest satisfaction group, may benefit from intensive academic counselling, peer support networks, and stress management workshops. Conversely, Class 3, the highest satisfaction group, may benefit from leadership development opportunities or advanced academic enrichment programmes. Thus, university management should develop targeted interventions tailored to the specific needs and characteristics of each profile.

These findings reinforce the importance of cultivating supportive learning environments, as underscored by Gloria-Barraza and Ortiz-Moreira (2012), to promote student well-being and facilitate knowledge acquisition. Consistent with Gloria-Barraza and Ortiz-Moreira's (2012) findings, universities should focus on creating a supportive learning environment that promotes student well-being and facilitates knowledge acquisition. This could involve improving campus facilities, providing access to mental health services, and promoting inclusive classroom practices.

## Conclusion

This study aimed to investigate the association between undergraduate students' personal satisfaction (PSA) and satisfaction with the academic environment (SAE) at UESD and to identify distinct latent classes based on these factors. Confirmatory factor analysis (CFA) was conducted to evaluate the model's fit. The results indicated a good fit, with the Comparative Fit Index (CFI = .972) and Tucker-Lewis Index (TLI = .958) demonstrating excellent fit. Additionally, the standardised root mean square residual (SRMR = .039) confirmed a strong fit, and the root mean square error of approximation (RMSEA = .071) fell within an acceptable range. Together, these indices supported the model's suitability in representing the data. According to Hooper et al. (2008), SRMR and RMSEA values below .08, along with CFI and TLI values exceeding .90, are indicative of acceptable model fit.

Consistent with the hypothesis, personal satisfaction and satisfaction with the academic environment were found to significantly predict students' overall campus experiences and academic adjustment. A statistically significant positive covariance was observed between PSA and SAE factors (Estimate = .579, SE = .045, Z = 12.9, $p < .001$, Standardised Estimate = .579). This finding highlights the need to address both academic and personal satisfaction to enhance student experiences. Accordingly, universities should consider strategies such as improving course satisfaction, fostering strong faculty-student relationships through mentorship programmes, and upgrading campus facilities to create an inclusive and supportive learning environment.

Latent profile analysis (LPA) was employed to identify subgroups of students based on their levels of academic and personal satisfaction. The analysis identified four distinct profiles: low satisfaction (12.6%), moderate satisfaction (15.7%), high satisfaction (54.9%), and mixed feelings (7.8%). These findings suggest targeted interventions are necessary. For students in the low-satisfaction group, strategies such as academic counselling,

peer support initiatives, and stress management workshops are recommended. For the high-satisfaction group, opportunities for leadership development and advanced academic enrichment could sustain and enhance their positive experiences. Students in the mixed-feelings group would benefit from focused interventions to identify and address the sources of their ambivalence.

## Recommendations

Based on the findings of the study, it is recommended that UESD prioritise initiatives to enhance student satisfaction and overall well-being. This can be achieved through:

The university should improve the academic environment by enhancing classroom resources, providing more accessible study spaces, and fostering better student-faculty interactions. This would positively impact student satisfaction and overall academic experience.

It is recommended the university should enhance students' academic advising, counselling, and peer mentoring, to help students, especially those with lower satisfaction levels, adjust to campus life and feel more connected to the university community.

The study recommends that future research should explore additional factors that may influence academic life satisfaction, such as financial support, commuting challenges, and other demographic variables. Understanding these nuances will enable UESD to implement more specific and impactful interventions to enhance overall student well-being and success.

The study recommends that university management implement regular student academic satisfaction scale to measure satisfaction levels for the purposes of identifying institutional weaknesses as well as providing prospective students with information about the institution.

**Acknowledgements or Notes**

The authors received no financial support for the research and/or authorship of this article.

**Author (s) Contribution Rate**

Mr. Bosomtwe contributed 60% of the writing and started the conceptualised ideas, the method and data analysis. Ms. Ampong contributed 40% with academic writing, the method and the conclusion, and the overall final reading of the article.

**Declaration of Conflicting Interests**

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

**Ethics approval**

The researchers received ethical clearance from the Research Committee of the University of Environment and Sustainable Development in Ghana. The researchers followed human ethics in conducting social science research as outline by the Research Committee of the University of Environment and Sustainable Development in Ghana.

## References


Alhamad, A. M., Elnahaiesi, M. F. B., & Baadhem, A. M. S. (2024). The effect of perceived quality, student life social identification on student satisfaction with moderator role of organizational identification. *International Research Journal on Advanced Engineering Hub (IRJAEH)*, *2*(04), 1075-1086.

Almeida, L. S., Soares, A. P., & Ferreira, J. A. (2002). Academic Experience Questionnaire (QVA-r): Evaluation of the adjustment of university students. *Psychological Assessment*, *2*, 81-93.

Akogul, S., & Erisoglu, M. (2017). An approach for determining the number of clusters in a model-based cluster analysis. *Entropy*, *19*(9), 452.

Arambewela, R., & Hall, J. (2009). An empirical model of international student satisfaction. *Asia Pacific Journal of Marketing and Logistics*, *21*(4), 555-569.

Atalayin, C., Balkis, M., Tezel, H., Onal, B., & Kayrak, G. (2015). The prevalence and consequences of burnout on a group of preclinical dental students. *European Journal of Dentistry*, *9*(03), 356-363.

Asadizaker, M., Abedsaeedi, Z., Abedi, H., Alijanirenani, H., Moradi, M., & Jahani, S. (2015). Improvement of the first training for baccalaureate Nursing students–a mutual approach. *Global Journal of Health Science*, *7*(7), 79.

Barraza, C. G., & Ortiz Moreira, L. (2012). Factors related to quality of life and satisfaction in nursing students. *Ciencia Y Enfermería*, *18*(3), 111-119.

Chen, F. F. (2007). Sensitivity of goodness of fit indexes to lack of measurement invariance. *Structural Equation Modelling: A Multidisciplinary Journal*, *14*(3), 464-504.

Dattey, K., Westerheijden, D. F., & Hofman, W. H. A. (2019). Compliance with accreditation measures in Ghanaian universities: Students' perspectives. *Quality in higher education*, *25*(3), 304-323.

Ghansah, B., Andoh, J. S., Gbagonah, P., & Okogun-Odompley, J. N. (2021). The Determinant of Student Satisfaction in Academic and Administrative Services in Private Universities. In *Research Anthology on Preparing School Administrators to Lead Quality Education Programmes* (pp. 1534-1551). IGI Global.

Guerra-Martín, M. D., Cano-Orihuela, A., Martos-García, R., & Ponce-Blandón, J. A. (2021). Translation and first pilot validation study of the "Undergraduate Nursing Student Academic Satisfaction Scale" questionnaire to the Spanish context. *International Journal of Environmental Research and Public Health*, *18*(2), 423.

Hakim, A. (2014). Nursing students' satisfaction about their field of study. *Journal of advances in medical education & professionalism*, *2*(2), 82.

Hayes, A. F., & Coutts, J. J. (2020). Use omega rather than Cronbach's alpha for estimating reliability. But…. *Communication Methods and Measures*, *14*(1), 1-24.

Hooper, D., Coughlan, J., & Mullen, M. R. (2008). Structural equation modelling: Guidelines for determining model fit. *Electronic Journal of Business Research Methods*, *6*(1), 53-60.

Huang, C. C., Wang, Y. M., Wu, T. W., & Wang, P. A. (2013). An empirical analysis of the antecedents and performance consequences of using the Moodle platform. *International Journal of Information and Education Technology*, *3*(2), 217.

Hughes, D. J., Adie, J. W., Kratsiotis, I. K., Bartholomew, K. J., Bhakta, R., & Martindale, J. (2023). Dark personality traits and psychological need frustration explain future levels of student satisfaction, engagement, and performance. *Learning and Individual Differences*, *103*, 102-273.

Helgesen, Ø., & Nesset, E. (2007). Images, satisfaction and antecedents: Drivers of student loyalty? A case study of a Norwegian university college. *Corporate Reputation Review*, *10*, 38-59.

Ilias, K., & Nor, M. M. (2012). Relationship between quality of life, academic behaviour and student motivation in Teachers' Training Institute, Malaysia. *Academic Research International*, *2*(2), 421.

Jamovi Project (2024). Jamovi. (Version 2.6) [Computer Software]. Retrieved from https://www.jamovi.org.

Kumar, S. P. K., & Dileep, P. (2006). *Academic life satisfaction scale and its effectiveness in predicting academic success.* (ERIC Document Reproduction Service No. ED491869). Retrieved from ERIC database.

Kwakwa, E., Adiyaa, O., & Ras Kumabia, F. K. (2023). Relationship between satisfaction and academic performance of students at the College of Education. *International Journal of Rehabilitation & Special Education*, *3*(2).

Lanza, S. T., & Bray, B. C. (2010). Transitions in drug use among high-risk women: an application of latent class and latent transition analysis. *Advances and applications in statistical sciences*, *3*(2), 203.Lent, R. W., & Brown, S. D. (2008).

Marsh, H. W., Muthén, B., Asparouhov, T., Lüdtke, O., Robitzsch, A., Morin, A. J., & Trautwein, U. (2009). Exploratory structural equation modelling, integrating CFA and EFA: Application to students' evaluations of university teaching. *Structural Equation Modelling: A Multidisciplinary Journal*, *16*(3), 439-476.

Memon, M. A., Ramayah, T., Cheah, J.-H., Ting, H., Chuah, F., & Cham, T. H. (2021). PLS-SEM statistical programs: a review. *Journal of Applied Structural Equation Modelling*, 5(1), 1-14.

Muthén, B. (2004). Latent variable analysis. *Handbook of quantitative methodology for the social science/Sage*.

Nogueira, M. J. (2018). Measuring Academic Life Satisfaction in Portuguese Students. *Nursing & Healthcare International Journal*, vol.2 (1), 1-3.

Nogueira, M. J., Antunes, J., & Sequeira, C. (2019). Development and psychometric study of the academic life satisfaction scale (ALSS) in a higher education students' sample. *Nursing & Healthcare International Journal*, *3*(2), 1-8.

Nylund-Gibson, K., & Choi, A. Y. (2018). Ten frequently asked questions about latent class analysis. *Translational Issues in Psychological Science*, *4*(4), 440.

Onditi, E. O., & Wechuli, T. W. (2017). Service quality and student satisfaction in higher education institutions: A review of literature. *International journal of scientific and research publications*, *7*(7), 328-335.

Pavot, W., & Diener, E. (2008). The satisfaction with life scale and the emerging construct of life satisfaction. *The journal of positive psychology*, *3*(2), 137-152.

Polit, D. F., & Beck, C. T. (2010). *Essentials of nursing research: Appraising evidence for nursing practice*. Lippincott Williams & Wilkins.

Ramos, A. M., Barlem, J. G. T., Lunardi, V. L., Barlem, E. L. D., Silveira, R. S. D., & Bordignon, S. S. (2015). Satisfaction with academic experience among undergraduate nursing students. *Texto & Contexto-Enfermagem*, *24*(1), 187-195.

Sam, D. L., Tetteh, D. K., & Amponsah, B. (2015). Satisfaction with life and psychological symptoms among international students in Ghana and their correlates. *International Journal of Intercultural Relations*, *49*, 156-167.

Sedgwick, P. (2014). *Cross sectional studies: Advantages and disadvantages*. BMJ, 348, g2276.

Sisto, F. F., Muniz, M., Bartholomeu, D., Pasetto, N. S. V., Oliveira, A. F. D., & Lopes, W. M. G. (2008). Study to the construction of an academic satisfaction scale to college students. *Avaliação Psicológica*, *7*(1), 45-55.

Soares, A. P., & Almeida, L. S. (2011). Academic satisfaction questionnaire. *Instruments and Contexts of Psychological Evaluation*, 103-124.

Spurk, D., Hirschi, A., Wang, M., Valero, D., & Kauffeld, S. (2020). Latent profile analysis: A review and "how to" guide of its application within vocational behaviours research. *Journal of Vocational Behaviours*, *120*, 103445.

Steenkamp, J. B. E., & Maydeu-Olivares, A. (2021). Best practices for structural equation modelling in marketing. *Journal of Marketing Research*, *58*(3), 429-458.

Suldo, S. M., & Shaffer, E. J. (2008). Looking beyond psychopathology: The dual-factor model of mental health in youth. *School Psychology Review*, *37*(1), 52-68.

Tarmizi, A., & Aprillita, D. (2024). Analysis of student satisfaction with learning process facilities and services. *Jurnal Scientia*, *13*(01), 53-58.

Tein, J. Y., Coxe, S., & Cham, H. (2013). Statistical power to detect the correct number of classes in latent profile analysis. *Structural Equation Modelling: A Multidisciplinary Journal*, *20*(4), 640-657.

Vanaki, Z., & Hakim, A. (2023). Students' Satisfaction of Nursing Education: A Qualitative Study. *SAGE Open*, *13*(2), 21582440231169471.

Wong, W. H., & Chapman, E. (2023). Student satisfaction and interaction in higher education. *Higher Education*, *85*(5), 957-978.

International Journal of Contemporary Educational Research
Volume 12, Number 1, March 2025, Page 102-122 Article Type: Research Article

# Web 3.0 and the Metaverse: Transformative Impacts on Education

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**Abstract**
This study aims to explore Web 3.0 technology, a transformative internet evolution that has just begun impacting our lives and is expected to play a pivotal role in shaping the future, alongside the Metaverse and its potential applications in education. Through insights gathered from five field experts via semi-structured interviews, this study also aims to clarify how these advancements might influence educational practices. For this purpose, semi-structured interviews were conducted with five experts in the relevant fields using a validated and reliable interview form. In this phenomenological study, data obtained from participants were analyzed using descriptive analysis techniques. The analysis identified the main themes of "Transformation to Web 3.0," "The Metaverse World," "Education in the Metaverse Environment," and "Requirements for Education through the Metaverse," each with several important sub-themes. The findings suggest that the transition from Web 1.0 to Web 2.0 brought about significant changes, and even greater transformations are expected in the transition from Web 2.0 to Web 3.0. Web 3.0, also known as the Semantic Web, is expected to create a digital environment where web technologies become more secure, decentralized, and integrated within immersive virtual worlds. Findings also indicate that while current virtual learning environments offer experiences similar to those in the Metaverse, the widespread adoption of Web 3.0 is expected to bring a vastly different and more immersive experience. Additionally, the implementation of Web 3.0 and Metaverse will likely require robust technical knowledge, infrastructure, user training, and high-speed internet connectivity.

**Keywords:** Web 3.0, Metaverse, Education, Virtual Reality, Technology, Phenomenological Research

**Citation**
Hanbay-Tiryaki, S. & Balaman, F. (2025). Web 3.0 and the Metaverse: Transformative Impacts on Education. *International Journal of Contemporary Educational Research, 12*(1), 102-122. https://doi.org/10.52380/ijcer.2025.12.1.756

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|---|---|
| Received | 15.11.2024 |
| Accepted | 05.03.2025 |
| Publication | 28.03.2025 |
| Peer-Review | Double anonymized - Double Blind |
| Plagiarism Checks | Yes - iThenticate |
| Conflicts of Interest | The author(s) has no conflict of interest to declare. |
| Complaints | editor@ijcer.net |
| Grant Support | The author(s) acknowledge that they received no external funding in support of this research. |


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## Introduction

The concept of the "Metaverse," which has attracted increasing attention in recent years, gained even more prominence following Mark Zuckerberg's announcement of Facebook's rebranding to Meta. According to Lee et al. (2021), the Metaverse—originating from the words "meta" (beyond) and "universe" —is characterized as a "digital big bang," representing a virtual universe where users engage and interact via avatars. The Metaverse encompasses various sectors integral to daily life, such as finance, business, art, law, fashion, social networking, shopping, gaming, and entertainment, attracting significant interest and progressing rapidly through both individual and collective contributions. Its decentralized structure allows for the development of distinct experiences tailored to each sector's foundational principles and operational frameworks, further enhancing its unique and adaptive nature (Yılmaz & Ceranoğlu, 2022).

The transfer of numerous daily activities from the physical world to the virtual universe suggests that the Metaverse will significantly find its place in individuals' real lives. For instance, in the Second Life Metaverse, permanent digital museums and art galleries have been established within the context of cultural activities (Tasa, 2009). In the Decentraland Metaverse, users have been able to purchase NFTs (Non-Fungible Tokens) and participate in experiences similar to real-world festivals (Decentraland, 2022). Furthermore, brands such as Channel, Louis Vuitton, Nike, Adidas, and Gucci have launched digital products like NFT clothing and shoes for Metaverse avatars (Thompson, 2021). Additionally, the capital of South Korea, Seoul, has begun developing content to establish "Metaverse Seoul," a pioneering virtual city worldwide, offering various opportunities such as festivals, historical and tourist excursions, and public services (Gaubert, 2021). These developments within the Metaverse have also led to the emergence of new professions, such as virtual real estate specialists, risk management experts, blockchain developers, digital detectives, and cybersecurity specialists, while also prompting revisions in the job descriptions of some existing professions (Sözcü, 2022). To better understand the structure of the Metaverse, it is essential to examine the concept of Web 3.0, which forms its foundation.

