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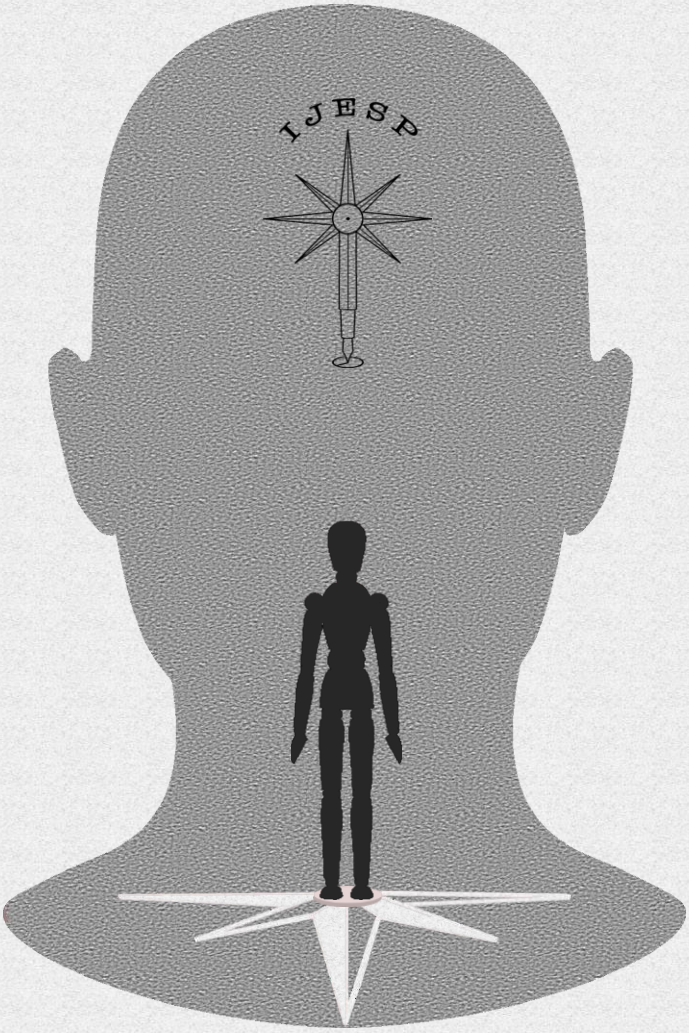

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The Concept of Micro-Credentials in the Context of Curriculum

Saadet Çınar[1], Mustafa Cem Babadoğan[2]

ABSTRACT

The aim of this study is to explain micro-credentials through the four components of a curriculum: objectives, content, teaching-learning processes, and assessment. This study was conducted using systematic review and the data were obtained through document analysis. Due to the lack of sources in Türkiye, the study sources consist of international articles, meeting minutes, booklets, books, brochures, and journals**.** Additionally, since online sources can also be used as data in document analysis, reliable official websites such as those of EHEA, OECD and YÖK were also used as study material, providing relevant information, definitions, statistics, and analyses. Content analysis was employed in the data analysis process. The data were categorized into four main themes: Objectives of Micro-Credentials**,** Content in Micro-Credentials**,** Teaching and Learning Processes in Micro-Credentials**,** and Assessment in Micro-Credentials**.** While some policymakers, educators, and trainers around the world have already recognized micro-credentials as useful practice and begun integrating them into policy frameworks, micro-credentials have become increasingly prominent in discussions of higher education in Türkiye in recent years. To understand the potential and limitations of micro-credentials, the issue should be made a state policy in Türkiye and a commission should be established to develop a framework. The practices of countries that have made progress in the field of micro-credentials should be studied, and interviews can be conducted with key stakeholders such as learners, employers, higher education institutions, and government officials, to examine micro-credentials from different perspectives.

Keywords: Micro-credentials, higher education, curriculum

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Introduction

In a world characterized by constant change, individuals' desires and needs have become increasingly diverse, which also impact educational systems that hold a significant place in people's lives. As Varış (1978) stated, education, which has a complex and multidimensional structure, is a product of interacting forces and possesses a multifaceted, comprehensive, continuous, and dynamic nature. The learning process, which begins at birth, continues within educational institutions as the individual reaches a certain age. Higher education institutions, where the individual actively and consciously carries out their education and learning process, are among the most crucial components of education.

Since their establishment, universities around the world have demonstrated continuous development and change on a national scale in order to provide more modern, academic, and high-quality higher education to the communities they serve. While countries work to advance their own higher education systems, they should also investigate different higher education systems worldwide and maintain communication with these institutions (Unvan, 2016).

To increase inter-university interaction and sharing, the Erasmus program was launched approximately 30 years ago, triggering structured collaboration among European higher education institutions. As demand for Erasmus student mobility rapidly increased, it became evident that the differing systems of universities led to incompatibilities. With the signing of the Sorbonne Declaration in 1998 by representatives from four countries, the aim was to create a common higher education area in Europe and facilitate student mobility and employability. Starting with these objectives, the Bologna Process continued in 1999 with the Bologna Declaration, signed by representatives from 29 European countries. The creation of the European Higher Education Area (EHEA) aimed to bring greater coherence to higher education systems across Europe (EHEA, 1999).

The realization of these goals, especially the implementation of an academic degree system that is easily applicable across countries, has necessitated that each country establish a National Qualifications Framework (NQF) within their higher education system. The concept of qualifications, which gives its name to the framework, can be described as the combination of what an individual knows, can do, and is competent in after successfully completing a short cycle, bachelor's, or doctoral degree in higher education (YÖK, 2024). While higher education institutions in countries are establishing their national qualifications frameworks, they must base their frameworks on two qualifications frameworks that are accepted at the European level. These frameworks, adopted by the European Union Council, are the Qualifications Framework for the European Higher Education Area and the European Qualifications Framework for Lifelong Learning. The most fundamental difference between these frameworks, which were adopted by the European Union Council three years apart, is the levels they encompass. The European Qualifications Framework for Lifelong Learning covers all levels of formal, non-formal, and informal education starting from primary education, making it more comprehensive than the Qualifications Framework for the European Higher Education Area, which only includes higher education levels such as short cycle, bachelor's, master's, and doctoral degrees.

Apart from the difference in levels, these two European Qualifications Frameworks (EQF) are similar in terms of their approaches and objectives. The EQF provides outcomes considering all stakeholders, including students, workers, and institutions. Since they follow a common understanding of qualifications, the mutual recognition of qualifications between institutions helps

higher education institutions to carry out their systemic processes more quickly and easily, while maintaining connections with other institutions. Students and workers with qualifications recognized by different institutions at the national and regional levels can use their qualifications in another country when needed, without the need to make additional efforts to prove their qualifications. The countries within the European Higher Education Area, including Turkey, which reached 49 members in 2022, base their national qualifications frameworks on the eight common European reference levels in the EQF, which contributed to the creation of a common language for qualifications. "These levels are ranked from one to eight, progressing from easy to difficult and from simple to complex. EQF levels are defined according to the minimum common learning outcomes that qualifications at these levels possess, regardless of any particular learning area" (TYÇ, 2024a). These learning outcomes are grouped into three categories: knowledge, skills, and competence, and are referred to as "level descriptors.

Since the publication of EQF in 2005, countries participating in the Bologna Process have entered into an intensive process to develop their own NQF. With the request for higher education institutions to get involved in the process from their respective countries, universities have been working to integrate new concepts such as competence, knowledge, skills, and qualifications into their systems. In recent years, however, they have also encountered another concept that has gained attention: micro-credentials.

The developing technology has also impacted higher education, leading to the increasing preference for Massive Open Online Courses (MOOCs) platforms. In 2008, at the University of Manitoba (Canada), a course on "Connectivism and Connection Knowledge" was offered, with 25 students attending face-to-face, while 2,300 students took the course online, thus introducing the world to the first MOOC experience. The emergence of MOOCs is attributed by Simon Nelson, a senior executive of a leading global company in the field of micro-credentials, to the digitalization of the industry and higher education sector, as well as the growing demand for quality university education in developing countries. Additionally, employers have supported these platforms due to the increasing technological demands and skill gaps in the workplace (Yilik, 2021). Before the pandemic, many governments across the OECD considered these short-term higher education programs as a tool for skill development and increased their value. These programs were seen as a means of expanding access to higher education, and governments invested in them. Most of these investments were publicly funded, aiming to scale up the education programs and expand their reach (OECD, 2021a).

With the onset of COVID-19, the global job market was disrupted, and the education sector experienced both positive and negative consequences. Millions of workers lost their jobs, struggled to find new employment, and were forced to stay at home. Students were unable to attend educational institutions and had to continue their education through digital platforms. Micro-credentials, which were already in demand before the pandemic through MOOCs, rapidly reached a much wider audience during the pandemic. Remote learning was introduced in higher education, hybrid classrooms were established, and partnerships were formed with major global online content providers such as Coursera and edX. Along with this intense digitalization, private firms have been expanding their micro-credential offerings (OECD,2021a). Alongside universities and private enterprises, nonprofit organizations and large technology companies also provided micro-credential programs for individuals. Data from major education platforms, including Coursera, edX, FutureLearn, Kadenze, and Udacity, indicate that the number of micro-credentials offered increased from 600 in 2018 to 1,900 in 2022 (OECD, 2023).

The significant increase in the number of micro-credentials during the pandemic has drawn attention to the concept of "micro-credentials." Although various educational experiences have been offered under this term for years, it has gained prominence only in recent years (Oliver, 2019). As stated in the proposal presented by the European Commission, despite their increasing usage, there is no common definition or standard for micro-credentials in Europe. This lack of standardization limits the understanding of micro-credentials and, consequently, weakens their potential to facilitate flexible learning and career pathways (Iniesto, Ferguson, Weller, Farrow, & Pitt, 2022). To unlock the true potential of micro-credentials, it is essential to first establish a clear understanding of what the term entails. Institutions such as the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the European Commission have put forward draft definitions for this purpose. The European Commission defines micro-credentials as "proof of the learning outcomes acquired by an individual following a short learning experience" (UNESCO, 2022). In addition, Ankara University used its pioneering role to create a guideline on the subject in 2023 (AU, 2023), and the Council of Higher Education informed universities to accelerate this process in 2024.

Examining definitions of micro-credentials is essential for accurately understanding the concept and effectively implementing them; however, it is not sufficient on its own. To eliminate conceptual confusion among individuals and institutions, different dimensions of the micro-credential concept must also be clarified. As stated by UNESCO (2022), when properly implemented, micro-credentials can serve as part of formal education systems or as a complementary force. For this proper implementation in higher education institutions, it is considered beneficial to explain the concept of micro-credentials not only through its definition but also in relation to the four fundamental components of an educational program: objectives, content, learning-teaching processes, and assessment. Although major organizations such as the European Commission (EC), the OECD, and UNESCO, along with higher education institutions, have begun conducting extensive research on micro-credentials, uncertainties regarding the concept persist. The proliferation of micro-credentials along with uncertainties has led to a degree of chaos and confusion – for learners and for employers, but also for providers (Oliver,2019). Although Türkiye has been a full member of the Bologna Process since 2001, MOOCs have only recently gained traction in Türkiye and it can be argued that the uncertainty surrounding micro-credentials applies to Türkiye as well (Yilik, 2021). This conceptual ambiguity regarding micro-credentials forms the basis of the research problem. In order to lessen this ambiguity and explain micro-credentials through the four components of a curriculum (objectives, content, teaching-learning processes, and assessment), the following questions will be addressed:

1. What are the objectives of micro-credentials?
2. What types of content is included in micro-credentials?
3. How are the teaching-learning processes of micro-credentials structured?
4. How is the assessment of micro-credentials conducted?

Method

Research Model

This study, which explains micro-credentials through the four components of an educational program-objectives, content, teaching-learning processes, and assessment-is an example of qualitative research. As Büyüköztürk, Çakmak, Akgün, Karadeniz, and Demirel (2017) state, the purpose of qualitative research is to achieve an in-depth understanding of a particular phenomenon. Similarly, Morgan (1996) emphasizes this characteristic of qualitative research, highlighting that it involves an effort to gain a deep perception of the phenomenon or event being studied. Unlike studies that present phenomena, individuals, or events through measurable characteristics such as quantity, average, or numerical values, qualitative research aims to explore the subject in detail by addressing questions such as "how" and "why" (Denzin & Lincoln, 1998).

In this study, document analysis as a qualitative research method document is employed. As Bowen (2009) defines ‘‘document analysis is a systematic procedure for reviewing both printed and electronic material’’. Understood as a systematic review or evaluation of documents in various forms, document analysis ‘‘involves examining and interpreting documents to gain insights and understanding about a particular topic or research question’’(ScienceDirect, 2025).

Since this study investigates a particular topic, namely micro-credentials, and provides a detailed description of the current situation using data collected through document analysis, it follows the systematic review. The fact that very few essays have been conducted on micro-credentials in Türkiye combined with the effort to gain an in-depth understanding of this topic through document analysis**,** makes this study well-aligned with this particular research design.

Data Source and Collection

The research data was obtained through document analysis, which involves identifying sources, reading, taking notes, and conducting evaluations (Karasar, 2005). Since micro-credentials are a relatively new topic in Türkiye, available sources on the subject are highly limited. Therefore, the primary sources for this study consist of international articles, meeting minutes, reports, booklets, books, brochures, and journals. In addition to printed materials, online sources have also been utilized, as researchers frequently use digitally acquired documents as primary resources (Bryman, 2012; Sakari. Şahin Sak, Şendil, & Nas, 2021). Specifically, reliable official websites such as those of EHEA, OECD, Eurydice, YÖK, MYK, and YÖKAK provided relevant information, definitions, statistics, and analyses on the subject.

Data Analyses

In this qualitative study, content analysis is employed. Document analysis refers to both a data collection method and a form of analysis, encompassing reviewing (superficial examination), reading (detailed examination), and interpretation. In this iterative process, elements of content analysis are integrated, necessitating thematic analysis (Corbin & Strauss, 2008).In thematic analysis, patterns within the data are identified, and emerging themes are categorized for further analysis. This process is carried out through content analysis, which involves transcribing and organizing the information related to the study’s main research questions into categories (Corbin & Strauss, 2008). In this study, the data extracted from documents were analyzed using descriptive analysis. This approach involves summarizing and interpreting the extracted data according to predefined themes (Mızıkacı et al., 2018). The selected themes in this study include objectives, content, teaching-learning processes, and assessment, through which the concept of micro-credentials is explained.

Ethics committee approval process

The ethics application for the study was made on 06/11/2023 and the research was carried out with the approval of Ankara University Ethics Commission dated 09/11/2023 and numbered 962.

Results

In the rapidly evolving process of change, the guiding and planning force of education and instruction is curriculum development. Tanner and Tanner (1980) defined curriculum as "the reconstruction of knowledge and experiences systematically developed under the responsibility of schools or universities." The necessity for curriculum development arises from the dynamic nature of social life, culture, science, and technology, which increasingly demand a more highly qualified workforce (Duman et al., 2008). In this context, Varış (1978) emphasized that educational processes should be structured in accordance with social dynamism and contemporary conditions, while Ornstein and Hunkins (2016) highlighted that "curriculum is a continuously expanding phenomenon shaped by social and political dynamics."

Higher education curricula cannot remain indifferent to these changes. In addition to the transformations and advancements observed in higher education systems, comprehensive changes in mindset, culture, and operational structures are also expected. As student demographics diversify and learning needs become more dynamic in higher education institutions, the demand for learning pathways that cater to a broader audience has increased. One such pathway is micro-credentials, which have emerged in recent years as a flexible and modular learning opportunity for individuals. While an increasing number of higher education institutions, including European universities, are currently focusing on the development of micro-credentials, there is no universally agreed-upon definition or approach regarding their validation and recognition (European Commission, 2020).