### Web 3.0 (Semantic Web)

The internet, initially developed in the 1950s for the purpose of military communication during potential wartime, has evolved through various developmental phases to arrive at its current Web 3.0 version. During the era of Web 1.0, known as the introductory phase of the internet, users could not interact with websites; information was merely distributed from a server computer to numerous client computers. With the advent of Web 2.0, it became possible for users to interact with each other as well as with websites. Platforms such as Facebook, Twitter, YouTube, and Blogger enabled users to share their information and thoughts and engage with other users without requiring any programming skills.

Thus, Web 2.0 marked a significant advancement in the evolution of the internet by allowing users to manipulate content on server computers and share it through those servers, distinguishing it from Web 1.0. Subsequently, as societal needs changed, Web 2.0 made way for the emergence of Web 3.0 (Bektaş, 2012; Yalın, 2001). The following table presents the differences between Web 1.0, Web 2.0, and Web 3.0, as given in Grayscale Research's 2021 report on Metaverse Web 3.0 Virtual Cloud Economies:

Table 1. Comparative analysis of Web (Grayscale Research, 2021)

| | **Web 1.0** | **Web 2.0** | **Web 3.0** |
|---|---|---|---|
| **Interaction** | Read | Read– Write | Read-Write-Own |
| **Medium** | Static text | Interactive Content | Virtual Economies |
| **Organization** | Companies | Platforms | Networks |
| **Infrastructure** | Personal Computers | Cloud & Mobile | Block Chain Cloud |
| **Control** | Decentralized | Centralized | Decentralized |

However, with Web 3.0, which was created with the completion of the development of Web 2.0 and carries some of the effects of Web 1.0, and is a decentralized technology that is not permanently connected to a certain center, it is possible to automatically find and process data in accordance with the standards determined within the data pool in question. The ongoing evolution of the internet positions it as a significant data reservoir that delivers information and documents to users. However, due to its centralized structure, which is not aligned with the current era, it is designed as a closed system, limiting its data acquisition to specific and fixed sources. However, with the completion of Web 2.0 development, Web 3.0 has emerged as a decentralized technology that retains some influences from Web 1.0. This new iteration enables the automatic discovery and processing of data according to established standards within the data reservoir. The initial manifestations of this transformation can be observed in social media platforms, advertising, and the creation of dynamic web pages (Bektaş, 2012).

The semantic web enables inference and interpretation of information found on websites. This type of web facilitates the development of software systems known as intelligent agents (Bektaş, 2012; Yiğit et al., 2000). This

facilitates the creation of ontologies, an abstract model frequently used in education, to present knowledge within a semantic structure (Antoniou & Van Harmelen, 2008; Choe, 2006).
The aim of Web 3.0 technology is to structure content on websites so that it can be easily understood and processed not only by people but also by computers. When considered from an educational perspective, Web 3.0 provides all the tools necessary for remote learning systems, including the design phase. Additionally, Web 3.0 shapes remote learning systems by enabling customization of teaching based on user needs and preferences, allowing for learning content to be reused across various e-learning platforms, creating universal content resources, and ensuring standardization. In other words, Web 3.0 in education focuses on interoperability, shareability, and reusability. Thus, remote learning systems built on this foundation will be able to provide educators and learners with more flexible and effective content, thereby accelerating, simplifying, and personalizing the educational experience (Aroyo & Dicheva, 2004; Lassila et al., 2001; Priya et al., 2012). Another concept closely related to Web 3.0 and its impacts on education is the Metaverse, which is grounded in Web 3.0 technology and is explored in this study for its educational applications.

**Metaverse**

The concept of the Metaverse, which has recently gained significant attention as leading technology companies describe it as the future of the internet, was first introduced by author Neal Stephenson in his 1992 novel Snow Crash. In this novel, the Metaverse is defined as a three-dimensional virtual world where people interact with each other and their surroundings, unrestricted by the physical boundaries of the real world (Lee et al., 2021). Then following CitySpace, the first Metaverse, which was active between 1993 and 1996, numerous other Metaverses emerged. One of the most popular of them is Second Life developed in 2003. Second Life provided users with a second world where they could create and customize their own avatars according to their preferences. In this virtual world, many universities, cities, artists, and individuals established virtual entities, enabling various interactions such as socializing, purchasing real estate, designing, and even receiving university education. Remarkably, Second Life even developed its own economy with the Linden Dollar currency (Narin, 2021).
Today, the concept of the Metaverse has gained even more prominence following Mark Zuckerberg's announcement that Facebook would rebrand as Meta. Google Trends reports from October 2021 show a significant increase in searches related to the Metaverse on both Google's search engine and YouTube. Similarly, although the number of academic publications on the topic has fluctuated over the years, there has been a noticeable rise in recent years in publications focused on the Metaverse (Narin, 2021).
Lee et al. (2021) define the Metaverse as a three-dimensional virtual universe and refer to the period from 2011 to 2017, marked by the presence of smartphones and smart wearable technologies in virtual worlds, as the era of immersive virtual environments in smartphones and wearable devices. During this period, augmented reality and virtual reality technologies such as Pokémon Go, VR Chat, and Super Mario AR emerged, drawing attention to the technologies related to the Metaverse.
In recent years, the concept of bitcoin, which has been frequently encountered particularly due to financial developments, is also related to the blockchain concept that can be examined under the elements of the Metaverse. Blockchain is a database that enables secure and consistent transactions made by numerous participants in a decentralized network (Beck, 2018). In other words, each transaction conducted in this database is recorded and shared by other participants in the network, creating a decentralized, distributed data structure (Tanrıverdi et al., 2019). The first currency of this structure was named Bitcoin. Another concept often encountered that is related to blockchain and cloud systems in the Metaverse is NFT. An NFT is a unique digital asset that can be bought and sold but cannot be replicated.
Lee et al. (2021), describing the period from 2017 onwards as the new era of the Metaverse, have articulated the Metaverse based on ecosystem and technological elements as follows:

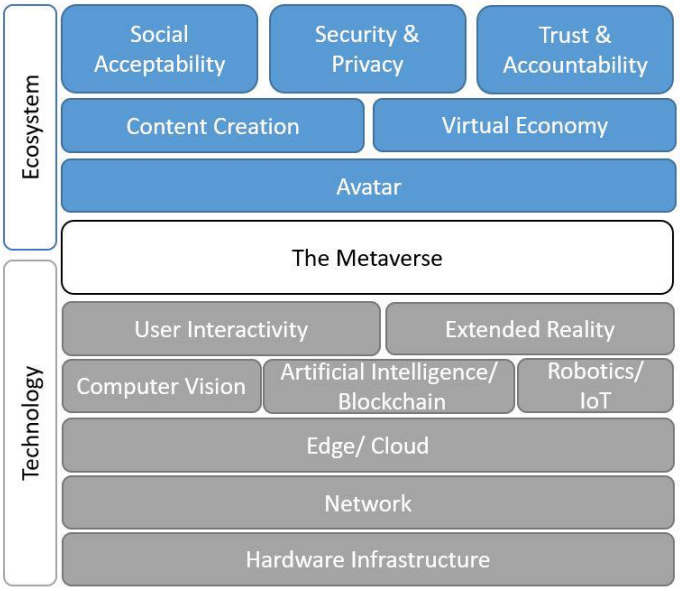



Figure 1. Metaverse ecosystem and technology elements (Lee et al., 2021)

As indicated in the Figure 1, the important technologies for the Metaverse are user interaction, extended reality technology (a concept that includes the concepts of Augmented Reality (AR), Virtual Reality (VR) and Mixed Reality (MR)), computer vision, artificial intelligence/blockchain, robotics/Internet of things, edge/cloud computing, computer networks and hardware infrastructure. The elements of the Metaverse ecosystem are stated as social acceptability, security and privacy, trust and accountability, content creation, virtual economy and avatar.

**Education and Metaverse**

Metaverse has emerged as a significant factor not only in finance, gaming, and social networking but also in the education sector. In addition to the augmented reality and virtual reality technologies that are currently being widely used in education, it is now possible to create a virtual education system, or a metaversal education, that incorporates various next-generation technologies such as artificial intelligence, blockchain technology, and 5G/6G internet speeds (Akpınar & Akyıldız, 2022; Damar, 2021). Various applications of this concept already exist today. In the Metaverse environment, rich and effective learning experiences based on experiential learning, course content, and scenarios, allowing for user interaction, simulation, and trial-and-error method. By conducting education in the Metaverse, it becomes possible to build learning environments in the digital world instead of the physical one, which can enhance learners' motivation through real experiences. Metaverse environments offer a wealth of reusable and customizable content. These environments can save time, space, and budget in education (Damar, 2021). Moreover, the accessibility, diversity, and equity provided by metaversal education, along with its more humane characteristics, can lead to many positive pedagogical outcomes (Duan et al., 2021).

Considering that informatics and game-based simulator applications are suitable, enjoyable, and motivating for 21st-century students, referred to as Generation Z or digital citizens (Tokel & Topu, 2017; Gennett, 2010), well-structured theoretical and pedagogical foundations of metaversal education can transfer Generation Z students into the learning environments of the Digital Age (Ünlü, 2019). In this context, metaversal education, which combines play and education, can create a new pedagogical field, potentially reducing the tension between school, family, and social media, making school more engaging for Generation Z (Akpınar & Akyıldız, 2022).

Kye et al. (2021) stated that education can be provided by overcoming spatial and physical boundaries through mirror worlds (Choi & Kim, 2017) where the real world can be reproduced when the subjects are suitable, and that learning and education processes can be improved with life diary records where learning-related data can be collected from online learning tools, provided that the security of personal data is ensured. With 3D virtual games, learners can develop strategic thinking, comprehensive thinking and problem-solving skills and acquire the skills needed for the physical world. In education carried out in the Metaverse environment with technologies such as augmented reality, avatar, mirror world, etc., active and effective learning can be achieved by supporting learning processes in a holistic way visually, auditorily and kinesthetically (Göçen, 2022; Lee & Hwang, 2022). Educational trips, life and industry practices in metaversal educational environments also offer students a rich life experience (Hazneci, 2019). The most important feature that distinguishes metaversal education from educational processes where other three-dimensional virtual environments or augmented reality etc. technologies are used is that it allows students to create a virtual community where they can socially interact with each other (Lee, 2021).

Metaversal educational environments can meet the teaching and learning needs of teachers and students in both the physical and virtual worlds at the same time and provide immersive and interactive learning that also supports individual learning (Guo & Gao, 2022; Kye et al., 2021). In metaversal educational environments where the teacher is the learning environment manager (Akpınar & Akyıldız, 2022), students will not only be in the role of an observer but also an active participant in the process through the avatar that can be used. Additionally, for the first time in education, students will have the opportunity for significant individualization, as they can freely choose their physical characteristics such as eye color, hair color, body image, and the clothes they wear (Salmon & Edirisingha, 2010). In metaversal education, activities are reusable and editable, and the student can reproduce the activity (Akpınar & Akyıldız, 2022; Damar, 2021). The student can take responsibility in the personal learning process, supporting his/her self-efficacy and self-learning. Therefore, since the senses of vision, hearing and touch are included in the educational processes, metaversal education turns into a "human-centered informatics application" (Duan et al., 2021).

It is believed that the Metaverse environment, which enables the creation of realistic learning environments, will greatly contribute to education. However, for education to be successful within this framework, collaboration between qualified education specialists and engineers is essential (Göçen, 2022). The gaps and uncertainties in the theoretical, psychological, pedagogical, and sociological foundations of metaversal education, as well as ethical issues such as copyright for the digital course content to be created, can hinder success (Akpınar & Akyıldız, 2022). Additionally, practical challenges that may be categorized as implementation issues, such as technical requirements, access to information, internet connectivity, differences between collaboration in real and virtual environments, and the extra workload placed on teachers, should not be overlooked (Koçak et al., 2018; Papapanagiotou & Devetsikiotis, 2008).

The Metaverse has also brought along some negative characteristics. Individuals representing themselves with avatars in the virtual world can choose to display "a character they wish to be" rather than their "true self." The virtual identity provided by the Metaverse can lead to "disembodiment" (Erkılıç & Dönmez, 2020) in students, causing them to distance themselves from their "real identity" (Göker, 2017) or perceive their identity differently. The interaction of "space without distance" (Göker, 2017) and uninterrupted time in the Metaverse can result in the erosion of perceptions, feelings, and meanings associated with the sense of presence provided by the interaction between space and people, leading to illusory consciousness (Akpınar & Akyıldız, 2022). These situations, along with the potential for the Metaverse virtual environment to foster a contactless society (Göker, 2017), the possibility of creating an unlawful environment due to its decentralized structure, and the risk of personal data becoming exposed (Kye et al., 2021), can pose problems for metaversal education on both theoretical and practical levels. The implications of these issues can be concerning from philosophical, pedagogical, psychological, and sociological perspectives.

### The Aim and the Significance of the Study

The Metaverse is a developing technology with undefined boundaries and applications. While this technology is being utilized in various sectors, its integration into education has also begun. Academically, the Metaverse has been researched most extensively in the field of education, following computer science and engineering (Narin, 2021). When these studies are examined, it is generally seen that either a Metaverse educational environment has been created or existing Metaverses have been analyzed in terms of certain variables. However, as Duan et al. (2021) pointed out, the studies conducted in the academic field regarding the Metaverse are limited. To effectively benefit from the Metaverse, which is gaining more attention daily and showing different applications in education, and to avoid falling behind as a developing country like Türkiye, more research is needed, as noted by Damar et al. (2018).

Unlike the review studies conducted in Türkiye, this study seeks the opinions of experts in the field of Web 3.0 and the Metaverse on how to effectively benefit from the Metaverse in education. The aim of this study is to examine the views of academicians and educators who are experts in Web 3.0 and the Metaverse, as well as the reflections of the Metaverse in education. This study is significant as it serves as a guide for the practical use of the Metaverse in education by addressing how the results obtained can be evaluated from various perspectives and with the opinions of different field experts.

## Method

### Research Design

The research is designed using a phenomenological approach. In phenomenological studies, due to the nature of this design, the focus is on subjects and phenomena that are known to exist but about which there is no in-depth

knowledge. Qualitative research aims to examine the experiences of individuals who have expertise in specific subjects while avoiding generalizations and the pursuit of absolute truth. In this context, phenomenology is widely preferred in qualitative research. Through this design, researchers strive to obtain detailed information by deeply investigating phenomena related to topics that have not been fully clarified or explored (Creswell, 2015). Web 3.0 and Metaverse are concepts that have not yet been fully utilized, clearly defined, and are newly entering our lives. This research aims to uncover the phenomena and concepts related to Web 3.0, the Metaverse, and the potential reflections of the Metaverse on education. It is assumed that the identified field experts are sufficient in number and quality to reveal these phenomena.

**Study Group**

In phenomenological studies, individuals who know, recognize, live the phenomena, and can convey this knowledge and experience are selected as data sources. In the application process of this design, the data source is people (Çapar & Ceylan 2022). In the study, educators who conduct studies and research on Web 3.0 and Metaverse were preferred as participants. While selecting the participants, scientific studies in the literature were examined and researchers working in this field were reached by e-mail and invited to participate by mentioning the research. 2 participants were selected in this way. The other 3 participants are researchers known for their research and experience on Web 3.0 and Metaverse in the close circle of the authors. These participants were also reached verbally and invited to the study. The study was limited to 5 participants whose demographic characteristics are given in the table below. The participants were coded and described with the abbreviations P1, P2,… throughout the study.

Table 3. Demographic characteristics of the participants

| Participant | Title | Position | Field |
|---|---|---|---|
| P1 | Assoc. Prof. | Faculty Member | Geomatics |
| P2 | Assoc. Prof. | Faculty Member | Computer and Instructional Technologies Education |
| P3 | Asst. Prof. Dr. | Faculty Member | Computer and Instructional Technologies Education |
| P4 | Dr. | Faculty Member | Computer and Instructional Technologies Education |
| P5 | Expert | Teacher | Information Technologies |

**Data Collection and Data Collection Tool**

The data were collected using a semi-structured interview form, which is a qualitative data collection method. In the data collection tool, interview questions were prepared in advance, and interviews were conducted with participants based on these questions. The data were obtained through one-on-one online video conferencing using the Zoom software. The online interviews lasted between 40 and 65 minutes. During the interview, the researcher recorded important statements of the participants by taking written notes. The researcher utilized these notes both to identify subsequent questions and to obtain qualitative data. Based on the course of the interview, follow-up questions were used to gather more detailed information from the interviewees. In this research, the aim was to clarify the research problem by utilizing the experiences of the participants, and in-depth textual data were sought from a small number of participants.

The primary data collection tool in phenomenological research is interview forms. In interviews, deeper information can be obtained to identify phenomena (Baker et al., 1992). Since phenomenological research aims to deeply understand the knowledge and experiences of people with life experiences related to the topic and to uncover phenomena (Morse & Field, 2013), the interview form was considered an appropriate data collection tool. Before preparing the interview questions, a literature review was conducted on the topics of Web 3.0 and the Metaverse, and studies related to these subjects were examined. This provided a foundation for the preparation of the interview questions. Initially, 12 questions were designed for the interview phase. Three faculty members with expertise in the field of information technologies and active in a public university were considered as subject experts. The draft interview questions were sent to these three faculty members for expert feedback. They were asked to review the questions based on the criteria of "clarity and comprehensibility," "relevance and adequacy for the purpose of the research," "removal of any unnecessary questions," and "whether there were additional questions to be included." Based on the feedback received from the experts, four questions were removed—two because they were roughly similar in meaning to other questions, and two because they were deemed outside the scope of the research. Additionally, adjustments were made to four questions. After being revised according to the expert opinions, the interview form was finalized to consist of eight questions. The interview form was then reviewed one last time by the researchers to assess its suitability for the interview. While creating the interview form, it started with questions about the basic structure of Web 3.0, continued with questions about the Metaverse and was completed with questions about the use of the Metaverse in education, thus trying to create a hierarchical and logical structure.