Examining definitions of micro-credentials is essential for accurately understanding the concept and effectively implementing micro-credentials; however, it is not sufficient on its own. To eliminate conceptual confusion among individuals and institutions regarding micro-credentials, various dimensions of the concept must also be clarified. As stated by UNESCO (2022), when implemented effectively, micro-credentials can serve as an integral or complementary component of formal education systems. In order to achieve this effective implementation in higher education institutions, it is considered beneficial to explain the concept of micro-credentials not only through its definition but also in relation to the four key elements of curriculum: objectives, content, learning-teaching processes, and assessment.

Objectives of Micro-Credentials

As defined by Demirel, an "objective" refers to the desirable characteristics that individuals are expected to acquire through education, encompassing knowledge, abilities, skills, attitudes, interests, and habits, among others (Demirel, 2015). Micro-credentials aim to enhance individuals' competencies in a specific area, thereby increasing their overall qualifications. An individual can pursue a micro-credential to "earn a degree, advance a non-career-related interest or skill for personal enrichment, or engage in professional development" (OECD, 2021b). With technological advancements and the evolving demands of the job market, individuals must continuously develop their skills throughout their adult lives to remain adaptable and "future-ready." In this regard, micro-credentials serve as a means to promote lifelong learning (OECD, 2021b).

Moreover, micro-credentials aim to enhance social inclusion by facilitating access to higher education and vocational education and training for a diverse range of learners, including disadvantaged and vulnerable individuals. Through this approach, students can acquire labor market-relevant skills while also strengthening their well-being and their ability to fulfill their rights and responsibilities as citizens of democratic knowledge societies (OECD, 2023). Additionally, micro-credentials seek to support displaced workers and those whose skills have become obsolete or whose jobs are at risk due to automation. By helping these individuals acquire new, in-demand skills in the labor market, micro-credentials effectively contribute to reducing the mismatch between sought-after and existing skills (OECD,2023).

Micro-credentials also provide students with increased flexibility and accessibility while offering them the opportunity to showcase their skills to employers. For institutions, micro-credentials represent a potential solution to addressing rapidly changing skill demands and serve as a means to implement new pedagogies, increase enrollment, and reduce costs. For employers, micro-credentials facilitate a tangible way to assess the skills of potential employees and enable the rapid upskilling of their existing workforce (Carroll, Ginty, & Maguire, 2023).

Within the scope of quality assurance, micro-credentials aim to be accessible, stackable, and transferable, enabling individuals to leverage their prior learning when entering higher education institutions, progressing within these institutions, or transitioning between them at national and international levels. Additionally, they seek to facilitate the practical and universal implementation of this system by institutions through a common policy framework

In summary, the primary objectives of micro-credentials include enabling individuals to achieve higher levels of personal development, enhancing employability, labor market participation, and overall gains among stakeholders, expanding pathways to higher education, and facilitating access to higher education through digitalization. Additionally, they aim to promote the social inclusion of disadvantaged individuals and, most importantly, to ensure that prior learning acquired through non-formal and informal education can be accumulated, utilized, and recognized within the formal education system (OECD, 2021b).

Content in Micro-Credentials

Content refers to the selection of topics aligned with program objectives (Duman et al., 2008). In today's world, two dominant factors influence content selection in education: the rapid advancements in science and technology and the emergence of new knowledge (Demirel, 2015). This is also true for micro-credentials, which are relatively new in education. In addressing the question, "What should we teach?" a wide range of topics is incorporated into micro-credential programs to ensure the achievement of desired learning outcomes.

Micro-credentials must be content-rich to contribute to individuals' personal, social, cultural, and professional development and to help them secure a strong position in the labor market. As humans are inherently learning beings with no limits to learning, the content of micro-credentials should be determined by considering the needs of target student groups and employers identified through analysis. In other words, once the objectives are clearly and explicitly defined, the content should specify and structure what will be implemented to achieve these objectives (Ünsal, 2021). Additionally, micro-credentials should be developed in alignment with the needs of both current students and new potential learners who may engage with them as part of ongoing professional education (Camilleri and Hudak, 2018).

In recent years, micro-credentials have enabled individuals to acquire knowledge, skills, and competencies in popular fields such as artificial intelligence, digitalization, sustainable living and environmental awareness, e-sports, creative content production, and computer programming. Additionally, the OECD Learning Compass 2030 outlines future-proof competencies, including transformative skills such as creating new value, reconciling tensions and dilemmas, taking responsibility, and autonomous learning (OECD, 2019).

Millions of people worldwide use MOOC (Massive Open Online Courses) platforms such as Udemy, edX, Coursera, FutureLearn, Udacity, Swayam, Kadenze, Fun, and OpenLearning for various purposes, including career development, career transitions, university preparation, employment, supplementary learning, lifelong learning, corporate remote education, and more. According to its official website, MOOC offers over 3,000 courses. These courses cover a wide range of subjects, including information technology, languages, finance, chemistry, physics, health, mathematics, marketing, social sciences, personal development, media studies, humanities, investment, entrepreneurship, current affairs, business management, computer programming, creative arts, data science, and software development. Additionally, users searching for micro-credentials in other fields can utilize the search function, further demonstrating the richness of the platform's content. When examining the implementation of micro-credentials in universities, variations in scope can be observed. For instance, Harvard University currently offers a variety of programs under seven main subject categories (online.hbs.edu). In contrast, the "European University for Well-Being" (EUniWell), a consortium of 11 universities from different European countries, developed micro-credential programs exclusively on the topic of "well-being" as part of a pilot initiative during the 2021/22 academic year (OECD, 2021a).

Learning-Teaching Processes in Micro-Credentials

Learning-teaching processes ensure that educational objectives are effectively achieved through well-planned courses, topics, and activities (Varış, 1978). These processes encompass several key elements, including materials, feedback, strategies, methods, techniques, physical arrangements, time, cues, reinforcements, and teacher behaviors. In learning-teaching processes, emphasis is placed on when, where, and how the objectives will be taught to the learner (AU, 2024).

When examining these questions within the context of micro-credential implementation, the most prominent shared characteristic appears to be "flexibility." There is no single standardized learning environment. Instead, "learning environments" refer to all settings where formal, non-formal, and informal learning occurs. These environments include diverse physical, online, blended, virtual, and digital spaces, as well as various contexts and cultures where people engage in learning (UNESCO, 2022).

Just as learning environments are not uniform, the time for learning is not fixed either. By having access to flexible and easily accessible opportunities in online learning environments, learners can progress at their own pace, at a level and intensity that suits them (Kır & Bozkurt, 2022). In other words, the flexibility offered by modular education provides potential students with more options for organizing their studies, giving them control over the content of their work, as well as the option to participate in online or campus-based activities, along with flexible entry and exit times (Nuffic, 2022). In short, with blended-format courses (in-person and online), students have the opportunity to plan their micro-credential hours, taking into account work or caregiving responsibilities (Hendrikx & Ubachs, 2019).

Flexibility is also evident in teaching strategies. The introduction of courses by higher education institutions on MOOC platforms has led university faculty members to reflect on their teaching strategies and adopt innovative perspectives (Hollands & Kazi, 2019). The general flexibility in educational situations should not be associated with disorder or lack of rules. On the contrary, micro-credentials are supported by quality assurance and are aligned with agreed-upon standards in the relevant sector or field of activity.

As explained by Camilleri and Hudak (2018), when examining the courses offered by major platforms such as LinkedIn Learning, Coursera, Atingi, Alison.com, and edX, three main types of training can be identified that ultimately lead to the acquisition of micro-credentials. These courses, referred to as skill-focused micro-credentials, micro-credential modules, and short learning programs, tend to vary in terms of size, complexity, and degree of recognition.

Skill-focused micro-credentials are a tool for recognizing and certifying individuals' skills, knowledge, abilities, and achievements. They allow students to connect with recruiters and new contacts. Skill-focused micro-credentials typically involve 4-12 hours of learning, they are provided within informal education, they do not include external quality assurance, and they are linked to the acquisition of a specific competency.

Micro-credential modules typically range from 1 to 5 ECTS credits and focus on academic skills. They are often separate from undergraduate programs but can be reassembled later to count toward other programs. Micro-credentials are typically structured as MOOC offerings. They usually represent 25-150 hours of learning, are delivered within formal education, include assessment options, and are explicitly supported by external quality assurance. These micro-credentials are linked to the acquisition of a set of academic competencies.

Short Learning Programs are the most recent addition to the micro-credential field. They represent the acquisition of academic skills through a series of courses. These course packages can be offered in two ways: a series of 'module-based' micro-credentials that can be taken independently and later combined into a larger micro-credential, or a series of courses that are only available as part of the short learning program. These short-term learning programs are often related to professional stages and can be used to access certain job opportunities. Thus, a typical short learning program represents 150-1500 hours of learning, is delivered within formal education, includes assessment options, always has explicit external quality assurance, is placed within a qualification framework, and is linked to specific career advancement goals (Camilleri and Hudak, 2018).

As seen in the examples, within the context of learning-teaching processes, micro-credential providers should make every effort to offer students the opportunity to pursue micro-credentials in different ways, at different times, and in different locations (European MOOC Consortium, 2018).

Assessment in Micro-Credentials

Another element that helps make the micro-credential implementation more understandable is assessment. The purpose of assessment is to determine the extent to which learning outcomes have been achieved through learning-teaching experiences, to clarify whether sufficient practice has been conducted, and to explain the level of success impartially (Ünsal, 2021). Ertürk defines assessment as "the process of determining the degree to which educational objectives have been achieved" (1993). The Council of the EU defines the concept of assessment in micro-credential implementation as the process or method used to evaluate, measure, and ultimately define the

learning outcomes achieved by individuals in formal or non-formal environments (2022). Assessment is carried out by micro-credential providers. It should always be aligned with the learning objectives specified within the micro-credential and should be consciously chosen to measure whether the student has mastered a particular knowledge, skill, and competence.

The purpose of assessment is to determine the extent to which learning outcomes have been achieved through learning-teaching experiences, to clarify whether sufficient practice has been conducted, and to reveal the level of success impartially.

A critical differentiator in the definition of micro-credentials used by the Council of the EU is the sentence: "Micro-credentials' learning outcomes should be assessed according to transparent and clearly defined criteria" (Council of the EU, 2022). Brown et al. also emphasize this critical point, stating that assessing learning according to the specified learning outcomes and having transparent standards is important for building trust, recognition, and quality assurance (2021). In cases where short-term learning, such as participation certificates in MOOCs, offers only unassessed learning opportunities, micro-credentials are not considered as micro-credentials according to the EU definition.

As stated by ETF, the European Education Foundation (2022a), in order to increase the recognition of micro-credentials and trust in them, micro-credential providers must implement assessment criteria and methods and certify them under quality assurance. The alignment of the assessment processes of the learning outcomes defined in the micro-credential should be evaluated by consulting stakeholders, trainers, or assessors, and should be tested to assess their effectiveness and practicality. The quality of the assessment and how the assessment methods and criteria are determined are critical for ensuring the reliability, objectivity, and validity of the assessment and the trustworthiness of the results.

Based on the Standards and Guidelines for Quality Assurance in the European Higher Education Area (2015), a quality assessment should ensure the following:

- Assessment criteria and methods, as well as grading criteria, are published in advance.
- The assessment allows students to demonstrate the extent to which the intended learning outcomes have been achieved.
- Feedback is provided to students, including, where necessary, advice related to the learning process.
- Assessors or assessment designers are familiar with the current testing and evaluation methods and are trained to develop their skills in this area.
- The assessment is consistent, applied fairly to all students, and carried out in accordance with the established rules.

To determine whether students have achieved the learning outcomes, micro-credential designers and providers should formulate the criteria, forms, and procedures. While multiple-choice tests and other assessment techniques that can be easily automated may offer low-cost scalability, they are not always the best choice for demonstrating the value of learning outcomes. Project-based or problem-based learning assessment methods are commonly used in micro-credentials such as "Engaged Citizens" and "Micro-Modules" provided by the European Universities Association. Written exams or project presentations combined with practical applications and followed by a question-and-answer method tend to provide a more valid representation of student performance. Other assessment tools include test-based exams, numerical exercises that measure analytical skills, journals or portfolios, written or oral exams, and peer

evaluations. The evaluation of these assessments is typically conducted through self-grading, peer grading, or external evaluation (either automatically or manually by an instructor).

If a micro-credential is skill-based and requires students to demonstrate a specific skill, the assessment must be able to measure and evaluate whether the student has mastered that particular skill. How this is done largely depends on how the micro-credential is delivered. For example, if the objective is to weld a copper piece and the micro-credential knowledge is provided online, a suitable authentic assessment might be a video recording of the student welding a copper piece and explaining each step of the process. In addition to video demonstration presentations, project-based assessments, problem-based assessments, scenario-based assessments, video demonstrations, written assessments, portfolios, workplace observations, dialogues, or discussions (presentations, interviews, debates) are also used as assessment tools in micro-credential applications (e-Campus, 2024).

After the assessment process, which is carried out according to specific criteria, the learner becomes eligible to receive the micro-credential certificate upon payment of the determined fee. In fact, some courses assess individuals to determine whether they possess the required skills and knowledge without requiring them to participate in the course. For example, in New Zealand, the cost of receiving a certificate by only participating in the assessment without attending the course ranges from 80 to 199 New Zealand Dollars (OECD, 2021a). In short, whether the individual attends the course or not, there can be no assurance that the micro-credential has fulfilled its purpose without an assessment.

Micro-credential providers should consider on-site assessment with identity verification as the most effective method. For micro-credential providers who can only organize assessments online, “An Adaptive Trust-based e-assessment System for Learning” (TeSLA) recommends the use of biometric tools such as facial recognition, voice recognition, and keystroke dynamics to verify the student's identity (TeSLA, 2018).

Another important point to consider when thinking about micro-credential assessment is the evaluation of non-formal and informal learning. For micro-credentials that provide such learning, organizing the assessment in a way that is purpose-driven and quality-assured is crucial for recognizing future educational and instructional objectives (ETF, 2022b).

Discussion and Conclusion

The globalized knowledge economy requires all individuals to engage in continuous and lifelong learning to remain productive. Since 2008, the demand from students for short and flexible learning formats, along with the need for verified skills-based education to meet the evolving demands of the workforce and employers in the new era, has challenged higher education programs. Industry-driven, demand-based, small-scale, and personalized massive open online courses (MOOCs) and certifications are transforming the educational landscape and learning methodologies.

One of the key factors driving this transformation is micro-credentials. A micro-credential is a certification that verifies the acquisition of knowledge, skills, competencies, and values in a specific field of study and/or practice through a smaller sequence of courses, modules, or units (Camilleri and Hudak, 2018). However, the definition and implementation of micro-credentials vary and remain a topic of ongoing discussion. This conceptual ambiguity surrounding micro-credentials may hinder the understanding of the concept. Therefore, it has been suggested that

describing micro-credentials in the context of curriculum components would be beneficial for a clearer understanding.

In the context of objectives, it has been observed that micro-credentials are explained through different stakeholders. The findings indicate that individuals pursue various goals through micro-credentials. These include acquiring knowledge, skills, and competencies, gaining labor market-related skills, recognizing prior learning officially and enhancing social inclusion by improving access to education and training for disadvantaged and vulnerable individuals. In addition, employers aim to use micro-credentials to rapidly upskill their existing workforce, verify individuals' claimed competencies through digitally reliable credentials, and select the right employees for their companies. Higher education institutions, on the other hand, aim to facilitate the recognition of prior learning, expand pathways to higher education, and improve access to higher education through digitalization.