### Data Analysis

In qualitative data analysis, the researcher seeks to discover and reveal the hidden information within the qualitative data obtained (Özdemir, 2010) and to derive meanings from the raw data (Corbin & Strauss, 2015). The data obtained from the interviews were read in detail to select significant and meaningful expressions, and the selected expressions were evaluated as data sources for direct quotations in their original form. In phenomenological studies, direct quotations are often used to obtain in-depth information (Baker et al., 1992).

Miles and Huberman (1984) propose a hierarchical classification consisting of stages for analyzing qualitative data, which includes data reduction, data visualization, and drawing conclusions. Accordingly, the following processes have been carried out:

*Data Reduction:* Raw qualitative data were read in detail, and texts that were not relevant to the topic were not considered for evaluation and were excluded from the research.

*Data Visualization:* After unnecessary elements within the qualitative data were filtered out, analyses were conducted on the remaining texts, leading to the creation of visualizations such as tables, word clouds, word networks, and AI-assisted original content visuals related to themes and sub-themes. This approach ensures that the visualized information captures readers' attention more than textual information. The memorability of visuals is higher than that of texts, enhancing their educational value.

*Drawing Conclusions:* Following the analysis of qualitative data, the discovered information was revealed and presented in a meaningful way.

Interviews conducted with participants via Zoom were recorded with the consent of each participant, resulting in separate video files for each individual. During the data analysis phase, the audio from these videos was transcribed by both researchers into text documents. The textual expressions in the Word document were analyzed using content analysis techniques. In this context, all documents were read individually, and meaningful codes were compiled to reach categories. Themes and sub-themes were then developed using these categories. Frequencies related to each sub-theme were tabulated. Since the themes were not predetermined in this research, the content analysis technique was preferred. Silverman (2006) defines content analysis as the most used technique in qualitative data analysis.

## Ethical Approval (only for necessary papers)

Ethical permission (5/12/2024 – 12/09) was obtained from Hatay Mustafa Kemal University Ethics Committee for this research.

## Findings

In direct quotes, participants' opinions are expressed using codes such as "P1, P2, P3, P4, P5." After analyzing the qualitative data obtained from the participants, the themes of "*Transformation to Web 3.0," "The Metaverse World," "Education in the Metaverse Environment,"* and *"Requirements for Education through the Metaverse,"*, along with their corresponding sub-themes, were identified. The frequencies for each sub-theme are presented in Table 4

Table 4. Themes and subthemes obtained from the interviews

| Themes | f |
|---|---|
| **Transformation to Web 3.0** | |
| Web 3.0 is still a very new, incomplete web technology. | 3 |
| There is an extraordinary change with Web 3.0. | 5 |
| The concept of decentralization is dominant in Web 3.0. | 3 |
| There is a semantic structure in Web 3.0. | 2 |
| The web transformation is based on blockchain and distributed ledger technology. | 3 |
| This transformation involves a large amount of data. | 4 |
| The Internet of Things is related to Web 3.0. | 2 |
| Virtual worlds are also a type of Web 3.0 tool. | 2 |
| Online shopping holds an important place in Web 3.0. | 3 |
| Web 3.0 applications have started to be partially used. | 4 |
| Artificial intelligence and/or deep learning applications are being used within the scope of Web 3.0 | 3 |
| **The Metaverse World** | |
| Environments similar to the Metaverse were used in the past. | 4 |

| | |
|---|---|
| There are many scientific concepts related to the Metaverse. | 3 |
| The Metaverse environment will require significant costs. | 3 |
| Significant innovations have been achieved with the Metaverse. | 4 |
| **Education in the Metaverse Environment** | |
| Digital environments like the Metaverse increase students' intrinsic motivation. | 3 |
| Many of the applications in education in the Metaverse have their counterparts. | 3 |
| The Metaverse has significant effects on education. | 5 |
| Students feel more comfortable while learning in the Metaverse environment. | |
| No technology ensures learning directly. | 2 |
| Extraordinary education is possible in the Metaverse environment. | 3 |
| **Requirements for Education through the Metaverse** | |
| There will be important requirements for education in the Metaverse environment. | 4 |
| Technical knowledge is required to conduct education in these environments. | 4 |
| Prior training is necessary for education in the Metaverse environment. | 2 |
| Very high-speed internet connections are needed. | 2 |

**Participant Opinions on the Theme of *"Transformation to Web 3.0"***

Participants generally focused on the transition from Web 2.0 to Web 3.0 regarding this theme. They expressed their opinions on how Web 3.0 evolved and the innovations that came with Web 3.0. Participants used the definition of third-generation internet services used in the infrastructure of applications and sites for Web 3.0. They interpreted the fundamental difference between Web 2.0 and Web 3.0 as the presence of more personalized content for users with artificial intelligence and machine learning in Web 3.0. Participants made the following comments about the theme:

P5: *"Web 3.0 is developing very fast, but I think Web 3.0 has not been fully discovered yet. Maybe teachers can learn the features of these tools in 5-10 years. People have a certain amount of knowledge because of Web 2.0. When people need Web 3.0 tools, they will learn how to use them. There are individuals in society who are interested in technology, follow technology, and learn and improve themselves in advance. However, these are a small segment of society."*

P3: *"In Web 3.0, there is a wallet consisting of 16 digits. Everything happens through this. Thanks to Blockchain technology, for example, a person will buy a car using credit. He/she does not need to go to the bank for this. He/she does not need to go to a notary for purchase and sale. The necessary information is recorded, and no one can delete this record. This is why people care about Blockchain technology. For example, normally a person with power and authority can issue a fake diploma, but this is not possible with the distributed ledger structure. The distributed structure provides immutability. When someone tries to commit fraud, the distributed structure prevents this."*

P5: "*People worldwide are aiming to earn large amounts of money through projects focused on decentralized finance based on Web 3.0."*

P1: "*I personally prefer defining Web 3.0 more through Semantic Web and Ontological Web technology. The inclusion of blockchain doesn't really change this definition. I view blockchain as a different computing technology. What did we use before blockchain technology? We used Cloud Computing technology. The issue with Cloud Computing was its centralized approach. Now, I see this as an evolution of that centralized approach in Cloud Computing into a distributed structure. In essence, I view it as a change in computing architecture. I classify the blockchain base separately and see it as an evolution from the Client-Server Architecture of Cloud Computing to a Peer-to-Peer structure."*

P4: *"Thanks to Web 3.0, a user, for instance, can sell a video or documentary they created on YouTube to someone on the other side of the world using NFT technology."*

P3: *"Web 3.0 will bring significant contributions. It is already evident that some of its features have started to be used to some extent."*

P4: *"Open-source code runs in the background of Web 3.0. There is no central structure; instead, data transfer occurs from person to person. For instance, in a Web 2.0 application like Facebook, all user data is stored centrally. If Facebook were to shut down, everything would be lost because all the data is under Facebook's control. However, in systems operating on Web 3.0, there isn't just one main server—you are the server. Moreover, there are millions of servers like you. It's the same with NFTs. An NFT generates a unique code for your digital asset, a code that is specific to that item. Without that code, it can't be sold elsewhere. I believe it's an ethical and fairer environment. Right now, I don't think a complete Metaverse exists globally. When you look worldwide, you see many Metaverses..."*

P3: *"Although the internet has been referenced by names like Web 1.0 and Web 2.0, these distinctions aren't very clear-cut, but Web 3.0 should be considered separately."*

P5: *"When you make a transaction with a credit card, your personal information goes to the other party, but in Blockchain and Public Key Cryptography, neither the sender nor the recipient can see each other's information during transfers."*
P5: *"In terms of Web 3.0's use in education, we teach programming in schools. Building on that, we will move on to teaching software development in areas like programmable money, smart contracts, and autonomous systems."*
P4: *"We call Web 3.0 a semantic structure, a meaningful structure. This structure eliminates centralization, and with Blockchain, there won't be a need for a central authority."*
P2: *"The increasing load of information required a web concept that could process it. As this has surpassed what can be done with human power alone, Web 3.0 was developed based on the logic of machines communicating with each other. When we look at the purpose of Web 3.0, it's fundamentally about allowing computers and the applications running on them to communicate, use each other's data, and understand each other. This is the core logic behind Web 3.0 and thus the Semantic Web."*
P1: "*The Big Data project is still ongoing and continues to grow. However, it's not enough to just establish a common language that these machines can use to communicate. In the logic of the Semantic Web, yes, machines will use a common language to understand each other, but they will also interpret that language. For example, when we speak Turkish, we both understand the structure and nuances of the language, so we create meaning in our minds based on the meanings we assign to words. The main expectation with the Semantic Web is that machines can also perform this kind of information structuring. Technologically, this is called inference—machines need to not only receive information but also make deductions from it. At present, it seems as though the Semantic Web stage has been completed."*
P2: *"We can observe machine-to-machine communication in our household devices as well. For example, you can connect to your smart TV from your phone or control your cleaning robot. The basic connection and the shared language among these machines have already been resolved."*
P3: *"The Semantic Web is currently in the transition phase following Web 2.0. While searching for answers to questions like how machines should be represented, how a common communication language can be established, and how to include machines in this process, a concept called Ontology emerged, and all Web languages were created based on ontologies. Ontology is actually a topic that linguists have worked on. It is a structuring schema used to make sense of knowledge. This is difficult to implement in any field, but it is especially challenging in the field of education. This is because there are at least 8-10 factors that make up a learning environment. Among these 8-10 factors, when we look at the 3 main factors, we see the teacher, the student, and instructional tools and materials, in other words, the teaching materials and content."*
P5: *"There are currently decentralized finance, distributed structure, and blockchain-based projects related to Web 3.0. If Web 3.0 is mentioned, the basis of this work is the blockchain structure and the distributed ledger structure. I consider the distributed ledger structure as the democratization of money and computing power and its transfer to the public. For example, while companies such as Facebook and Google host their own servers, UBER is in the taxi sector despite not having its own taxis. Drivers use their own taxis but they use them in connection with UBER. With Web 3.0, information storage, processor power, and especially the processing power of video cards in the blockchain are being used a lot. With Web 3.0, a company will do the computing and IP part of the project itself without having any servers or even a building. As far as I can see, when people call Web 3.0 the semantic web, the issue of trust and money comes into play. This is understood as the completely transparent, auditable, and retroactively unchangeable structure of the blockchain due to its structure."*
P4: *"With Web 3.0, data mining emerges here. When we look at the systems that form the semantic structure, data mining and learning analytics are working in the background."*
*P2: "Since Web 2.0 was developed with the purpose of content creation and the concept that every user connected to the Web can contribute to the content, the amount of data and information on the Web increased significantly along with social network applications. This rapid increase in the amount of information has led to a vast expansion of the data sets that could previously be scanned or interpreted using simple HTML tags or by extracting data based on the structure of HTML tags."*
P4: *"The structure we refer to as the Internet of Things today enables billions of pieces of information to interact and connect with each other. This data exchange among objects operates within a certain systematic framework. Communication between objects forms a pattern, and it is learning analytics that detects this pattern and transforms it into behavior. On the other hand, intelligent systems are in operation—namely, artificial intelligence. Intelligent learning systems are at work. All of these are associated with Web 3.0."*
P2: *"What Web 3.0 has aimed to achieve is to establish a common language structure that allows machines to understand each other. When we look at current applications, we can see that machines are indeed able to communicate, understand each other, and retrieve data from one another by using these languages. You can also see this in social network applications. For instance, you can connect to Facebook with your Google account—though they are separate applications and platforms, even if they operate under different companies, you can still*

*connect to another social network platform. However, a complete information structure has yet to be established. Can we say that all information on the Web has been converted into a format that machines can understand? No, we cannot say that yet."*

P1: *"Another concept related to Web 3.0 is the virtual world. Within virtual worlds, we have virtual reality, augmented reality, mixed reality, and beyond that, X reality, or extended reality. Above all these lies the Metaverse. All of these are interconnected. There are blockchain systems, such as Bitcoin and Ethereum, that control the financial dimension of this. Additionally, NFT technologies are in place to manage the ethical issues within these systems. All of these concepts I mentioned are systems associated with Web 3.0."*

P2: *"In Web 2.0 or earlier systems, which were centralized, if you were an artist who created a painting, the best way to sell it would be to go to a centralized system—a fair or an exhibition—and display it there to sell it, right? That's how you would earn money. Web 3.0 has introduced the concept of decentralization into our lives. What does this mean? The same artist can also sell the digital version of their work. Web 3.0 enables a creator to sell their work in a physical setting as well as its digital version. NFT technologies are essential for securely selling these works and materials in digital environments. When you sell a product, the NFT provides you with a code, ensuring the buyer knows they uniquely own that product. Digital currency, not physical money, underpins NFT technologies."*

P4: *"The language of the Web is JavaScript, and JavaScript continues to be used in Web 3.0 as well, because there is a library developed specifically for Web 3.0. From what I've seen, React Native is the most widely used framework, which is JavaScript-based. For smart contracts, the Solidity programming language is used, particularly for writing smart contracts on the Ethereum network. If you're planning to become a blockchain developer, you might want to learn Go and Rust programming languages. Without writing any code, it's also possible to develop applications like Web 2.0 tools. Content creators don't necessarily need to learn the coding languages I mentioned, but those working within this infrastructure should learn these languages and coding skills."*

P5: *"There is a space station application. When you open this application and put on the Oculus headset, it feels like you are actually on the space station, moving around and being assigned the routine tasks an astronaut would need to perform daily, which you then complete. There is also an element of gamification involved here. The Metaverse can be described as a step beyond what we know as simulation. In the example I gave, we see that the likelihood of someone becoming an astronaut and going into space during their lifetime is extremely low, perhaps even impossible. An astronaut undergoes months or even years of training, completing various tasks on Earth, and if their health is suitable, they can eventually go to the space station. The Metaverse allows us to have this experience easily and economically, without the need for any of that."*

P4: *"I bought a virtual reality headset. It provides amazing experiences across various topics. Using the device, I went on virtual tours to different parts of the world. You really feel as if you're in that location. When you fall from a height in the virtual environment, it feels real, and you get scared. After using these devices for a certain period, side effects like dizziness and headaches can occur. As far as I know, Apple is seriously working on these devices. Google also made an attempt. Over time, I think they will eliminate the negative effects of these devices. In the coming years, I believe lighter, more practical, and side-effect-free devices that can be worn like glasses will be produced."*

P2: *"Research continues on objects truly understanding each other, interpreting information, and making inferences, which leads us to a technology known as Deep Learning. How is that information processed? Deep Learning extracts the most meaningful insights from the information, regardless of which application the user is using. Many algorithms and models are being developed for this, but standardization has not yet been achieved."*

P3: *"Facebook is working on its own Deep Learning algorithms, Google is developing its own, and Apple is focusing on Deep Learning algorithms for applications like Siri. Why are they doing this? Because if they can extract meaning from the data, the Web could become an incredibly powerful force. A software, machine, or application that can interpret this information can be used positively or negatively, depending on the intention."*

**Participant Opinions on the Theme of "Metaverse world"**

Participants expressed that traditional education encourages students to describe, think about, and conceptualize information, whereas the Metaverse allows students to experience the information and immerse themselves in the learning environment. Most of the interviewed participants focused on gamification and emphasized its importance. The opinions of the participants on this theme are as follows:

P3: *"There will inevitably be a lot of artificial intelligence working within Metaverse systems. In such complex structures, data processing is very intricate, and implementing security measures is challenging. Therefore, data security is crucial in the Metaverse, as there will be a massive flow of data. It will be challenging to monitor, control, and secure such a vast amount of data, especially in the initial stages of Metaverse usage, where data security issues might arise."*