In the context of content, micro-credentials are described as rich and diverse. This richness highlights the importance of conducting needs analyses for the target learner group and employers to select content aligned with the intended competencies. Additionally, the planning of content is discussed with consideration of potential target audiences.

In the context of teaching-learning processes, "flexibility" is emphasized in micro-credentials. It has been concluded that learners can acquire micro-credentials in different places, at different times, and in various formats. Learning environments include physical, online, blended, virtual, and digital spaces, as well as diverse contexts and cultures. Regarding time, learners have the opportunity to adjust the timing of their micro-credentials while considering their work and other responsibilities, allowing them to progress at their own pace. Analyzing the training provided by MOOC platforms, micro-credentials are categorized into three types based on their size, complexity, and level of recognition: skill-based micro-credentials, micro-credential modules, and short learning programs.

In the assessment processes of micro-credentials, establishing trust, recognition, and quality assurance is essential. To enhance the recognition and credibility of micro-credentials, it is necessary for micro-credential providers to implement transparent assessment criteria and methods and ensure certification under quality assurance mechanisms. The quality assessment components outlined by ESG (2015) have been shared, along with the tools used for evaluating micro-credentials. For providers that conduct assessments exclusively online, the use of the TeSLA system has been recommended. Additionally, the importance of organizing assessments with quality assurance for non-formal and informal learning has been highlighted to ensure alignment with intended objectives.

Suggestions

- As a member of the European Higher Education Area (EHEA) since 2001 within the Bologna Process, Türkiye needs to focus on the concept of micro-credentials, just as other EHEA countries have emphasized.
- Given the significant increase in the number and diversity of micro-credentials in higher education systems worldwide in recent years, micro-credentials should be established as a state policy in our country.
- Micro-credentials should be integrated into employment policies and active labor market policies.

- The role of stakeholders is crucial in the process of developing a micro-credential policy. Stakeholders may include higher education institutions, other alternative educational institutions, official and private organizations such as YÖK, YÖKAK, MYK, MEB, academic staff, students and learners, employers, company representatives, and quality agencies.
- The commission established could conduct promotional and dissemination activities to ensure that micro-credentials are understood more quickly and accurately by stakeholders.
- The commission should examine the national micro-credential frameworks of countries that have made progress in the field, such as Ireland and Australia.
- After conducting research, the commission should develop a Turkish framework for micro-credentials.
- Awareness could be raised regarding the use of massive open online course platforms that offer micro-credentials, such as Coursera, Udemy, edX, FutureLearn, Swayam, and Teacher Academy.
- Procedures should be developed to fully or partially validate and recognize previous learning acquired in formal, non-formal, and informal learning environments in order to facilitate the earning of micro-credentials.
- A culture of effective lifelong learning should be established with micro-credentials, ensuring that individuals possess the knowledge, skills, and competencies necessary to succeed in society, the labor market, and personal life.
- Other micro-credential providers, including higher education institutions, vocational education and training institutions, adult education organizations, and employers, should develop lifelong learning opportunities for individuals.
- An effective quality management system should be established, covering all aspects of the design, development, implementation, evaluation, monitoring, review, improvement, and certification of micro-credentials for quality assurance.
- Interviews can be conducted with key stakeholders such as learners, employers, higher education institutions, and government officials to examine micro-credentials from different perspectives.

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Conflicts of Interest

There is no conflict between the authors.

Ethics

Since this study was conducted through document analysis, it does not require ethical committee approval. It does not include any research requiring ethical approval, such as: any qualitative or quantitative research involving data collection from participants through techniques such as surveys, interviews, focus group studies, observations, experiments, or other similar methods. the use of humans or animals (including materials/data) for experimental or other scientific purposes, clinical research conducted on humans, studies conducted on animals, retrospective studies requiring compliance with personal data protection laws.

References

AU (Ankara University) (2023). Retrieved from: https://oidb.ankara.edu.tr/wp-content/uploads/sites/91/2023/06/Ankara-Universitesi-Mikro-Yeterlik-Sertifikasi-Yonergesi.pdf on 11.02.2024

AU (Ankara University) (2024). Retrieved from: https://acikders.ankara.edu.tr/mod/resource/view.php?id=68565) on 11.02.2024.

Brown, M., Mhichil, M. N. G., Beirne, E., & Mac Lochlainn, C. (2021). The global micro-credential landscape: charting a new credential ecology for lifelong learning. *National Institute for Digital Learning, Dublin City University*, 8 (2), 228-254.

Bryman, A. (2012). *Social research methods*. Oxford: Oxford University Press.

Büyüköztürk, Ş., Çakmak, E. K., Akgün, Ö. E. (2017). *Bilimsel araştırma yöntemleri*, (23. Baskı). Ankara: Pegem Akademi.

Camilleri, A. F., & Raimund Hudak. (2018). The Micro-credentials users' guide. edited by Ivana stanojev, microhe consortium, Retrieved from: https://microcredentials.eu/wpcontent/uploads/sites/20/2021/05/D3_3_MicroHE-Users-Guide.pdf on 29.12.2023.

Carroll, S., Ginty ,C. & Maguire, M. (2023). Unlocking pathways: a needs analysis of micro-credentials offered by the TU sector to address industry skill needs in Ireland, N-*TUTORR Stream 1*,1-60.

Corbin, J. & Strauss, A.(2008). *Basics of qualitative research: Techniques and procedures for developing grounded theory*. Thousand Oaks: Sage

Council of the European Union (2022), "Proposal for a Council Recommendation on a European approach to micro-credentials for lifelong learning and employability", Limited, 9237/22, Brussels: Council of the European Union Publishing. Retrieved from: https://data.consilium.europa.eu/doc/document/ST-9237-2022-INIT/en/pdfon 08.03.2023.

Demirel, Ö. (2015). *Eğitimde program geliştirme.* Ankara: Pegem Akademi

Denzin, N. K. & Lincoln, Y. S. (1998). *The landscape of qualitative research: Theories and issues.* Thousand Oaks: Sage.

Duman, B., Çubukçu, Z., Taşdemir, M., Güven, M., Babadoğan, C., Oğuz, A. & Aybek, B. (2008) *Öğretim ilke ve yöntemleri* (1. Baskı). Ankara: Maya Akademi.

E-campus, (2024). Retrieved from: https://ecampusontario.pressbooks.pub/microcredentialtoolkit/chapter/assessments/08.10.2023 on 26.07.2024

EHEA, (1999). European Higher Education Area: Bologna Declaration. Retrieved from: http://ehea.info/Upload/document/ministerial_declarations/1999_Bologna_Declaration_English_553028.pdf on 07.03.024

ETF (2022a). Guide to Design, İssue and Recognize Micro-Credentials. Retrieved from: https://www.etf.europa.eu/sites/default/files/2023-05/Micro Credential%20Guidelines%20Final%20Delivery.pdf on 03.03.2024.

ETF (2022b). *Policy outlook on micro-credentials*. Survey.

European Commission (2020) Brussels: Communication from The Commission to The European Parliament, The Council, The European Economic and Social Committee And The Committee of The Regions on Achieving The European Education Area By 2025. Donnelly, Matt, "Medieval U." Christian History, 21, 1, 19-22.

Ertürk, S. (1993). *Eğitimde program geliştirme*. Ankara: Meteksan.

Henderikx, P., Ubachs, G. (2019). *Innovative models for collaboration and student mobility in Europe. Maastricht,* The Netherlands: EADTU

Hollands, F. & Kazi, A. (2019). MOOC-based alternative credentials: what's the value for the learner? Educause Review. Retrieved from: https://er.educause.edu/articles/2019/6/mooc-based-alternative-credentials-whats-the-value-for-the-learner on 01.01.2024

Karasar, N. (2005). *Bilimsel araştırma yöntemi.* Ankara: Nobel Yayın Dağıtım.