P1: *"In our era, data science is now the profession of the future. Those who work in this field will try to identify meaningful patterns from a person's data coming from millions of different sources. This includes data mining, systems that enable responses based on incoming data, and the Internet of Things that allows different objects to communicate. All of these are new professions based on Web 3.0 systems. Training must be provided to prepare people to manage these tasks."*
P5: *"Currently, we can only transmit our voice and image, but in the Metaverse, we will be able to send our avatars, our three-dimensional representations. This means that I will appear in a different place as my 3D self, even though I am physically here. Tools like Oculus Quest, HP, and HTC Vive enable this experience. For example, we are currently in a 2D environment using Zoom for virtual meetings, but on the other hand, we'll be able to interact in a 3D environment. An example application allows several people to sit and chat together in the same virtual environment."*
P3: *"I can define the Metaverse as a project aiming to achieve a global level of 3D simulation like Second Life, where objects and scenarios are animated realistically in a shared space."*
P2: *"I can't say for sure how successful the Metaverse will be or how far it will advance, but I expect it to attract a significant number of users. If this weren't the case, a company wouldn't have changed its name to Meta. I don't think the considerable investments and focus on the Metaverse would happen without feasibility studies. My expectations aren't extraordinary, but I believe it will be used as an alternative platform."*
P3: *"Is the Metaverse a new concept? No, there was Second Life before it, and even earlier virtual environments. The Metaverse is really an umbrella term, encompassing platforms like Second Life."*
P4: *"When being physically present in a learning environment is costly, time-consuming, or impossible, joining the Metaverse, which gets quite close to reality, could offer convenience in terms of time, cost, and accessibility."*
P3: *"When trying to establish an educational presence on the Metaverse, there will undoubtedly be costs. If you need to purchase services to develop an avatar, there will be a cost. Likewise, if you're an avatar developer selling to others, there will be costs. For all of these, you'll need blockchains, Ethereum, and similar technologies. Although these will certainly be utilized, blockchain is not the primary focus in an educational context."*
P5: *"Today, there are people who design and sell avatars and create Metaverse environments. There will be professions centered around these tasks. Web 3.0 alone could give rise to at least 30 new job types, some of which have already emerged."*
P3: *"The Metaverse offers something unprecedented: a shared space where we can gather together in a virtual world. This is incredibly significant."*

**Participant Opinions on the Theme of "Education in the Metaverse"**

The participants noted that the Metaverse is not a savior in education but rather an effective tool that facilitates learning. They emphasized that it appeals to multiple senses and allows students to feel as though they are learning in a separate world within the Metaverse. The participants made the following comments regarding the theme:
P3: *"The defining characteristic of Generation Z is not that they are smarter or have better learning abilities than previous generations, but rather that they have more opportunities to use technology and are using it more extensively. Learning requires experiences; learners must be active, engage in hands-on activities, and learn from making mistakes and finding their own solutions."*
P1: *"When a new technology emerges and is integrated into education, we often view it as a magic wand that will transform education and solve all problems. However, this is not the case with any technology. Typically, we adopt a hybrid model. For instance, while we are using Zoom today, we will be using the Metaverse tomorrow. The Metaverse offers us certain advantages, particularly in areas where it can have a significant impact."*
P4: *"A child's motivation is influenced by both intrinsic and extrinsic factors. Intrinsic motivation is far more valuable than extrinsic motivation. If extrinsic motivation takes precedence over intrinsic motivation, it can be dangerous. We want children to be eager to learn on their own. While we can offer external motivational elements like coins or badges in the learning process, if these overshadow intrinsic motivation, students may shift to a mindset where they learn only to receive the reward. If the reward is absent, the student might adopt an attitude of 'I won't learn.'"*
P2: "*Normally, visiting a museum abroad is quite challenging for a person, but with the Metaverse, it becomes much more economical, faster, and easier. Additionally, we can explore interactively with our friends. In this environment, I can touch and use all my senses."*
P3: *"For example, when you're teaching history, experience is crucial for learning. The more experiences you can provide, the more successful the student will be. In face-to-face education, we can use digital materials to the fullest. However, in remote education, even if we conduct assignments, discussion activities, etc., we can't really talk about genuine experiences. In the Metaverse, you place the student directly into a virtual laboratory that we've developed, where they can gain hands-on experience. The student can take on the role of a character in a*

*historically reenacted event. For instance, you can make the student an avatar that actively participates in the War of Independence, experiencing it firsthand as if they were a part of the battle. You can enable the student to observe everything, live through it, and even intervene when necessary."*

P5: *"In schools with virtual classrooms in the Metaverse, students can join classes from outside and listen to lectures. A student can take a course from any institution and any teacher in the world. They can choose institutions that offer open services, which may require accreditation and enrollment, or they can attend completely free and open-access courses."*

P3: "*You can create a virtual laboratory where children can explore inside a DNA helix in biology. In a medical school, you can place a corpse on the table for students to examine. They can cut, dissect, and practice. This can also be done in a real environment, but when a student sees a cadaver for the first time, it can be frightening, and some students even drop out of the program when confronted with a cadaver in class. Instead, if they were introduced to it in a virtual environment, the experience could be very different. Surgeries can be performed in a virtual environment using an experimental simulator, and this can be done collaboratively. We can involve many people in the same surgery simultaneously."*

P2: "*Today, we can place children inside a three-dimensional representation of a museum and guide them through it using augmented and virtual reality. However, in these scenarios, children can only interact using a mouse. In the Metaverse, children can move, explore, and touch things within the museum. They can experience this environment enriched with virtual and augmented reality that we embed into the Metaverse. As you can see, the Metaverse has the potential to provide positive contributions to education. For another example, when children engage in planting seedlings or other plants, they can do this in the Metaverse. They can witness what happens when the wrong plant is sown in the wrong soil or when proper fertilization and watering are not done. In the virtual environment, children can cultivate the field and learn about it. The Metaverse offers us the incredible opportunity to facilitate such experiences."*

P1: "In environmental education, we tell children not to litter, but they often don't understand why it's important. In the Metaverse, we could create a simulator where children can actually throw trash on the ground. After they do that, they can see the consequences of their actions. They will understand that throwing trash makes the environment uninhabitable. This way, we facilitate a deeper learning experience."

P4: "*I don't believe that the Metaverse or any other platform directly influences learning. In my opinion, the most important factor in education is pedagogy. Even if we use a hologram of Einstein to teach physics, there will still be people who don't understand. Regardless of how much technology is employed, we can never fully disconnect from traditional education. This is particularly crucial for younger students, where face-to-face education plays a vital role. We need to present information with the right method and appropriate pedagogy."*

P1: "*The Metaverse has many dimensions; these can include sociological, technological, and economic aspects, but these dimensions manifest quite differently in the Metaverse. Education is one of the prominent applications of Metaverse technologies. Especially during the Covid-19 period, the experiences gained from distance learning and people's adaptation to this technology will remove a significant barrier to teaching with avatars in the Metaverse. I believe that people's acceptance will be quite straightforward. Whether this is successful or not will depend on the quality of education, which is a separate topic. However, I think users will have a high level of acceptance. There are no technological obstacles; it's very feasible. This can be achieved in different Metaverse environments or a dedicated Metaverse can be created for such purposes. Creating avatars is very straightforward today, and environments similar to classrooms can also be easily set up in the Metaverse. Sharing resources like YouTube videos or educational materials on a board will be very simple, and this is already being done. Therefore, I don't see any significant obstacles in that regard."*

P3: *"For instance, let's say to take this training, a student needs to use a coin, and if Bitcoin is expensive, they might receive it as a form of payment for taking the course. After completing the course, they take an exam, and in return, they get an NFT, which they can use in a game. This way, the student has to show interest in successfully completing the course to obtain that NFT and use it in the game afterward."*

P2: "*The definition of a teacher as the one who imparts knowledge has become outdated. This definition has been replaced by the idea of a teacher as someone who guides students in accessing information, learning paths, and methods of learning.*

P4: "*When certain elements are gamified, they attract people's attention and can reach a wider audience. This gamification can be adapted to education. There are numerous graduate theses written on Second Life. Globally, there are campuses and classrooms within the Metaverse where you can directly participate and attend classes."*

P3: "*For these systems to be effective, all teachers, including Information Technology teachers, must undergo a certain orientation training. Ultimately, education will take place in a different environment. We experienced this with the FATİH project. Merely transferring technology into education does not improve educational quality. It is essential first to understand, analyze, and use that technology correctly. Otherwise, the likelihood of failure is high. Research consistently shows this. When students encounter unfamiliar new technology, their success tends to decline. However, once students become accustomed to the environment, and if the environment has beneficial effects, their success will subsequently increase."*

P5: *"I believe that the use of the Metaverse in education could be beneficial at this time, but it would be incorrect to assert that it will replace the teacher or take on the role of teaching. However, I do think it will certainly add value to education."*
P4: "*For instance, if I want to take a course from MIT, I can participate online, but with the Metaverse, it would be as if I am physically present in the classroom. While the Metaverse may not enhance equal opportunities among students, it does improve access quality and increases interaction between people.*
P2: "*If we can create educational ontologies in learning areas, we can at least use these ontologies to structure content recommendation systems. One of the best examples of this is EBA (the Educational Information Network). With very limited content adaptation, you can filter the contents on EBA according to age groups and types. Now, imagine if this could be further developed. If an educational ontology can be established, it could significantly minimize the time teachers take to find the instructional information they are looking for. For instance, similar to what Google Earth does—'You visited this place, would you like to go here this year?'—having educational ontologies that offer such suggestions would greatly facilitate learning and ease the workload for teachers. Back in the 1980s, when Computer-Assisted Instruction was introduced, there was a strong reaction in Türkiye against the idea that teachers would become obsolete, suggesting that 'How could one learn from a machine?' Now, machines can learn too, and we can foresee that people will continue their learning processes more in informal environments than in formal learning settings."*
P1: "*We should not think of the Metaverse solely as virtual reality. If we are tied to virtual reality in the selected Metaverse environment, we cannot keep the existing VR headsets on for long periods. This poses a problem. For instance, a school conducting half-day instruction with VR goggles cannot sustain it for long, as it can lead to headaches, nausea, or other discomforts. One student may not experience issues, while another might. Therefore, while virtual reality can be utilized, it shouldn't be the sole method; sometimes augmented reality (AR) or mixed reality (MR) could be applied, and it doesn't always have to be three-dimensional. Many things can be tried, and these can be mixed. We need to do what is necessary to ensure that the student is comfortable for a longer duration, allowing them to understand better. Ultimately, our problem is how to formulate the academic success of students in a more secure and comfortable environment. The Metaverse could be one of the environments that provide these opportunities. The question then becomes how to follow a methodology in the Metaverse to achieve this. My impression from what we have discussed so far is that we need to consider how the Metaverse can be used to enhance student comfort and success. This raises further issues; for instance, if augmented reality is to be used, then it necessitates a setting where students can be together to integrate with reality. The Metaverse can exist in a classroom setting, but if it's virtual reality, then it can also exist outside of that classroom environment. However, as mentioned, there are also concerns like dizziness and nausea associated with it."*
P3: *"For example, in language education, we often feel shy about speaking due to fears of making mistakes, being embarrassed, or feeling humiliated. The Metaverse can eliminate these fears. In this virtual space, there is a digital persona—an avatar. You are speaking, but you are not physically visible as yourself. The person you are interacting with doesn't know who you are. You are in a real environment where you can use gestures, body language, and facial expressions. These movements and gestures facilitate conversation, enabling you to express yourself better and ultimately boost your confidence.*
P4: *"When social media first entered our lives, it seemed like a savior. It was seen as something that would revolutionize our lives and bring new horizons to education. However, now we see people going to doctors to disconnect from social media. Technologies are always changing, and none of us may be able to keep up with that change. What's important is teaching pedagogy. Why is pedagogy important? Why do learning theories exist in our lives? When learning a subject, which strategy or method is the right one to use? These aspects are much more significant."*
P1: *"The actions taken by the student can be easily visible to everyone if desired. This could involve using Public Blockchain, Private Blockchain, or Hybrid Blockchain. At this point, algorithmic designs can be implemented. If we're thinking about a crowded classroom, the teacher may not be able to keep track of every student. In fact, there's no need for the teacher to monitor the students directly. Based on the algorithmic work done, it can be determined what assignments need to be completed next, which tests can be opened according to the student's performance, and so on. The integrity of these processes can be maintained in some way."*
P2: "*In the Metaverse, technology companies and capital will provide the same consumption opportunities to both the public sector and private sector. Control can also be implemented. Just as inspectors come to physical schools, there could be avatars of inspectors in the Ministry of Education who can check how teachers conduct their lessons in different locations. Centralized exams would still exist, and the achievements of students could be revealed through these exams. Firms that build Metaverse Schools will also emerge. For instance, a private school could partner with such a firm, and education would take place in the Metaverse environment."*
P5: *"We need to think of education as a whole. The educational elements in the Metaverse environment must be integrated. For example, we need to be able to write and communicate effectively. My avatar should be able to*

*deliver lessons in the Metaverse. If I simply transfer my performance from Zoom to the Metaverse by changing the platform or replacing my visible real self with an avatar, nothing significant will change."*
P4: "*One of the elements that makes the Metaverse what it is, is its connection to blockchain and the crypto world. How will this be established? On the other hand, students will find it much easier to imagine and realize many projects in the Metaverse because a variety of technologies are already available in a more advanced form in that environment. For instance, using three-dimensional models, elementary school students can create many things there. This can also enhance their achievements.*
P2: "*Hologram usage is something entirely different. All of these will have their advantages, but it's crucial to consider which advantage the student will use at what stage and for what purpose. There may also be disadvantages associated with all of these. We need to evaluate all these advantages and disadvantages. Students from different cities and countries can be in the same Metaverse classroom. This allows for applications that stretch geographical boundaries, enabling resources to be used more efficiently."*
P3: "*The Metaverse is designed to replicate the reality of everything. People can visit virtual worlds created to mirror real-life environments precisely. For instance, while you may not have the opportunity to physically visit the Egyptian pyramids, you can explore them as if you were there in the Metaverse. This enables a wealth of learning opportunities. Children today no longer spend time playing outside as they used to; games have now integrated into technological devices, computers, and phones."*

**Participants' Opinions on the Theme of "Requirements for Education through the Metaverse"**

Participants have emphasized the need for important infrastructure to ensure education in the Metaverse. High-speed internet, technical knowledge regarding usage, and various pre-usage training programs are among these requirements. Some of the comments made by participants on this theme are as follows:
P3: "*Therefore, it is necessary to analyze the needs first. There is a need for teachers who will guide the students in this context. Experts in the field are needed. Technology specialists are required in this scope. If the connection settings of the hardware and software to be used need to be configured, technical personnel are needed for that. In this process, it is essential to have educational programmers, educational technologists, teachers, and technical personnel to provide support and solve problems."*
P4: "*For example, there is language education. No matter how well you know a language, there is still the fear of embarrassment. Students might think, 'What if I make a mistake or embarrass myself?' This fear doesn't exist in the Metaverse. The Metaverse is a great platform for overcoming all these human qualities and taking action. No one recognizes your face; it doesn't matter if they recognize your avatar or not. In a virtual environment, students can engage in movements and gestures as part of their experience. It can become an incredible attraction for learning a language. However, this does not mean that Metaverse is an alternative for every educational system. There is no system in the world that effectively applies the same method to all people. If we compare this system to distance education, I believe that the Metaverse is superior to distance education systems."*
P2: *"What impact does the Semantic Web have on education? We can say that we expect content-focused content recommendation systems to develop further. There is an expectation that the number of applications where content-based teaching practices can be more queried and executed by machines will increase significantly. We can already see this in the learning management systems we use today. Many of us are likely using the Moodle learning system in our universities. This is one of the learning management systems that emerged within the relationship between the Semantic Web and e-learning. These systems are designed to interpret and understand only a limited amount of information, such as student exam results, student log records, and student interactions. What can we do because of this? We can analyze questions like how many students have logged into the system, how many questions they answered correctly, and what they answered incorrectly. However, what is still the problem there? When we look at educational systems created with content clouds, there is still an issue of understanding."*
P1: "*What we are currently discussing are actually technology-based learning environments. You can place the Semantic Web on top of this, and in the future, you can also place the Metaverse on top of it. To understand these technology-based learning environments, you need to have at least some knowledge, meaning you must have technical knowledge as well."*
P5: *"In courses related to artificial intelligence, we should first teach basic artificial intelligence knowledge, introduction to artificial intelligence. Not everyone has to be interested in the Semantic Web. Not everyone has to know basic artificial intelligence information at a very good level. Courses that will provide basic data structures and basic programming logic should be taught by experts in the field who are experts in that subject. In other words, these courses should not be passed superficially because the depth that will be provided in these courses will make it easier for them to understand and interpret constantly developing new technologies."*
P3: *"In order to use Metaverse properly, a very high-speed internet connection is needed. For this, it is necessary to go much higher than the fiber connection speeds that exist in our country. Considering that even the speeds in Europe may be insufficient, the speeds of those connected with normal ADSL connections in our country will not*

*be sufficient. For this reason, very serious infrastructure investments need to be made. Metaverse requires sending and receiving very high amounts of data."*
*P2: "Since ADSL connections are asymmetric, our data receiving speed is high, but our data sending speed is low."*
*P5: "With Web 3.0, especially the upload speeds need to be increased. Generally, download speeds are high, and bandwidths are greater, but in Web 3.0, upload speeds must also be very high. This requires serious infrastructure."*

**Word Cloud, Word Map, and Text-Related Images Obtained Using Artificial Intelligence**

A word cloud has been created using artificial intelligence to determine the most frequently used words from the data obtained in the interview, with the aim of revealing commonly mentioned concepts. In word clouds, the size of the text indicates the frequency of usage of the word found in the interview data. It is known that as the text size increases, the frequency of the word's usage also increases. Thus, the prominent concepts and emphasized expressions can be visualized.

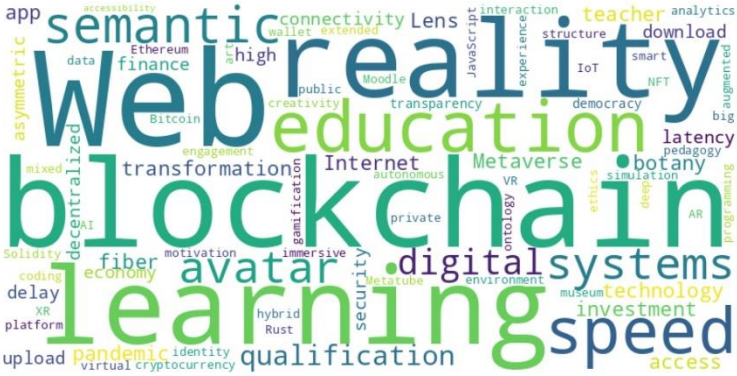


Figure 2. Word tree for interview data

According to the findings obtained in this research, it was determined that words such as web, blockchain, learning, reality, semantic, education, avatar, were used more frequently. This finding indicated that the participants frequently mentioned concepts, technologies and education related to Web 3.0 and Metaverse in the interview and that the participants used expressions related to these phenomena.
In the study, a word network was also created to access information such as where the participants' expressions were used in written texts and their combination with other concepts and to examine their relationships. It was determined that the Web 3.0 concept, which had the highest frequency, was the most used expression and the other most used concepts and the sub-concepts they were used with were also included in the word network. VOSviewer software was used to create this concept map.

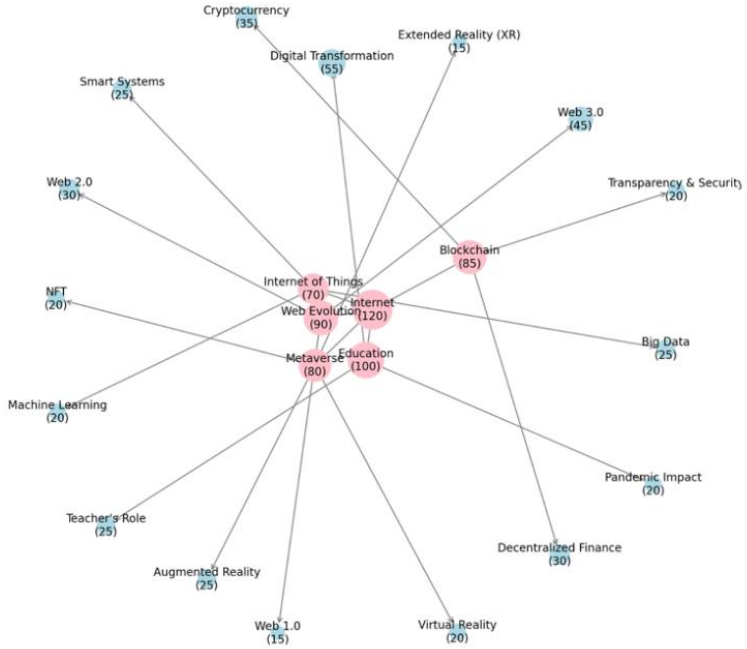
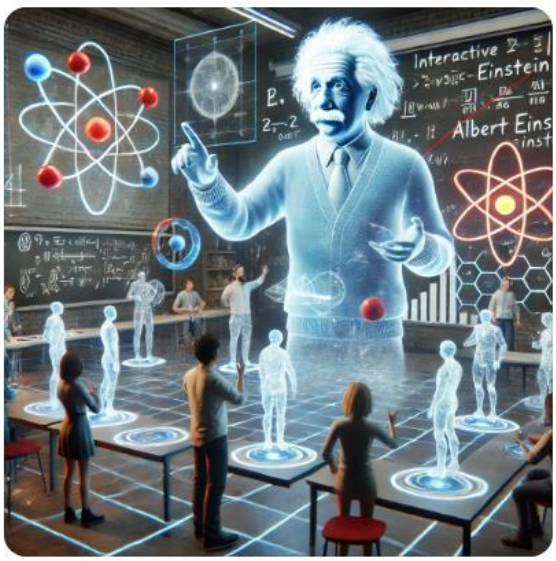



Figure 3. A concept map related to the interview data.

According to the concept map derived from the interview data, the most frequently used main concepts are Internet (120), education (100), web evolution (90), Blockchain (85), Metaverse (80), Internet of Things (70). The sub-concepts associated with these main concepts are presented in Figure 3. The main concepts, along with the three sub-concepts most commonly used with them and their respective frequencies, are as follows:

- For the concept of internet: big data (25).
- For the concept of education: digital transformation (55), teacher's role (25), pandemic impact (20).
- For the concept of web evolution: web 3.0 (45), web 2.0 (30).
- For the concept of blockchain: cryptocurrency (35), decentralized finance (30), transparency (20).
- For the concept of metaverse: NFT (25), virtual reality (25).
- For the concept of internet of things: big data (25), smart systems (25), machine learning (20).

In qualitative studies, the visualization of data is crucial. ChatGPT artificial intelligence tool was used to generate the visuals. The interview data were uploaded to this tool and the prompt "Produce a visual depicting the classroom environment described in the text" was typed. As a result, the following visuals were obtained:



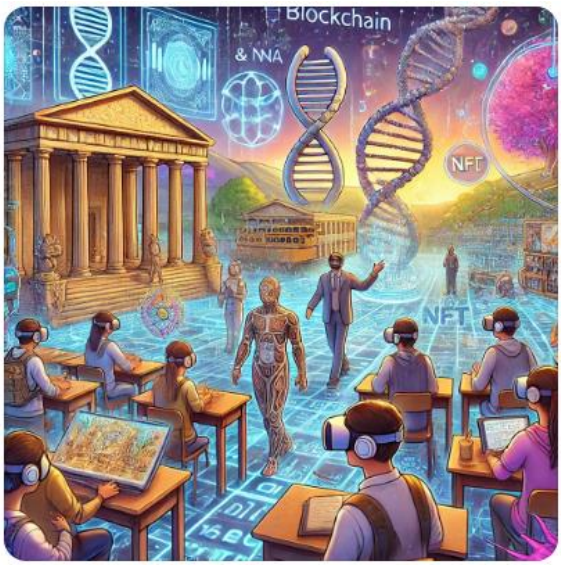



Figure 4. AI visuals that define the metaverse

The visuals presented include hologram technologies and the Metaverse environment created in a real classroom environment, the use of virtual reality technologies in a real classroom environment based on the examples given in the interview, the transfer of historical environments to the classroom environment with the Metaverse, and the Metaverse environment created by combining the history course teaching in the interview data with the real classroom environment.

## Results and Discussion

The transition from Web 1.0 to Web 2.0 brought about significant changes. There will be even greater transformations in the transition from Web 2.0 to Web 3.0. Web 3.0 is characterized as a more secure environment compared to existing web technologies, often referred to as decentralized web or semantic web. Web 3.0, with the integration of artificial intelligence and machine learning, will provide users with increasingly personalized content, predominantly existing within virtual worlds. (Li et al., 2024) also supported this view in his research.

In recent years, we have started to hear the term Metaverse frequently. The popularity of the Metaverse has increased since Mark Zuckerberg rebranded the company as Meta in 2021 (Suryodiningrat et al., 2024). In our research, it was concluded that Metaverse has started to be used today. Tinmaz & Dhillon (2024) also stated that Metaverse environments, which were once limited to science fiction, have now become reality. Senadheera et al. (2024) emphasised that the Metaverse offers incredible advantages and transformation, but also brings privacy and security risks, and that more precautions are needed in the use of these environments.

Currently, virtual learning environments are offering experiences similar to the Metaverse. However, the Metaverse, which will become widespread with Web 3.0, will provide a significantly different environment. While traditional education allows for the representation, contemplation, and construction of knowledge for students, the Metaverse is offer students the opportunity to experience knowledge firsthand, immersing them directly in the learning environment. Aydın et al. (2023) and Yıldız and Bozkurt (2023) have also reached similar conclusions in their respective studies.

On the other hand, Wong et al. (2024) and Ruiu et al. (2024) found that the use of metaverse in education is attracting more and more attention every day. Similarly, Arantes (2024) stated that there is a tendency in education to replace or empower teachers with machines instead of humans. In contrast to these positive views, Mahmoud (2024) and Ruiu et al. (2024) stated that the Metaverse is beginning to shape our understanding of education, but that it will ultimately pose serious technological challenges and digital divide, privacy and security concerns.

In their research, Tinmaz & Dhillon (2024) and Wong et al. (2024) emphasised the difficulties encountered in the metaverse environment related to learning difficulties. They stated that training is needed for the use of these environments. This result coincides with the findings of our study. Tınmaz & Fanea-Ivanovici (2024) also saw the use of the metaverse in education as a great potential in the age of innovation, but stated that it has various challenges.

Metaverse can be used very widely in daily life. It has an immersive feature in entertainment, education and working life (Guo et al., 2024). Political regulations and important technical infrastructures are needed for the efficient use of the Metaverse in education (Shwedeh, 2024).

In designing learning environments within the Metaverse, the focus is not solely on creating virtual spaces. It is believed that the Metaverse can address the shortcomings of various existing methods and enhance student interaction in a way that resembles traditional classroom settings. To accomplish this, collaborative learning and flipped learning approaches, as well as hybrid models, can be implemented. This aligns with findings from several studies that support these conclusions (Diaz, 2020; Diaz et al., 2020; Jeon & Jung, 2021).

Like many other technologies, the Metaverse does not provide direct learning and should not be seen as a savior in education. However, similar to other technologies, the Metaverse can serve as an effective tool to facilitate learning. It is particularly believed that when gamification techniques are employed, especially those that incorporate technologies suitable for the Web 3.0 and Metaverse environments (like tokens), the learning experience can be enhanced. Metaverse will increase students' intrinsic motivation by appealing to more senses and creating the impression that students are having an extraordinary learning experience in a world apart. Some studies support these findings (Atmaca Demir & Kandemir 2020; Duan et al., 2021; Park et al., 2021; Tokgöz & Karabatak, 2022; Vaca et al., 2016; Yaratan, 2022). Although the boundaries of the Metaverse are still not fully defined and it continues to evolve, it is expected to make significant contributions to education. Akpınar and Akyıldız (2022) identified some of these contributions as reducing tension between school and social media, opening new horizons for thinking, personalizing instruction, and increasing access to education.

Additionally, The use of Web 3.0 and the Metaverse will require technical knowledge and infrastructure, user training, and very high-speed internet connections. Yıldırım and Keçeci (2024) also noted that necessary planning should be carried out in this context, and updates should be made continuously according to users' needs. (Guo et al., 2024) is also worried about utilizing Web 3.0 applications in case Web 3.0 becomes widespread, unless very high speed internet connections are provided with advanced technologies.

Based on the results obtained from this study, the following recommendations have been developed:

• Necessary preparations for the technical infrastructure for the Metaverse, identified as the technology of the future, should be made, and ethical boundaries regarding the Metaverse should also be established.

• When developing Metaverse environments for educational purposes, these environments should be developed in line with the opinions and suggestions of educators.

• Metaverse platforms should be adaptable to different educational environments.

• Training should be provided to Metaverse users before they begin using the platform.

• New and specialized professions should be created and encouraged to train qualified individuals who can develop metaverse technologies.

## Authors Contribution Rate

The authors equally contributed to this research.

## Ethical Approval (only for necessary papers)

Ethical permission (5/12/2024 – 12/09) was obtained from Hatay Mustafa Kemal University Ethics Committee for this research.

## References


Akpınar, B., & Akyıldız, T. Y. (2022). Metaversal teaching as a new educational ecosystem. *Journal of History School (JOHS), 15*(56), 873-895. http://dx.doi.org/10.29228/Joh.57283

Antoniou, G., & Van Harmelen, F. (2008). *A semantic web primer.* The MIT Press.

Arantes, J. (2024). Digital twins and the terminology of "personalization" or "personalized learning" in educational policy: A discussion paper. *Policy Futures in Education*, *22*(4), 524-543. https://doi.org/10.1177/14782103231176357

Aroyo, L., Dicheva, D. (2004). The new challenges for e-learning: The educational semantic web. *Educational Technology & Society*, *7*(4), 59- 69. https://pure.tue.nl/ws/portalfiles/portal/1824531/623993.pdf

Atmaca Demir, B., & Kandemir, C. (2020). On Virtual Reality Applications in Education: 'Ben De Varım in the Classroom' Project. *Turkish Online Journal of Design Art and Communication, 10*(4), 339-354. https://doi.org/10.7456/11004100/002

Aydın, S., Nalbant, K. G., & Ozat, K. (2023). The experiences that the Metaverse will bring to virtual markets in the digitalising world. *Journal of Social, Human and Administrative Sciences, 6*(1), 130-147. https://doi.org/10.26677/TR1010.2023.1175

Baker, C., Wuest, J., & Stern, P. N. (1992). Method slurring: The grounded theory/phenomenology example. *Journal of advanced nursing*, *17*(11), 1355-1360. https://doi.org/10.1111/j.1365-2648.1992.tb01859.x

Beck, R. (2018). Beyond bitcoin: The rise of blockchain world. *Computer*, *51*(2), 54 – 58. https://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=8301120

Bektaş, G. A. (2012). *An application on the use of Web 3.0 technology in internet based education systems* [Master Thesis]. Gazi University, Informatics Institute.

Lassila, O., Hendler, J., & Berners-Lee, T. (2001). The semantic web. *Scientific American*, *284*(5), 34-43. https://www.lassila.org/publications/2016/lassila-dickinson-semweb-lecture-2016.pdf

Choe, H. (2006). Ontology Based E-Learning Authoring System. *Asian Journal of Information Technology*, *5*(12), 1319 – 1322. https://doi.org/ajit.2006.1319.1322

Choi, H.S., & Kim, S.H. (2017). A content service deployment plan for Metaverse museum exhibitions Centering on the combination of beacons and HMDs. *International Journal of Information Management*,37, 1519-1527. http://dx.doi.org/10.1016/j.ijinfomgt.2016.04.017

Corbin, J., & A. Strauss (2015). *Basics of qualitative research.* Sage. http://ejournals.library.ualberta.ca/index.php/cjuce-rcepu

Creswell, J. W. (2015). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research.* Pearson.

Çapar, M. C., & Ceylan, M. (2022). Comparison of case study and phenomenology designs. *Anadolu University Journal of Social Sciences*, *22*(2), 295-312. https://doi.org/10.18037/ausbd.1227359

Damar, M. (2021). Metaverse and educational technology. Tarık Talan (Ed.), *In Digitalisation and New Approaches in Education* (ss. 169-192). Efe Academy Press.

Damar, M., Özdağoğlu, G., & Özdağoğlu, A. (2018). Software Quality and Standards on a Global Scale: Trends in the Literature from Scientific and Sectoral Perspective. *Alphanumeric Journal*, 6(2), 325-348. https://doi.org/10.17093/alphanumeric.404102

Decentraland (2022). Metaverse Festival: Frequently Asked Questions. Erişim Tarihi: 29.07.2022 https://themetaversefestival.io/MusicFestivalFAQs.pdf adresinden erişilmiştir.

Díaz, J. (2020). Virtual world as a complement to hybrid and mobile learning. *International Journal of Emerging Technologies in Learning (iJET), 15*(22), 267-274. https://doi.org/10.3991/ijet.v15i22.14393

Díaz, J., Saldaña, C., & Avila, C. (2020). Virtual World as a Resource for Hybrid Education. *International Journal of Emerging Technologies in Learning (iJET), 15*(15), 94-109. https://doi.org/10.3991/ijet.v15i15.13025

Duan, H., Li, J., Fan, S.,Lin, Z., Wu, X., & Cai, W. (2021, October). Metaverse for social good: A university campus prototype. In Proceedings of the *29th ACM International Conference on Multimedia* (MM '21), October 20–24, Virtual Event, China.

Erkılıç, H., & Dönmez, S. C. (2020). Tracing the narrative of virtual reality: Examples of Trinity VR and cyathouse VR. *Journal of Cine Philosophy, Special Issue,* 318-344. https://doi.org/10.31122/sinefilozofi.674107

Gaubert, J. (2021). Seoul to become the first city to enter the Metaverse. What will it look like? https://www.euronews.com/next/2021/11/10/seoul-to-become-the-first-city-to-enter-the-metaverse-what-will-itlook-like

Gennett, Z. A. (2010). *Shortfall Online: The Development of An Educational Computer Game for Teaching Sustainable Engineering to Millennial Generation Students*. Master thesis, The Department of Mechanical and Industrial Engineering Northeastern University Boston.

Göçen, A. (2022). Metaverse in the context of education. *International Journal of Western Black Sea Social and Human Sciencesi*, *6* (1), 98-122. https://doi.org/10.46452/baksoder.1124844

Göker, G. (2017). Digital heterotopias: New media in a 'different' context. *Selcuk Communication*, *9*(4), 164-188. https://doi.org/10.18094/si.57679

Grayscale Research (2021). The Metaverse, Web 3.0 Virtual Cloud Economies. Grayscale. https://grayscale.com/wp-content/uploads/2021/11/Grayscale_Metaverse_Report_Nov2021.pdf

Guo, H., & Gao, W. (2022). Metaverse-Powered Experiential Situational English-Teaching Design: An Emotion-Based Analysis Method. *Frontiers in Psychology*, 13, 1-9. https://doi.org/10.3389/fpsyg.2022.859159

Guo, Y., Qin, Z., Tao, X., & Li, G. Y. (2024). Federated multi-view synthesizing for metaverse. *IEEE Journal on Selected Areas in Communications*, *42*(4), 867-879. https://doi.org/10.1109/JSAC.2023.3345427

Hazneci, U.Ö. (2019, October). A review on the use of current augmented reality applications in education. Ondokuz Mayıs University International 100th Year Education Symposium 26-28 October, (ss. 499-508). Samsun.