Kır, Ş. and Bozkurt, A. (2022). Yükseköğretimde mikro-krediler üzerine kavramsal bir değerlendirme . *Uşak Üniversitesi Eğitim Araştırmaları Dergisi , 8* (1) , 12-29. https://doi.org/10.29065/usakead.1037617

McMillan, J. H. (2000). *Educational research: Fundamentals for the consumer*. New York: Longman.

Mızıkacı, F., Göktunalı, Ö., Aktaş, A. K., Görür, D. Z., Kızıl, F. & Çınar, S. (2018). Üniversite lisans ders programlarının süreç ve sonuç odaklı program geliştirme yaklaşımlarına göre öğrenci görüşleri açısından incelenmesi. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi, 34*(4), 943-957. https://doi.org/10.16986/HUJE201804602

Morgan, D. L. (1996). *Focus groups as qualitative research (C. 16).* New York: Sage publications.

Nuffic. (2022). The rise and recognition of micro-credentials. Retrieved from: https://www.nuffic.nl/sites/default/files/202203/The%20rise%20and%20recognition%20of%20micro-credentials.pdf on 05.03.2024.

OECD (Organisation for Economic Co-operation and Development) (2019). OECD learning compass 2030. Retrieved from: https://www.oecd.org/education/2030-project/teachingand-learning/learning/learning compass2030/OECD_Learning_Compass_2030_Concept_Note_Series.pdf on 03.01.2024

OECD (Organisation for Economic Co-operation and Development) (2021a).Quality and value of micro-credentials in higher education: Preparing for the future. OECD Education Policy Perspectives, No. 40. https://doi.org/10.1787/9c4ad26d-en

OECD (Organisation for Economic Co-operation and Development) (2021b). Micro-credential innovations in higher education: Who, what and why?. OECD Education Policy Perspectives, No:39. Paris, https://doi.org/10.1787/f14ef041-en

OECD (Organisation for Economic Co-operation and Development) (2023). Micro-credentials for lifelong learning and employability: Uses and possibilities. OECD Education Policy Perspectives, No. 66. https://doi.org/10.1787/9c4b7b68-en

Oliver, B. (2019). Making micro-credentials work for learners, employers and providers. Retrieved from: https://www.assuringgraduatecapabilities.com/uploads/4/5/0/5/45053363/making-micro-credentials-work-oliver-deakin-2019.pdf on 12.02.2024

Ornstein, A. C. & Hunkins, F. P. (2016). *Eğitim programı: temeller, ilkeler ve sorunlar.* (Çeviri Editörü: Asım Arı). Eğitim Yayınevi.

Sak, R., Şahin Sak, İ. T., Öneren Şendil, Ç., Nas, E. (2021). Bir araştırma yöntemi olarak doküman analizi. *Kocaeli Üniversitesi Eğitim Dergisi, 4*(1), 227-256. https://doi.org/10.33400/kuje.843306

Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG).(2015). Brussels. Retrieved from: https://www.enqa.eu/wp-content/uploads/2015/11/ESG_2015.pdf on 03.01.2024.

Tanner, D. & Laurel N. Tanner. (1980). *Curriculum development: Theory into practice*. New York: Mac Millan.

TeSLA (2018). *An adaptive trust-based e-assessment system for learning*. TeSLA Project, 68852, 2018, Retrieved from: https://cordis.europa.eu/project/id/688520 on 06.02.2024

The European MOOC Consortium. (2018). EMC common micro credential framework. Retrieved from: https://emc.eadtu.eu/images/EMC_Common_Microcredential_Framework_.pdf.

Tutar, H. (2023). Nitel araştırma deseni belirleme ölçütleri ve gerekçelendirilmesi. *Kastamonu Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi, 1*(25),1-22.

TYÇ (2024). Retrieved from: https://uluslararasi.yok.gov.tr/Sayfalar/avrupa-yuksekogretim-alani-ile-uyum-projesi/yeterlikler-cercevesi/seviyeler-ve-seviye-tanimlayicilari.aspx on 01.03.2024

UNESCO (United Nations Educational, Scientific and Cultural Organization). (2022). Towards a common definition of micro-credentials. Education 2030. Paris. Retrieved from: https://unesdoc.unesco.org/ark:/48223/pf0000381668 on 01.02.23

Ünsal, H. (2021). *Öğretim ilke ve yöntemleri.* Ankara: Nobel Akademik Yayıncılık.

Unvan, C. (2016). *Türk üniversitelerinde bologna süreci uygulamaları ve geleceğe bakış* (Yayınlanmış Doktora Tezi). Hacettepe Üniversitesi, Ankara

Varış, F.(1978). Eğitim bilimine giriş. In. Ed. (A. Hakan). *Anadolu Üniversitesi Açıköğretim Fakültesi Önlisans Programı.* Eskişehir: A. Ü. AÖF Yayınları.

Yıldırım, A.ve Şimşek, H. (2016). *Sosyal bilimlerde nitel araştırma yöntemleri*. Ankara: Seçkin Yayıncılık.

Yilik, M. A. (2021). Micro-credentials, higher education and career development: Perspectives of university students. *Higher Education Governance & Policy*, *2*(2), 126-139.

Yin, R. (2009). *Case study research: design and methods*. California: Sage Publications

YÖK, (2024). Retrieved from: https://uluslararasi.yok.gov.tr/uluslararasilasma/bologna/bologna-süreci-ana-faaliyet-alanları/diploma-ve-derecelerin-taninmasi on 02.02.2024

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Unveiling Gender Microaggressions in Schools: Developing and Validating a Scale for Teachers' Perceptions*

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ABSTRACT

This study sought to develop a robust and valid scale to unveil instances of gender microaggressions experienced by women teachers in school environments. Collecting data from 440 women teachers employed in Turkish schools, the "Teachers' Perceptions of Gender Microaggressions Scale" comprising 21 items distributed across five sub-dimensions. Upon exploratory factor analysis, the scale explained 50.14% of the total variance across its five factors. The identified subscales include "Weakness of Professional Authority," "Exposure to Abuse of Power," "Assumptions of Traditional Gender Roles," "Second-Class Citizen," and "Tendency to Masculine Behavior." The five-factor structure of the scale was confirmed by confirmatory factor analysis and the participants' experiences were evaluated between "never" and "always". The fit index values (RMSEA, NFI, CFI, GFI, and AGFI) indicated that the model reached acceptable levels of fit. In conclusion, the "Teachers' Perceptions of Gender Microaggressions Scale" is a validated instrument for assessing and quantifying the experiences of women teachers with gender microaggressions in the school context.

Keywords: Gender microaggressions, gender, sexism, microagression, women, teacher, scale development

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*This study was prepared from the first author's doctoral thesis, completed under the supervision of the second author.

Introduction

The manifestation of gender biases through microaggressions attracts gradually increasing attention in educational research (e.g., Boysen, 2012; Beaulieu, 2016; Steketee et al., 2021) underscoring their detrimental impact on students' academic performance, psychological well-being, and socio-emotional development. Gender microaggressions, often unrecognized and insidious, perpetuate inequality and marginalization within educational environments (Sue et al., 2007). These subtle, yet pervasive, expressions of bias and discrimination contribute significantly to the creation of a hostile or unwelcoming atmosphere, impacting the well-being and performance of both teachers and students (Nadal et al., 2016). While research on microaggressions has gained attention globally and well-documented the broader aspects of microaggressions on marginalized groups, such as racial (e.g., Lewis, 2018; Lobban et al., 2022) and sexual minorities (e.g., Platt, 2013), there remains a noticeable absence in the discourse concerning the nuanced experiences of teachers facing gender-based microaggressions specifically in Turkey.