Koçak, Ö., Karakuş Yılmaz, T., & Göktaş, Y. (2018). Pedagogical challenges in the design of virtual worlds as a learning environment. *Educational Technology Theory and Practice*, 8(2), 90-106. https://dergipark.org.tr/en/download/article-file/506975

Kye, B., Han, N., Kim, E., Park, Y., & Jo, S. (2021). Educational applications of Metaverse: Possibilities and limitations. *Journal of Educational Evaluation for Health Professions, 18*, 1–13. https://doi.org/10.3352/jeehp.2021.18.32

Lee, J.Y. (2021). A study on Metaverse hype for sustainable growth. *International Journal of Advanced Smart Convergence*, 10 (3), 72-80. http://dx.doi.org/10.7236/IJASC.2021.10.3.72

Lee, L. H., Braud, T., Zhou, P., Wang, L., Xu, D., Lin, Z., ... & Hui, P. (2021). All one needs to know about Metaverse: A complete survey on technological singularity, virtual ecosystem, and research agenda. *Journal of Latex Class Fıles, 14*(8), 1-66. https://doi.org/10.48550/arXiv.2110.05352

Lee, H., & Hwang, Y. (2022). Technology-enhanced education through vr-making and Metaverse linking to foster teacher readiness and sustainable learning. *Sustainability*, *14*(8), 4786. https://doi.org/10.3390/su14084786

Li, S., Bunlikhitsiri, B., & Punthupakorn, P. (2024). The evolution of cultural relics: environmental sculpture of huai'an in metaverse. *Journal of Ecohumanism*, *3*(4), 107-117. https://doi.org/10.62754/joe.v3i4.3551

Mahmoud, A. B. (2024). Exploring the public's beliefs, emotions and sentiments towards the adoption of the metaverse in education: A qualitative inquiry using big data. *British Educational Research Journal*, *42*(4), 867-879. https://doi.org/10.1002/berj.4026

Morse, J. M., & P.-A. Field (2013). *Nursing research: The application of qualitative approaches*. Springer.

Narin, N. G. (2021). A content analysis of the Metaverse articles. *Journal of Metaverse*, *1*(1), 17-24. https://dergipark.org.tr/tr/download/article-file/2167699

Özdemir, M. (2010). Qualitative data analysis: A study on the problematic of methodology in social sciences. *Eskişehir Osmangazi University Journal of Social Sciences*, *11*(1), 323-343. https://dergipark.org.tr/en/download/article-file/113287

Papapanagiotou, I., & Devetsikiotis, M. (2010). Aggregation network design methodologies for Triple Play Services. *2010 7th IEEE Consumer Communications and Networking Conference*, 1-5. https://doi.org/10.1109/CCNC.2010.5421849

Park, S., Min, K., & Kim, S. (2021). Differences in learning motivation among bartle's player types and measures for the delivery of sustainable gameful experiences. Sustainability, 13(16), 9121. https://doi.org/10.3390/su13169121

Priya L., Ravikumar G., Anandkumar M., Gunasekaran S., Kanimozhi E., & Jennifer D. (2012). Improving e-learning system using ontology web language. *International Journal of Modern Engineering Research, 2*(1) 366-370. http://www.ijmer.com/papers/vol2_issue1/BH021366369.pdf

Ruiu, P., Nitti, M., Pilloni, V., Cadoni, M., Grosso, E., & Fadda, M. (2024). Metaverse & Human Digital Twin: Digital Identity, Biometrics, and Privacy in the Future Virtual Worlds. *Multimodal Technologies and Interaction*, *8*(48), 1-22. https://doi.org/10.3390/mti8060048

Salmon, G., & Edirisingha, P. (2010). Developing a five-stage model of learning in Second Life. *Educational Research 52*(2), 169-182. https://shorturl.at/ZsVq0

Senadheera, S., Yigitcanlar, T., Desouza, K. C., Li, R. Y. M., Corchado, J., Mehmood, R., Mossberger, K., & Cheong, P. H. (2024). Metaverse as local government communication platform: A systematic review through the lens of publicness theory. *Cities*, *155*, 1-21. https://doi.org/10.1016/j.cities.2024.105461

Shwedeh, F. (2024). Harnessing digital issue in adopting metaverse technology in higher education institutions: Evidence from the United Arab Emirates. *International Journal of Data and Network Science*, *8*(1), 489-504. https://doi.org/10.5267/j.ijdns.2023.9.007

Silverman, D. (2006). *Interpreting qualitative data : Methods for analyzing talk, text and interaction.* Sage Publications.

Sözcü, (2022). Here are the professions that will enter our lives with the Metaverse. https://shorturl.at/4cShu

Suryodiningrat, S. P., Prabowo, H., Ramadhan, A., & Santoso, H. B. (2024). The essential components of metaverse-based mixed reality for machinery vocational schools. *Journal of Applied Engineering and Technological Science (JAETS)*, *5*(2), 1069-1085. https://doi.org/10.37385/jaets.v5i2.4117

Tanrıverdi, M., Uysal, M., & Üstündağ, T. M. (2019). What is blockchain technology? What is not: A literature review, *Journal of Information Technology*, *12*(3), 203 - 217. https://doi.org/10.17671/gazibtd.547122

Tasa, U. B. (2009). *Art and architectural design in 3D virtual worlds whose content is created by users: A case study on Second Life®*, [Unpublished Master Thesis]. Yıldız Teknik University.

Tasa, U. B., & Görgülü, T. (2010). Meta-art: Art of the 3-D user-created virtual worlds. *Digital Creativity, 21*(2), 100-111. https://doi.org/10.1080/14626261003786251

Thompson, W. (2021). Wunderman Thompson Metaverse 2021 Raporu (2021) Into The Metaverse. Wunderman Thompson Intelligence.

Tinmaz, H., & Dhillon, P. K. S. (2024). User-centric avatar design: A Cognitive walkthrough approach for Metaverse in virtual education. *Data Science and Management*(7), 267–282. https://doi.org/10.1016/j.dsm.2024.05.001

Tınmaz, H., & Fanea-Ivanovici, M. (2024). The metaverse–the next big thing in education: A systematic literature review. *Milli Eğitim Dergisi*, *53*(242), 827-854. https://doi.org/10.37669/milliegitim.1235647

Tokel, S. T., & Topu, F. B. (2017). *The use of 3D virtual world s in education in 3D Virtual Worlds and Usage Areas (1-24)* (Ed. Yüksel Göktaş). Pegem Press.

Tokgöz, M. M., & Karabatak, S. (2022). Metaverse and educational technology. *Education & Science*, 9-24. https://shorturl.at/WjxIc

Ünlü, M. (2019). International studies on improving the quality of e-learning environments in the digital age. *Journal of Ufuk University Social Sciences Institute*, *8*(16), 165-182. https://dergipark.org.tr/en/download/article-file/1476301

Vaca, B., Cela, J., & Gallardo, E. (2016). Learning profiles and collaborative work in 3D-simulation environment. *Ried-Revista Iberoamericana de Educación a Distancia, 19*(2), 193-215. https://doi.org/10.5944/ried.19.2.15438

Wong, P. P. Y., Wong, G. W. C., Pangsapa, P., & Shen, D. J. (2024). Virtual to reality: Understanding the role of metaverse as a pedagogical strategy. *Electronic Journal of e-Learning*, *22*(3), 90-110. https://doi.org/10.34190/ejel.21.6.3219

Yalın, H.İ. (2001). Instructional Technologies and Material Development. Nobel Press.

Yaratan, A. S. (2022). *The effect of augmented reality applications on students' academic achievement and attitudes in architectural education* [Master Thesis]. Fırat University.

Yıldırım, P., & Keçeci, G. (2024). Metaverse and education: A new period is beginning!. *National Education, 53*(243), 1635-1654. https://doi.org/10.37669/milliegitim.1240070

Yılmaz, H., & Ceranoğlu, M. (2022). The digital future of fashion: 3d clothes, metaverse and Nft. *Art-e Art Magazine, 15*(29), 642-672. https://doi.org/10.21602/sduarte.1081397

Yıldız, S. K., & Bozkurt, G. (2023). The New Platform Of Virtual Reality: Metaverse. *TRT Academy, 8*(17), 268-293. https://doi.org/10.37679/trta.1203353

Yiğit, Y., Yıldırım, S., & Özden, M., (2000). Web based internet tutorial: A case study. *Hacettepe University Journal of Faculty of Education, 19,* 166-176. https://dergipark.org.tr/en/download/article-file/88048

International Journal of Contemporary Educational Research

Volume 12, Number 1, March 2025, Page 123-133 Article Type: Research Article

# The Relationship between Motivation to Teach, School Climate, and Attitude toward Teaching Profession

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## Abstract

This study examines the relationships between pre-service teachers' motivation to teach, their perceptions of school climate, and their attitudes toward the teaching profession. Data were collected from 377 pre-service teachers studying at a state university in Turkey. Structural equation modeling (SEM) revealed that motivation to teach significantly and positively predicted attitudes towards teaching profession both directly and indirectly through school climate. While motivation to teach also significantly predicted school climate, school climate had a smaller but significant effect on professional attitudes. The model explained 69% of the variance in professional attitudes and 47% of the variance in school climate. These findings emphasize the importance of strengthening intrinsic motivation and creating supportive educational environments to promote positive professional attitudes in teacher education.

**Keywords:** Motivation to teach, School climate, Attitudes towards teaching profession

**Citation**
Yetiş, E. (2025). The relationship between motivation to teach, school climate, and attitude toward teaching profession. *International Journal of Contemporary Educational Research*, *12*(1), 123-133. https://doi.org/10.52380/ijcer.2025.12.1.800

| | |
|---|---|
| Received | 04.11.2024 |
| Accepted | 25.02.2025 |
| Publication | 28.03.2025 |
| Peer-Review | Double anonymized - Double Blind |
| Plagiarism Checks | Yes - iThenticate |
| Conflicts of Interest | The author(s) has no conflict of interest to declare. |
| Complaints | editor@ijcer.net |
| Grant Support | The author(s) acknowledge that they received no external funding in support of this research. |
| Copyright & License | Authors publishing with the journal retain the copyright to their work licensed under the **CC BY-NC 4.0**. |

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## Introduction

Teaching plays a crucial role in determining a nation's future by providing high-quality education and nurturing competent individuals (Mansfield and Volet, 2010). Within this framework, teacher training significantly influences the general standards and effectiveness of education systems (Darling-Hammond and Baratz-Snowdon, 2005). Teachers, who directly deliver educational content, require sufficient motivation to perform their roles effectively (Watt and Richardson, 2008). Teacher motivation can be described as the interplay between internal aspirations and external rewards that encourage teachers to participate actively in educational activities.This motivation is a key determinant of the efficiency of the teaching process, the teacher's professional commitment, and students' academic achievement (Yıldız et al., 2021). According to Self-Determination Theory (Deci & Ryan, 1985; Ryan & Deci, 2000), intrinsic motivation arises from the inherent satisfaction and meaningfulness of teaching, whereas extrinsic motivation is driven by external incentives such as financial rewards or avoidance of negative evaluations (Vermote et al., 2023). Prior studies confirm that motivated teachers exhibit higher levels of professional commitment, satisfaction, and pedagogical innovation (Yıldız et al., 2021; Sari & Yetkiner, 2020; Han & Yin, 2016). These teachers perform instructional duties due to external obligations rather than internal desires. While intrinsic motivation stems from internal satisfaction and enjoyment, extrinsic motivation is shaped by external pressures or incentives (Vermote et al., 2023). Indeed, Han and Yin (2016) emphasized that teacher motivation is positively associated with better teaching practices, increased student motivation, and overall teacher well-being. Similarly, various studies have shown that highly motivated teachers demonstrate greater commitment and success in their profession, report higher job satisfaction, and adopt innovative methods in classroom settings (Yıldız et al., 2021; Sari and Yetkiner, 2020). These findings highlight that teaching motivation is a crucial component of teacher quality.

The school climate forms the basis for instructional activities and influences the learning environment directly as well as indirectly (Nilsen et al., 2016). Even though researchers have not yet reached a consensus on a single definition of school climate (Wang and Degol, 2016), it is commonly described as "the collective patterns arising from individuals' perceptions and experiences within school," encompassing "norms, objectives, values, interpersonal dynamics, instructional approaches, and the organizational structure" (Cohen et al., 2009). In other words, the school climate reflects the shared experiences of individuals involved in the educational setting. (Thapa et al., 2013). It represents the academic, social, civic, emotional, and ethical experiences of all stakeholders (Cohen and Geier, 2010). A positive school climate is characterized by trust-based and collaborative relationships, high expectations, supportive leadership, and a well-structured learning environment (Wang and Degol, 2016). Research has demonstrated that a positive school climate significantly influences both students' academic achievement and teachers' professional attitudes and performance (Thapa et al., 2013; Toropova et al., 2021). In this context, school climate can be regarded as a critical environmental variable that shapes teachers' professional motivation, commitment, and interactions with students. The Person–Environment Fit Theory (Kristof-Brown et al., 2005) provides a relevant framework for understanding how alignment between individual characteristics (e.g., motivation) and environmental factors (e.g., school climate) can enhance job satisfaction and professional attitudes.

Attitude refers to the tendency to express or respond with a positive or negative feeling toward an object or concept (Garrett, 2010; Philipp, 2007; Robbins and Judge, 2013). Since attitude is directly related to behavior, it holds vital importance in the context of organizational behavior. The teaching profession represents a specific position within an educational organization; this position entails a set of expected behaviors and encompasses the status, responsibilities, and relationships associated with the role (Üstüner, 2006). Attitude toward the teaching profession refers to individuals' emotional, cognitive, and behavioral tendencies regarding a teaching career. This attitude includes both positive and negative evaluations of the profession and reflects one's level of professional commitment (Eagly and Chaiken, 1993). When pre-service teachers have positive professional attitudes, they tend to encourage students' intrinsic motivation for learning, communicate more effectively and constructively, and actively contribute to making the learning environment more personalized and diverse (Andronache et al., 2014). Similarly, it has been found that pre-service teachers with positive attitudes demonstrate stronger professional identification and exhibit greater enthusiasm and dedication in classroom management and instructional practices (Üstüner, 2006; Kılınç and Ceyhun, 2017).

This research aims to fill an important gap in the existing literature by investigating the relationships between pre-service teachers' motivation to teach, their perceptions regarding the school climate, and their attitudes toward the teaching profession. Earlier studies mostly examined the direct, pairwise relationships among these variables and produced valuable insights. Concerning the association between teaching motivation and professional attitudes, research has typically identified a meaningful positive connection (Erdem & Koçyiğit, 2025; Zhao et al., 2023;

Baş, 2022; Kula, 2022; Pinkas, 2022; Davulcu et al., 2021; Rahman and Ashraf, 2020; Kanadlı, 2017 Ayık & Ataş, 2014; Uçgun, 2013; Chien et al., 2012). For instance, in a study conducted by Baş (2022) involving 447 pre-service teachers in Türkiye, it was revealed that teaching motivation was positively correlated with attitudes towards teaching, with components of attitude significantly predicting motivation. Similarly, Kula (2022), examining 361 pre-service teachers, concluded that intrinsic teaching motivation strongly predicted professional attitudes. These results imply that pre-service teachers who are highly motivated also exhibit more favorable professional attitudes (Kanadlı, 2017; Richardson and Watt, 2018). In this context, the following hypothesis has been developed, proposing that teaching motivation positively influences attitudes toward the teaching profession. This hypothesis posits that an increase in a teacher's teaching motivation results in the development of a more favorable attitude toward the profession.

**H1: Teaching motivation positively influences attitudes toward the teaching profession.**

In the literature concerning teaching motivation and school climate, the focus has predominantly been on the impact of school climate on teacher motivation. For instance, Pinkas (2022), in a study conducted with 467 teachers, found that perceived school climate significantly predicted teachers' work motivation. This finding indicates that a supportive and positive school environment can enhance teacher motivation. Similarly, Erdem and Koçyiğit (2025), in a large-scale study involving 3,883 teachers, revealed that teacher motivation plays a mediating role in the relationships between school climate and teaching quality, as well as between school climate and teacher job satisfaction. In another study conducted by Davulcu et al. (2021) with 3,868 teachers, a positive and moderate-level relationship was identified between school climate and teacher motivation. In this context, the following hypothesis was developed, proposing that teaching motivation positively influences school climate. This hypothesis suggests that teachers with high individual motivation may contribute to the development of a more positive climate within their schools.

**H2: Teaching motivation positively influences school climate.**

When investigating the relationship between school climate and attitudes towards teaching, existing literature commonly points to a significant positive connection between these variables. In a study conducted with 411 pre-service teachers, Güneş (2019) reported a notable positive association between perceived school climate and attitudes toward the teaching profession. Similarly, research by Cardina and Fegley (2016), involving 318 health education teachers, highlighted a positive correlation between these two factors. Additionally, Rahman and Ashraf (2020) examined 100 teachers and found a meaningful relationship between school climate perceptions and attitudes toward their profession. Based on these findings, a hypothesis was formulated suggesting that school climate positively affects attitudes toward teaching. In other words, it is anticipated that teachers working in supportive and positive school climates will hold more favorable views regarding their profession.

**H3: School climate positively influences attitudes toward the teaching profession.**

Previous research addressing the interactions among school climate, teaching motivation, and professional attitudes indicates that school climate can act as a mediating factor within various relationship models. For example, Pinkas (2021) demonstrated that perceived school climate partially mediated the relationship between principals' leadership approaches and teacher motivation. Likewise, Sun (2017) found that a positive school climate indirectly promoted teachers' willingness to adopt innovative practices. Consequently, this study aims to empirically examine—for the first time—a three-way interaction model involving school climate, teaching motivation, and attitudes toward teaching. Specifically, the hypothesis proposes that school climate might serve as an underlying mediator influencing the relationship between teachers' motivation and their attitudes toward the profession. In other words, it is expected that a supportive school climate could facilitate highly motivated teachers in developing more positive professional attitudes.

**H4: School climate mediates the relationship between teaching motivation and attitudes toward the teaching profession.**

## Method

In this study, (SEM) was utilized to investigate the relationships among pre-service teachers' teaching motivation, perceptions of school climate, and attitudes toward the teaching profession. SEM is a robust statistical method integrating multiple analytical procedures, designed to investigate and validate the predictive connections between variables within complex structures (Bowen and Guo, 2011; Ullman and Bentler, 2012). The research model developed for this study and the proposed relationships among variables are illustrated in Figure 1.

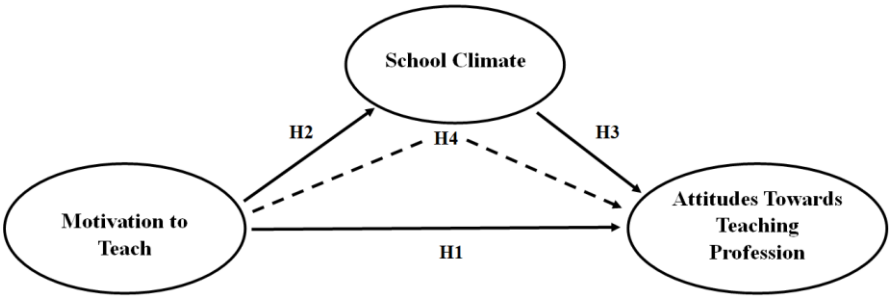


Figure 1: Proposed Model

**Participants**

This study was conducted with the participation of 377 pre-service teachers enrolled at the Faculty of Education of a university located in Eastern Türkiye. Data were collected using an online questionnaire distributed to students. The questionnaire included a concise and clear description of the study's purpose and guaranteed participant confidentiality. The demographic characteristics of the participants are presented in Table 1.

Table 1. Demographics of main study sample

| Variable | Groups | N | % |
|---|---|---|---|
| **Gender** | Female | 231 | 61.3 |
| | Male | 146 | 38.7 |
| | Total | 377 | 100 |
| **Field of Study** | Social Sciences | 246 | 65.3 |
| | Natural Sciences | 61 | 16.2 |
| | Fine Arts / Physical Education / Conservatory | 78 | 19.4 |
| **Preferred Teaching Level** | Primary School | 27 | 7.2 |
| | Middle School | 52 | 13.8 |
| | High School | 248 | 65.8 |
| | Other | 50 | 13.3 |

As shown in Table 1, 61.3% of the participants (n = 231) were female, while 38.7% (n = 146) were male, and it was observed that the participants were enrolled in various academic departments.

**Data Collection Instruments**

In this study, a personal information form, the School Climate Scale, the Motivation to Teach Scale, and the Attitude Toward the Teaching Profession Scale were used as data collection instruments.

*Personal Information Form:* Prepared by the researchers, this form includes descriptive information about the participants, such as age, gender, field of study, and the educational level at which they wish to teach.

*Attitude Toward the Teaching Profession Scale:* The internal consistency reliability of the Attitude Toward the Teaching Profession Scale, developed by Kahramanoğlu et al. (2018), was evaluated using Cronbach's alpha coefficient and the split-half reliability method. The Cronbach's Alpha coefficient for the 12-item, unidimensional version of the scale was calculated as .85. The reliability coefficient for the full scale was found to be .76. The confirmatory factor analysis (CFA) fit indices calculated for this study indicated a good fit ($\chi^2/df = 3.92$, RMSEA = 0.07, CFI = .91, TLI = .90, SRMR = 0.03).

*Motivation to Teach Scale (MTS):* The scale, developed by Kauffman, Yılmaz Soylu, and Duke (2011), was created to assess pre-service teachers' intrinsic and extrinsic motivations for teaching. During the development process, an item pool of 160 statements was created—80 for intrinsic motivation and 80 for extrinsic motivation. After expert reviews and a pilot study, the scale was finalized with 12 items. It is a 6-point Likert-type scale consisting of two subdimensions: intrinsic motivation and extrinsic motivation. The CFA fit indices calculated for this study indicated a good model fit ($\chi^2/df = 3.84$, RMSEA = 0.07, CFI = .96, TLI = .95, SRMR = 0.03).

*School Climate Scale:* In this research, the School Climate Scale for University Students developed by Terzi (2015) was utilized. The scale comprises 17 items organized into three subdimensions: school attachment (5 items),

communication (6 items), and learning environment (6 items). The CFA results calculated for this study indicated an acceptable model fit ($\chi^2/df = 4.68$, RMSEA = 0.08, CFI = .93, TLI = .92, SRMR = 0.04).

**Data Collection**

Upon receiving approval from the ethics committee of the Faculty of Education at Fırat University (Date: 16.07.2024 – Approval No: 25732), the data collection phase was initiated. An online questionnaire form was delivered via mobile and internet networks to pre-service teachers who voluntarily agreed to participate in the research. Participants received comprehensive information about the study's purpose and were explicitly informed that their personal details would remain strictly confidential. It was emphasized that no identifying information would be shared, and participants had the freedom to withdraw from the survey at any point without any consequences.

**Data Analysis**

Prior to performing the (SEM) analysis, common method bias was assessed. Common method bias refers to the shared variance that arises from the measurement method itself and is an important concern that should be tested prior to SEM analysis (Hair et al., 2021; Podsakoff et al., 2003). Such bias may emerge when survey instructions lead participants toward particular response tendencies or due to social desirability effects (Kock, 2017). In this study, Harman's single-factor test and Variance Inflation Factor (VIF) values were employed to evaluate the presence of common method bias. The calculated VIF values were found to be below 3, and the single-factor structure explained 47.96% of the total variance. These results indicate that common method bias is at a negligible level.

To assess the convergent and discriminant validity of the measurement model, Average Variance Extracted (AVE) and Composite Reliability (CR) values were calculated. Furthermore, Cronbach's alpha coefficient was used to evaluate the internal consistency reliability of the scales (Fornell and Larcker, 1981). For adequate levels of validity and reliability, AVE values should preferably be above 0.50, whereas both CR and Cronbach's alpha coefficients should exceed 0.70 (Fornell and Larcker, 1981; Nunnally and Bernstein, 1994).

Finally, the structural model was examined to evaluate the hypothesized relationships. The model fit was determined by using multiple fit indices, such as $\chi^2/df$ (chi-square to degrees of freedom ratio), RMSEA (Root Mean Square Error of Approximation), CFI (Comparative Fit Index), TLI (Tucker–Lewis Index), and SRMR (Standardized Root Mean Square Residual) (Kline, 2015). Good model fit is indicated by $\chi^2/df < 5$, RMSEA and SRMR < 0.08, and CFI and TLI > 0.90 (Hu and Bentler, 1999; Kline, 2015). To test the significance of indirect effects within the model, the bootstrap method with 2,000 resamples was applied and 95% confidence intervals were calculated (Davison and Hinkley, 1997; Efron and Tibshirani, 1994). Correlations between variables were interpreted as follows: 0.00–0.29 = weak, 0.30–0.69 = moderate, and 0.70–1.00 = strong (Cohen, 1988).

Table 2 provides descriptive statistics and reliability and validity coefficients for Attitude Towards Teaching Profession, Motivation to Teach, and School Climate scales.

Table 2. Descriptive Statistics, Reliability, and Validity

| | $\bar{X}$ | Sd | Skewness | Kurtosis | α | CR | AVE |
|---|---|---|---|---|---|---|---|
| 1. Attitude Towards Teaching Profession | 2.60 | 1.08 | 0.896 | -0.585 | 0.97 | 0.97 | 0.79 |
| 2. Motivation to Teach | 3.01 | 0.95 | 0.369 | -0.904 | 0.95 | 0.96 | 0.67 |
| 2.1. Intrinsic Motivation | 2.96 | 1.01 | 0.444 | -0.673 | 0.93 | 0.93 | 0.66 |
| 2.2. Extrinsic Motivation | 3.08 | 0.97 | 0.361 | -0.612 | 0.91 | 0.91 | 0.69 |
| 3. School Climate | 3.11 | 0.98 | 0.192 | -1.069 | 0.96 | 0.97 | 0.70 |
| 3.1. Commitment to School | 3.19 | 1.03 | 0.009 | -0.873 | 0.91 | 0.91 | 0.69 |
| 3.2. Communication | 3.07 | 1.09 | 0.173 | -0.956 | 0.94 | 0.94 | 0.72 |
| 3.3. Learning Environment | 3.08 | 1.10 | 0.144 | -0.930 | 0.94 | 0.94 | 0.74 |

The skewness and kurtosis values for Attitude Towards Teaching Profession, Motivation to Teach, and School Climate fall within the normal distribution range (Tabachnick and Fidell, 2007). The Cronbach's Alpha reliability coefficients ranged from .91 to .97, indicating excellent internal consistency. The Composite Reliability (CR)

values ranged from 0.91 to 0.97, and the Average Variance Extracted (AVE) values ranged from 0.66 to 0.79, confirming good convergent validity (Fornell and Larcker, 1981). Among the variables, Commitment to School (M = 3.19, SD = 1.03), Learning Environment (M = 3.08, SD = 1.10), Extrinsic Motivation (M = 3.08, SD = 0.97), and Communication (M = 3.07, SD = 1.09) have relatively higher mean scores. On the other hand, Attitude Towards Teaching Profession has the lowest mean score (M = 2.60, SD = 1.08). The standard deviation values suggest heterogeneous opinions among participants.

Correlation values between variables and measurement model results are presented in Table 3.

Table 3. Correlation Values and Measurement Model

| | **1.** | **2.** | **2.1** | **2.2** | **3** | **3.1** | **3.2** | **3.3** |
|---|---|---|---|---|---|---|---|---|
| 1. Attitude Towards Teaching Profession | 1 | | | | | | | |
| 2. Motivation to Teach | .816** | 1 | | | | | | |
| 2.1. Intrinsic Motivation | .806** | .971** | 1 | | | | | |
| 2.2. Extrinsic Motivation | .742** | .936** | .823** | 1 | | | | |
| 3. School Climate | .695** | .689** | .663** | .653** | 1 | | | |
| 3.1. Commitment to School | .613** | .655** | .631** | .620** | .866** | 1 | | |
| 3.2. Communication | .639** | .597** | .579** | .558** | .932** | .700** | 1 | |
| 3.3. Learning Environment | .651 | .645** | .615** | .620** | .938** | .721** | .826** | 1 |
| Measurement Model Fit Values | **χ2/df** | **RMSEA** | **SRMR** | **CFI** | **TLI** | | | |
| | 3.54 | 0.07 | 0.05 | 0.90 | 0.90 | | | |

An analysis of the correlation coefficients among the research variables revealed that all relationships were statistically significant at the .01 level. Notably, a strong positive correlation was found between Attitude Toward the Teaching Profession and Motivation to Teach ($r = .816$, $p < .01$). Similarly, a strong positive relationship was found between Motivation to Teach and its sub-dimensions: Intrinsic Motivation ($r = .971$, $p < .01$) and Extrinsic Motivation ($r = .936$, $p < .01$). Furthermore, School Climate showed high positive correlations with Commitment to School ($r = .866$, $p < .01$), Communication ($r = .932$, $p < .01$), and Learning Environment ($r = .938$, $p < .01$). The measurement model fit indices indicated good model fit ($\chi^2/df = 3.54$, RMSEA = .07, SRMR = .05, CFI = .90, TLI = .90).

The structural equation model illustrating the effect of Motivation to Teach on Attitudes Toward the Teaching Profession, mediated by School Climate, is displayed in Figure 2.

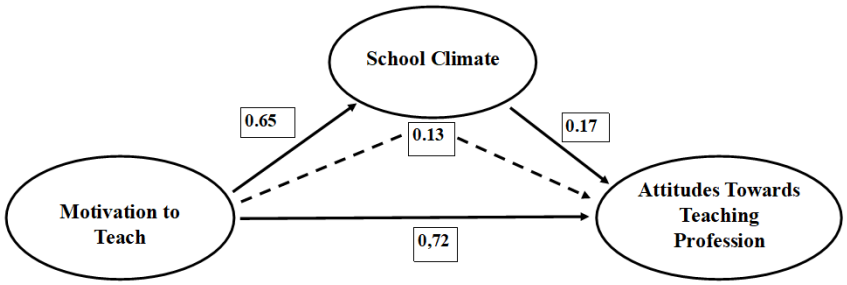


**Figure 2. Illustrates the direct and indirect relationships among Motivation to Teach, School Climate and Attitudes Towards Teaching Profession.**

According to the (SEM) results, Motivation to Teach has a strong direct effect (β = 0.72) on Attitudes Towards Teaching Profession and also has a significant indirect effect through School Climate (β = 0.13). Additionally, Motivation to Teach significantly predicts School Climate (β = 0.65), and School Climate in turn positively affects Attitudes Towards Teaching Profession (β = 0.17). In the model, solid lines indicate direct paths, while dashed lines represent indirect paths.

Table 4. Bootstrapping results for mediation model of Attitude Towards Teaching Profession, Motivation to Teach, and School Climate

| | β | S.E. | z | 95% Confidence Interval | | $R^2$ | p |
|---|---|---|---|---|---|---|---|
| | | | | Lower | Upper | | |
| Total effect | | | | | | | |
| Motivation to Teach → Attitudes Towards Teaching Profession | 0.854 | 0.023 | 37.841 | 0.81 | 0.53 | 0.69 | 0.000 |
| Specific direct effect | | | | | | | |
| Motivation to Teach → Attitudes Towards Teaching Profession | 0.722 | 0.055 | 13.109 | 0.63 | 0.81 | | 0.000 |
| Motivation to Teach → School Climate | 0.652 | 0.073 | 8.983 | 0.66 | 0.81 | 0.47 | 0.000 |
| School Climate → Attitudes Towards Teaching Profession | 0.179 | 0.062 | 2.918 | 0.07 | 0.27 | | 0.000 |
| Specific indirect effect | | | | | | | |
| Motivation to Teach → School Climate → Attitudes Towards Teaching Profession | 0.132 | 0.044 | 3.008 | 0.05 | 0.20 | | 0.003 |
| SEM Fit Values | **χ2/df)** | **RMSEA** | **SRMR** | **CFI** | **TLI** | | |
| | 3.54 | 0.07 | 0.05 | 0.90 | 0.90 | | |

The bootstrap analysis results revealed that Motivation to Teach positively and significantly influences Attitudes Towards Teaching Profession (β = 0.722; p < .000) and School Climate (β = 0.652; p < .000). Additionally, School Climate positively and significantly influences Attitudes Towards Teaching Profession (β = 0.179; p < .000). The (SEM) analysis also indicated that Motivation to Teach has a positive and significant indirect effect on Attitudes Towards Teaching Profession through School Climate (β = 0.132; p < .003). The total effect of Motivation to Teach on Attitudes Towards Teaching Profession is positive and significant (β = 0.854; p < .000). Furthermore, Motivation to Teach explains 47% of the variance in School Climate, while Motivation to Teach and School Climate together explain 69% of the variance in Attitudes Towards Teaching Profession. The model fit indices indicate good model fit ($\chi^2$/df = 3.54, RMSEA = .07, SRMR = .05, CFI = .90, TLI = .90).

## Discussion

This study utilized (SEM) to examine the relationships among pre-service teachers' teaching motivation, their perceptions of school climate, and their attitudes toward the teaching profession. The results were found to align with previous research in the existing literature. Each result, when analyzed within the scope of existing research, offers both points of consistency and contributions specific to the field. Theoretically, this study contributes to the literature by positioning school climate not only as an outcome variable but also as a contextual mechanism that amplifies or regulates the influence of intrinsic motivation on professional attitudes.

The analysis revealed that pre-service teachers' teaching motivation was a strong predictor of their attitudes toward the profession. Individuals with higher motivation levels exhibited more favorable attitudes toward teaching. This result aligns with previous findings in the literature (Kula, 2022; Ayık and Ataş, 2014; Kontaş, 2016). This suggests that fostering intrinsic motivation during teacher education may enhance pre-service teachers' professional attitudes. This underscores the applicability of Self-Determination Theory (Deci & Ryan, 1985) in explaining how autonomous motivation can translate into strong occupational commitment among prospective teachers.