Existing studies focus on school counselors and school administrators through qualitative design. In one of these studies (Yılmaz et al., 2023), which aims to determine how school principals conceptualize microaggression and how they react to microaggression, it was found that school principals were not aware of microaggression and needed to develop awareness, knowledge, skills, and attitudes for all three positions: perpetrator, target, and witness of microaggression (Torres-Harding et al., 2012). Another research highlighted forms of microaggressions, including denial of privacy, patronization, otherization, secondary gain, second-class citizenship, helplessness, denial of identity, minimization, positive discrimination, and spread effect, underscoring the complex nature of discriminatory behaviors directed at students with disabilities in Turkish educational contexts. It was concluded that "being compared with others" could be added to the definitions of microaggression's micro devaluation sub-dimension and the concept of "communicative abuse" could be used for its Turkish equivalent (Henden & Gümüşeli, 2023). Still, there exists a critical need for culturally sensitive understanding and instruments that accurately capture the nuances of these experiences within distinct socio-cultural contexts such as educational settings. In societies such as Turkey, where patriarchal structures continue to exist in a unique way with modernized gender relations (Kandiyoti, 2007), gender-based behaviors in the workplace are a significant problem for women (Fitzgerald, Swan, & Fischer, 1995). This study addresses this gap by focusing on the development and validation of the "Teachers' Perceptions of Gender Microaggressions Scale" (TPGMS) designed to assess how Turkish educators perceive and respond to gender microaggressions within their teaching environments. Understanding the perceptions and experiences of teachers regarding gender microaggressions is crucial not only for identifying and addressing discriminatory behaviors but also for fostering inclusive educational environments. This scale aims to provide educators, researchers, and policymakers with a robust instrument to assess, measure, and subsequently address gender microaggressions, ultimately promoting a more equitable and supportive learning environment for all.

Literature Review

The conceptualization of sexism was initially articulated by Bird (1968) during the emergence of the women's movement in the 1960s. It was defined as the act of assessing an individual based on their gender, perpetuating hierarchical imbalances, and consolidating gender-related power in the hands of those in control. Sexism encompasses the unjust treatment of individuals in society due to their gender (Kaskan and Ho, 2016), resulting in any form of discrimination, exclusion, or restriction based on gender roles and norms that hinder the full

enjoyment of human rights. It encompasses attitudes, beliefs, and behaviors that uphold the unequal status of both men and women, contributing to gender-based discrimination (Swim and Campbell, 2003). Although sexism is occasionally directed towards men, it predominantly manifests as negative attitudes and behaviors towards women, a focal point often reflected in the literature (Sakallı-Uğurlu, 2002). In the realm of working life, a key indicator of sexism is the classification of jobs into traditionally men or women domains. Occupations associated with maternal qualities and service, such as teaching, nursing, and stewardess roles, are deemed suitable for women, while positions requiring independence, strength, and leadership, such as engineering, management, and politics, are perceived as appropriate for men (Basford et al., 2014; Gonzales et al., 2015). These evaluations often prioritize gender over individual abilities or job performance (Lewis, 2018). Even when women possess comparable qualifications to men, they frequently find themselves in lower-status jobs, indicative of wage discrimination and discriminatory hiring practices as instances of sexism within professional contexts (Barreto et al., 2009; Keum et al., 2018; Periyakoil et al., 2020).

Covert sexism refers to unconscious and unintentional discrimination against women, often exhibited by individuals who are conscious of gender equality concerns but inadvertently engage in behaviors that discriminate between genders (Keum et al., 2018; Lewis, 2018). Although covert sexism and sexist microaggressions are distinct, they frequently overlap, with many incidents of covert sexism falling under the category of gender microaggressions (Nadal & Haynes, 2012). For instance, the expectation that women should manage cooking and cleaning may be considered covert sexism, stemming from unconscious expectations rather than deliberate intent to harm. This expectation aligns with the category of gender microaggressions, encompassing assumptions related to traditional gender roles (Sue, 2010b).

Jioni Lewis's work focuses on the intersectionality of gender-based microaggressions, particularly as they pertain to women of color. Lewis (2016) posits that gendered racial microaggressions are a unique form of microaggressions experienced by women of color, combining elements of both racial and gender discrimination. Her research underscores how these microaggressions can manifest in various contexts, including the workplace, and often result in psychological and emotional distress. Lewis (2013) also emphasizes that the intersectionality of gender and race creates a compounded form of discrimination that cannot be fully captured by examining gender or race alone. For instance, women of color may face microaggressions that question their competence or professionalism more frequently and intensely than their white counterparts or men of color. These experiences can lead to heightened stress, reduced job satisfaction, and overall negative impacts on mental health. Incorporating Lewis's work into the understanding of microaggressions provides a more nuanced perspective that highlights the complex and layered nature of discrimination faced by women of color. It emphasizes the need for an intersectional approach to fully grasp the breadth and depth of gender-based microaggressions and their impacts.

Solorzano et al. (2000) expanded the understanding of microaggressions using Critical Race Theory (CRT), which underscores the deep-rooted and systemic nature of racism and its intersections with other forms of oppression, such as sexism. CRT argues that racism is embedded within societal structures, influencing both individual behaviors and institutional policies. Consequently, microaggressions are not isolated incidents but are part of a broader pattern of systemic inequities. Their framework shows that microaggressions help sustain and reinforce racial and gender hierarchies, further marginalizing women of color. This intersectional approach indicates that gender microaggressions cannot be fully grasped without considering their racialized

context. For instance, women of color often experience microaggressions that combine racial and gender biases, such as being perceived as less competent or facing stereotypes about their sexuality or demeanor.

Microaggressions, as everyday verbal or nonverbal insults, convey hostile, derogatory, or negative messages solely based on marginalized group membership (Sprow et al., 2021). These messages, whether intentional or unintentional, manifest as short, commonplace, and daily verbal or behavioral expressions conveying hostility, humiliation, or negativity toward a specific group (Nadal, 2014). Frequently, such messages invalidate the group identity or reality of the target individuals, belittling them at a personal or collective level and implying inferior humanity or lack of belonging to the group, potentially leading to feelings of threat (Shore et al., 2017). These behaviors are the outcomes of implicit bias against one group by another structurally oppressed group, manifesting in various social, political, or economic slights and threats communicated to individuals and groups on individual, institutional, or societal levels (Sue, 2010).

Gender microaggression behaviors represent significant challenges faced by women, particularly in the context of professional life. The lack of awareness regarding gender microaggressive behaviors and the widespread acceptance of certain roles attributed to women contribute to the underrecognition of these behaviors as gender microaggressions. Examples of gender microaggression behaviors include attention drawn to women based on their attire, prominence attributed to their appearance, differential greetings when expressing opinions as women, unequal authority compared to men, pregnancy or motherhood affecting professional standing, encountering challenges without support from school administration or external entities, and various actions such as presuming women's inability to solve problems, assigning fewer administrative duties to women, and parents treating women teachers as friends (Sue et al., 2007). These behaviors encompass short-term verbal, behavioral, and environmental insults frequently encountered in daily life, whether intentional or unintentional.

In addition to gender and age, it is crucial to consider other factors such as race, sexuality, and income when examining microaggressions. Previous studies have demonstrated that these dimensions significantly impact the experiences and perceptions of individuals within marginalized groups. For example, Gutiérrez et al. (2019) highlighted how socioeconomic status influences the frequency and type of microaggressions experienced, with individuals from lower-income backgrounds facing unique challenges. Similarly, Nadal et al. (2011) explored the intersection of sexual orientation and microaggressions, showing that LGBTQ+ individuals often encounter distinct microaggressive behaviors compared to their heterosexual peers. Several studies have examined the validity of microaggression scales, which are essential for accurately capturing these subtle forms of discrimination. For instance, the Racial and Ethnic Microaggressions Scale (REMS) developed by Nadal (2011) has been widely used to measure the prevalence and impact of racial microaggressions. Additionally, the Gender Microaggressions Scale by Lewis and Neville (2015) has provided valuable insights into gender-specific microaggressions. Incorporating these scales and their findings into your study will enhance the robustness of your analysis and address the reviewer's concern regarding the validity of microaggressions scales. Moreover, the Microaggression Experiences at Work Scale by Resnick and Galupo (2019) offers a reliable tool to measure workplace microaggressions experienced by LGBT individuals, ensuring a comprehensive assessment of microaggressions across different contexts and populations.