Another significant finding of this study is that pre-service teachers' motivation to teach was a strong predictor of their perceptions of school climate. Although past studies have predominantly focused on how school climate influences teacher motivation, there is also evidence from existing research that points to a mutual relationship between these two variables (Pinkas, 2022; Pişmek et al., 2023; Fang and Qi, 2023; Erdem and Koçyiğit, 2025; Ali and Saleh, 2021). The present findings suggest that highly motivated pre-service teachers may either perceive school environments more positively or contribute to the formation of a more supportive and engaging climate. Thus, enhancing teacher motivation may yield benefits not only at the individual level but also in fostering a more positive overall school climate. This insight provides a reverse-directional interpretation rarely explored in prior studies, highlighting the role of agency in shaping contextual perception.

In our study, school climate was also found to significantly predict pre-service teachers' attitudes toward the profession. This finding is largely consistent with prior research that has explored the influence of school climate on teacher attitudes (Güneş, 2019; Weisel and Dror, 2006; Maxwell, 2016). However, in our model, the effect of school climate was lower than the effect of teaching motivation. This may indicate that individual motivation plays

a primary role in shaping professional attitudes, while environmental conditions are secondary. This supports the argument that while institutional factors matter, internalized values and intrinsic drives are more decisive in early-stage professional identity formation.

Another notable result in our structural model is the significant indirect effect of teaching motivation on attitudes toward the profession. This indicates that teaching motivation influences professional attitudes not only directly but also indirectly through the mediating role of school climate. In other words, highly motivated pre-service teachers tend to develop positive professional attitudes both directly and by perceiving or contributing to a supportive school climate. This finding is supported by studies that emphasize the interaction between motivation and environmental factors. For instance, Zeidan (2023) found that both motivation and school climate play a joint role in teachers' decisions to remain in or leave the profession, highlighting the need for further exploration of their interrelations. Similarly, another study identified teacher motivation as a mediator in the relationship between school climate and job satisfaction (Erdem and Koçyiğit, 2025). Such findings underscore the importance of considering individual motivation and organizational context together in understanding teacher behavior and attitudes. In our model, although the direct effect of teaching motivation was notably strong, the additional indirect effect via school climate suggests a partial mediation. This means that the impact of motivation is not confined solely to internal factors but can be further amplified in a conducive school environment. This partial mediation demonstrates that motivation interacts with environmental affordances, offering empirical support for ecological frameworks like Person–Environment Fit Theory (Kristof-Brown et al., 2005).

Overall, the proposed model in this study proved to be highly effective in explaining pre-service teachers' professional attitudes. Specifically, it accounted for approximately 47% of the variance in school climate and 69% of the variance in attitudes toward the teaching profession. These high levels of explained variance indicate that variables such as motivation and school climate play a critical role in shaping how pre-service teachers view the profession. In conclusion, this study provides a more holistic perspective by situating the themes of motivation and attitude within the context of school climate in teacher education. While previous research has typically examined these variables in pairs, the current study's integration of all three offers richer theoretical and practical insights. This integration of motivation, climate, and attitude variables in a single mediational framework sets a foundation for future longitudinal research, policy development, and curriculum innovation in teacher education.

## Conclusion and Recommendations

The general findings of this study can be summarized as follows:

School climate has a substantial impact on pre-service teachers' motivation for teaching and their attitudes toward the teaching profession. When pre-service teachers perceive the school climate positively, their motivation tends to increase, leading to more favorable professional attitudes.

Teaching motivation emerged as a key determinant influencing pre-service teachers' attitudes toward the teaching profession. Pre-service teachers exhibiting higher motivation levels were found to hold more positive professional attitudes and values. This indicates that intrinsic motivation significantly shapes commitment and enthusiasm for the teaching career. Additionally, the findings revealed an indirect relationship in which school climate influences attitudes toward teaching through its impact on teaching motivation. In other words, a positive school climate first boosts motivation, which in turn leads to improved professional attitudes. Additionally, the direct effect of school climate was found to be significant; a supportive school environment can positively shape professional attitudes independently of motivation levels. This finding underscores the multifaceted importance of school climate in teacher education.

Based on these findings, several recommendations can be made for teacher education programs and educational policy at both individual and institutional levels. First, it is essential to prioritize experiences and activities that strengthen pre-service teachers' intrinsic motivation. Practical experiences that increase candidates' desire to teach have been shown to positively influence their professional attitudes. Second, creating and conveying a positive school climate to pre-service teachers is crucial. Candidates who are trained or intern in schools characterized by collaboration, open communication, and a culture of support are more likely to develop strong professional commitment. Future research could extend this model by incorporating additional variables, such as self-efficacy beliefs, leadership support, or teacher stress, to offer a broader perspective on factors influencing attitudes toward the teaching profession. Moreover, employing longitudinal research designs could facilitate a deeper understanding of how teaching motivation and professional attitudes evolve over time, as well as provide insights into the sustained impact of school climate. To support policymakers, it is recommended to design national teacher

education frameworks that mandate structured motivational enhancement activities—such as reflective teaching journals, peer mentoring systems, and value-based training modules—as part of initial teacher preparation programs. For practitioners and school administrators, fostering a climate of psychological safety, shared leadership, and teacher autonomy may help enhance both teacher motivation and retention.

The findings of this research indicate that pre-service teachers who possess higher motivation levels and are educated within supportive school environments generally exhibit more favorable attitudes toward teaching as a profession. Therefore, it is important to simultaneously address both individual and institutional aspects when aiming to nurture qualified and committed future teachers. In future research, it is suggested to test this model in diverse cultural and institutional contexts to assess its generalizability and relevance beyond the current sample. Researchers may also consider using mixed-method approaches to capture the nuanced interplay between motivational dynamics and perceived climate factors, offering a more holistic understanding of teacher identity development over time.

**Author Contribution Rate**
Author contribution rate is 100%

**Ethical Approval**
Ethical permission (16.07.2024-25732) was obtained from Firat University institution for this research.

**References**


Al-Asme, M. B. K. (2022). Teachers' attitudes towards the teaching profession among government school teachers in the Sultanate of Oman. Journal of the College of Education, Ain Shams University, 46(3), 63-89.

Ali, A. K., & Saleh, M. (2021). Contribution of the principal's transformational leadership and school climate on teacher performance through work motivation. *Journal of K6 Education and Management*, *4*(1), 81-90.

Andronache, D., Bocoş, M., Bocoş, V., & Macri, C. (2014). Attitude towards teaching profession. *Procedia-Social and Behavioral Sciences*, *142*, 628-632. https://doi.org/10.11594/jk6em.04.01.08

Ayık, A., & Ataş, Ö. (2014). Öğretmen adaylarının öğretmenlik mesleğine yönelik tutumları ile öğretme motivasyonları arasındaki ilişki. Eğitim Bilimleri Araştırmaları Dergisi, 4(1), 25-43. : http://dx.doi.org/10.12973/jesr.2014.41.2

Bas, G. (2022). Effect of student teachers' teaching beliefs and attitudes towards teaching on motivation to teach: mediating role of self-efficacy. *Journal of Education for Teaching*, *48*(3), 348-363. https://doi.org/10.1080/02607476.2021.2006043

Bowen, N. K., & Guo, S. (2011). *Structural equation modeling*. Oxford University Press.

Cardina, C. E., & Fegley, J. M. (2016). Attitudes Towards teaching and perceptions of school climate among health education teachers in the United States, 2011-2012. *Journal of Health Education Teaching*, 7(1), 1-14.

Cohen, J., & Geier, V.K. (2010). School Climate Research Summary: January 2010. 〈www. schoolclimate.org/climate/research.php〉

Cohen, J., McCabe, E. M., Michelli, N. M., & Pickeral, T. (2009). School climate: Research, policy, practice, and teacher education. Teachers College Record, 111(1), 180–213. https://doi.org/10.1177/016146810911100108

Davison, A. C., & Hinkley, D. V. (1997). *Bootstrap methods and their application* (No. 1). Cambridge university press.

Davulcu, Ö., Kuluma , H. & Kaçmaz, S. (2021). Examining the relationship between the school climate and motivation of teachers who work in primary and secondary schools. *Global Journal of Guidance and Counseling in Schools: Current Perspectives*, 11(1), 01-14. https://doi.org/10.18844/gjgc.v11i1.5601

Eagly, A. H., & Chaiken, S. (1993). *The psychology of attitudes*. Harcourt brace Jovanovich college publishers.

Efron, B., & Tibshirani, R. J. (1994). *An introduction to the bootstrap*. Chapman and Hall/CRC.

Fang, J., & Qi, Z. (2023). The influence of school climate on teachers' job satisfaction: The mediating role of teachers' self-efficacy. *Plos one*, *18*(10), e0287555. https://doi.org/10.1371/journal.pone.0287555

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of marketing research*, *18*(1), 39-50. https://doi.org/10.1177/002224378101800104

Garrett, P. (2010). *Attitudes to language*. Cambridge University Press.

Güneş, A. M. (2019). Öğretmen adaylarının öğretmenlik mesleğine yönelik tutumlarıyla okul iklimi arasındaki ilişki. *Ahi Evran Üniversitesi Kırşehir Eğitim Fakültesi Dergisi*, *20*(3), 1595-1632. https://doi.org/10.29299/kefad.2019.20.03.017

Hair Jr, J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., Danks, N. P., & Ray, S. (2021). *Partial least squares structural equation modeling (PLS-SEM) using R: A workbook* (p. 197). Springer Nature. https://doi.org/10.1007/978-3-030-80519-7

Han, J., & Yin, H. (2016). Teacher motivation: Definition, research development and implications for teachers. *Cogent education*, *3*(1), 1217819. https://doi.org/10.1080/2331186X.2016.1217819

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. https://doi.org/10.1080/10705519909540118

Kahramanoğlu, R., Yokuş, E., Cücük, E., Vural, S., & Şiraz, F. (2018). Öğretmenlik mesleğine yönelik tutum ölçeği (ÖMYTÖ) geçerlik ve güvenirlik çalışması. *Turkish Studies*, *13*, 11. http://dx.doi.org/10.7827/TurkishStudies.13561

Kanadlı, S. (2017). Prospective teachers' professional self-efficacy beliefs in terms of their perceived autonomy support and attitudes towards the teaching profession: A mixed methods study. *Kuram ve Uygulamada Egitim Bilimleri*, *17*(5), 1847-1871. DOI 10.12738/estp.2017.5.0597

Kauffman, D. F., Soylu, M. Y., & Duke, B. (2011). Validation of the motivation to teach scale. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi*, *40*(40), 279-290.

Kline, R. B. (2023). *Principles and practice of structural equation modeling*. Guilford publications.

Kock, N. (2017). Common method bias: a full collinearity assessment method for PLS-SEM. *Partial least squares path modeling: Basic concepts, methodological issues and applications*, 245-257. https://doi.org/10.1007/978-3-319-64069-3_11

Kontas, H. (2016). The Effect of an Education-Themed Movie on the Academic Motivation of Teacher Candidates and Their Attitude Towards Teaching Profession. *Journal of Education and training studies*, *4*(6), 93-103. http://dx.doi.org/10.11114/jets.v4i6.1483

Kula, S. S. (2022). The predictive relationship between pre-service teachers' self-efficacy belief, attitudes towards teaching profession and teaching motivation. *International Journal of Contemporary Educational Research*, *9*(4), 705-718. https://doi.org/10.33200/ijcer.1068573

Maxwell, A. R. (2016). *The composition and characteristics of teacher self-efficacy for inclusive practice*. University of Exeter (United Kingdom).

McCarthy, C. J., R. G. Lambert, S. Lineback, P. Fitchett, and P. G. Baddouh. 2016. "Assessing Teacher Appraisals and Stressin the Classroom: Review of the Classroom Appraisal of Resources and Demands." Educational Psychology Review 28:577–603. https://doi.org/10.1007/s10648-015-9322-6.

Nilsen, T., Gustaffsson, J.-E., Bl¨omeke, S., 2016. Conceptual framework and methodology of this report. In: Nilsen, T., Gustafsson, J.-E. (Eds.), Teacher quality, instructional quality and student outcomes. Springer Open. DOI 10.1007/978-3-319-41252-8_1

Nunnally, J. C., & Bernstein, I. H. (1994). Psychometric theory. New York: McGraw-Hill.

Philipp, R. A. (2007). Mathematics teachers' beliefs and affect. *Second handbook of research on mathematics teaching and learning*, *1*, 257-315.

Pinkas, G. (2022). The Relationship between Perception of School Climate and Teacher Motivation. *DHS-Društvene i humanističke studije: časopis Filozofskog fakulteta u Tuzli*, *20*(20), 209-228. https://doi.org/10.51558/2490-3647.2022.7.3.209

Pişmek, N., Pişmek, Ü. & Akyüz Çömez, S. (2023). Okul İklimi ve Öğretmen Motivasyonu Arasındaki İlişkinin İncelenmesi, *International Social Mentality and Researcher Thinkers Journal*, (Issn:2630-631X) 9(75): 4429-4457. DOI: http://dx.doi.org/10.29228/sm ryj.70757

Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: a critical review of the literature and recommended remedies. *Journal of applied psychology*, *88*(5), 879. https://doi.org/10.1037/0021-9010.88.5.879

Rahman, A. K., & Ashraf, P. (2020). A Study on The influence of school organizational climate and attitude of teachers. *Our Heritage*, *68*(1), 3709-3712.

Richardson, P. W., & Watt, H. M. (2018). Teacher professional identity and career motivation: A lifespan perspective. *Research on teacher identity: Mapping challenges and innovations*, 37-48. https://doi.org/10.1007/978-3-319-93836-3_4

Robbins, S. P., & Judge, T. (2013). *Comportamiento organizacional: edición 15*. Pearson educación.

Sari, H., & Yetkiner, A. (2020). Relationships between Job Satisfaction, Motivation and Life Satisfaction in the Teachers: A Structural Equation Modeling Study. *International Journal of Progressive Education*, 16(3). https://doi.org/10.29329/ijpe.2020.248.16

Sun, C. (2017). *Attitudes of chinese preschool teachers towards inclusion of students with special needs in relation to teacher self-efficacy and school climate* (Doctoral dissertation, University of the Pacific).

Terzi, A. R., & BAÜ, N. E. F. (2015). Developing a school climate scale for university students. *Journal of Research in Education and Teaching*, *4*(4), 111-117.

Thapa, A., Cohen, J., Guffey, S., & Higgins-D'Alessandro, A. (2013). A review of school climate research. *Review of educational research*, *83*(3), 357-385. https://doi.org/10.3102/0034654313483907

Toropova, A., Myrberg, E., & Johansson, S. (2021). Teacher job satisfaction: the importance of school working conditions and teacher characteristics. *Educational review*, *73*(1), 71-97. https://doi.org/10.1080/00131911.2019.1705247

Uçgun, D. (2013). Türkçe öğretmenlerinin öğrencileri motive etme düzeyleri ile ilköğretim 6. sınıf öğrencilerinin Türkçe dersine yönelik tutumları arasındaki ilişki. *Mersin Üniversitesi Eğitim Fakültesi Dergisi*, 9(2), 449-460. https://doi.org/10.17860/efd.56606

Ullman, J. B., & Bentler, P. M. (2012). Structural equation modeling. *Handbook of psychology, second edition*, *2*.

Üstüner, M. (2006). Öğretmenlik mesleğine yönelik tutum ölçeğinin geçerlik ve güvenirlik çalışması. *Kuram ve Uygulamada Eğitim Yönetimi*, *45*(45), 109-127.

Vermote, B., Vansteenkiste, M., Soenens, B., & Beyers, W. (2023). Which teachers feel good and adopt a motivating teaching style? The role of teaching identity and motivation to teach. Studies in Higher Education, 49(11), 2235–2261. https://doi.org/10.1080/03075079.2023.2296565

Wang, M. T., & Degol, J. L. (2016). School climate: A review of the construct, measurement, and impact on student outcomes. *Educational psychology review*, *28*(2), 315-352. https://doi.org/10.1007/s10648-015-9319-1

Weisel, A., & Dror, O. (2006). School climate, sense of efficacy and Israeli teachers' attitudes toward inclusion of students with special needs. *Education, Citizenship and Social Justice*, *1*(2), 157-174. https://doi.org/10.1177/1746197906064677

Yamina, Q. (2021). Students' attitudes toward the teaching profession and its relationship to university students' motivation for achievement. An Unpublished Master's Thesis, Ahmed Draya University, Adrar, Department of Social Sciences, Algeria.

Yıldız, B. B., Gunay, G., & Özbilen, F. M. (2021). Evaluation of Teachers' Motivation and Curriculum Autonomy Levels. *Educational Policy Analysis and Strategic Research*, 16(2), 330-353. https://doi.org/10.29329/epasr.2020.345.15

Zeidan, S. S. (2023). *Teacher Motivation, School Climate Student Behavior in Louisiana* (Doctoral dissertation, Grand Canyon University).

Zhao, K., Chen, N., Liu, G., Lun, Z., & Wang, X. (2023). School climate and left-behind children's achievement motivation: The mediating role of learning adaptability and the moderating role of teacher support. *Frontiers in Psychology*, *14*, 1040214. https://doi.org/10.3389/fpsyg.2023.1040214