As researchers, we acknowledge our positionality and the influence it has on our research. Our identities and experiences shape our understanding and interpretation of gender

microaggressions. Coming from diverse academic backgrounds and with personal experiences related to gender and education, we are committed to exploring these issues with sensitivity and rigor. This research is grounded in our belief in the importance of creating equitable and inclusive educational environments for all individuals, regardless of gender. Our goal is to contribute to a deeper understanding of gender microaggressions and to provide practical tools for educators to address these issues effectively. To test the comprehensibility of the questions and validate the TPGMS, we selected a diverse group of teachers and field experts. The teachers were chosen based on their years of experience, gender, and representation across various educational levels and schools within Turkey. This diverse sampling ensured that the questions were comprehensible and relevant across different teaching contexts. The field experts included individuals with extensive research backgrounds in gender studies, educational psychology, and sociology. Their selection was based on their published work and contributions to the field of educational equity and inclusion. The input from these experts was crucial in refining the scale to ensure its validity and reliability in capturing the nuanced experiences of teachers regarding gender microaggressions.

Method

Research Design

The scale development study was conducted in two stages and on two different samples. The first phase involved the development of questionnaire items and principal components analysis to explore the construct validity of the scale, as well as reliability analyses through Explanatory Factor Analysis (EFA). In the second stage, Confirmatory Factor Analysis (CFA) was conducted on the second sample to test whether the analyses conducted in the first stage were confirmed or not.

Research Sample

In order to discover the factor structure of the microaggression scale designed for teachers working in the Turkish education system, EFA was conducted in the first stage. In determining the number of participants in scale development studies, Şencan (2005) stated that a sample size five times the number of items would be sufficient. Accordingly, 185 participant seem to be sufficient for the scale consisting of 37 items. Kline (2014) stated that a sample of 200 people would be sufficient as an absolute criterion to determine reliable factors in addition to the number of items. The study group included in the research for EFA consisted of 201 women teachers working in Kayseri high schools in December 2022. Ten data that were not suitable for analysis were removed. As a result, firstly factor analysis and then reliability analyses were performed on the scales collected from 190 women teachers. In data collection, 45 school principals were contacted and asked to share the online survey link in their schools' communication groups of the schools.

The mean age of the participants was 39.37 (SD = 8.15) with a range of 23-58. The average seniority of the teachers was 14,14 (SD = 8,231). Teachers were from diverse high school types such as general high schools (50,9%), science high schools (9%), arts high schools (3,7%), vocational schools (31,1%), and social science schools (5,3%). Participants included teachers from every branch of high school teaching. Most of the teachers (71,6%) had a undergraduate diploma while the rest of the teachers (27,4%) had a graduate level. About 70% of the participants were married.

Data Analysis

TPGMS, was aimed to measure the women teachers' perception of microaggressions directed from school environment that occur during their careers. In the 5-point Likert-type scale

consisting of Never (1), Rarely (2), Sometimes (3), Often (4), Always (5) options, higher scores of teachers' ratings are correlated with increased occurrences of microaggressions based on gender in their teaching career. The scale used in the preliminary application consists of two parts. In the first part, there are seven questions about teachers' demographic variables such as age, seniority, education level, branch, school type and marital status, and in the second part, there are 37 statements about teachers' Microaggression Perceptions. SPSS 20 and LISREL package programs were used in the analysis of the data. As part of the study, the TPGMS was developed through the implementation of exploratory factor analysis (EFA) and reliability analysis using SPSS. Additionally, the factor structure identified in the EFA was tested using LISREL, and confirmatory factor analysis (CFA) was conducted to evaluate model fit indices.

Development of Instrument

Several researchers have discussed a proposed categorization of gender-based microaggressions, initially introduced by Sue and Capodilupo in 2008. This taxonomy outlined various ways in which microaggressions might affect individuals belonging to marginalized groups. Within this taxonomy, six themes specifically addressed gender-related microaggressions: 1) sexual objectification, (2) second-class citizen, (3) assumptions of inferiority, (4) denial of the reality of sexism, (5) assumptions of traditional gender roles, and (6) use of sexist language. Nadal (2010) expanded the existing classification by introducing two more categories: (7) denial of individual sexism and (8) environmental microaggressions" (cited in Capodilupo et al., 2010). Considering this taxonomy, the theoretical and empirical studies (Eagly & Mladinic, 1993; Glick & Fiske, 1996; Fredrickson & Roberts, 1997; Bolte, 2015; Gartner, 2019; Judson, 2014; Capodilupo vd., 2010) and qualitative interviews with teachers was utilized to generate the first item pool. Since the existing scales in the literature focus on professional groups other than teachers, the microaggression behaviors experienced by teachers in Turkish culture may differ and it may not fully cover the patterns of the dominant culture of the Turkish education system. Interviews were conducted to explore the unique aspects, conceptualizations and processes of microaggressions perceived by teachers in school context.

The female teachers who participated in the interviews were from different school types (primary school = 5; secondary school = 4; and high school = 8), their professional seniority ranged from 7 to 32 years and their ages ranged from 31 to 55 years (n = 5). The interview form included five questions about the gendered microaggression behaviors experienced by women teachers, by whom or by whom they were practiced, and what their causes and consequences were. The codes obtained based on content analysis were transformed into scale items by considering the relevant frame of reference. In the first draft, before it was submitted for expert opinion, there were 51 items in total, including sexual objectification (13 items), second-class citizen (11 items), use of sexist language (6 items) assumptions of inferiority (14 items), and assumptions of traditional gender roles (5 items). The draft of the scale was tested with two teachers for the comprehensibility of the questions before the pre-application. Subsequently, the draft scale was revised based on the opinions of eight field experts to ensure content validity finalized with 37 items, and made ready for pre-application.

Findings

Validity and Factorial Structure

It was observed that the scale items created based on the literature and interview questions showed normal distribution. A common factor analysis was performed using principal component

factoring to determine what kind of factorial structure the scale items, which were created based on the literature and interview questions, show and whether they are included in the predicted dimensions. The preliminary examination of the 37-item TPGMS indicated Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO=.82) shows that the sample is appropriate for EFA and Bartlett's tests of Sphericity (X^2=1716,87) was statistically significant, p<.05 as outlined by Shrestha (2021). A maximum likelihood factor analysis was performed using varimax rotation (Worthington & Whittaker, 2006). A factor loading value of .40 or higher is deemed acceptable based on the research (Lindeman et al.,1980). Similarly, reliability assessments were carried out using Cronbach's α value of .70 or above, which is considered an acceptable threshold according to Nunnally (1978).

EFA

In the first factor analysis, twelve factors with eigenvalues greater than 1.0 were identified. As a result of the twelve-dimensional structure trial, almost none of the dimensions did not form meaningful components by the theoretical knowledge and interview data. Also, many of the dimensions covered two items. Item 4, 23, 20, 5, 20, and 23 were removed from the scale since factor commonalities were below .40. Other items (2, 3, 6, 7, 11, 19, 20, 21, 22, 23, 24, 25, 22, and 37) were removed because they were and loaded more than one-factor (overlapping). Items 1 and 19 were removed as they did not load to any factor. Thus, alternative dimensions were tested to determine the most suitable structure and factors. Alternative dimensions were tested by decreasing from 12 to five dimensions. It was determined that the most statistically and theoretically meaningful and appropriate structure was the five-factor. However, the five-factor EFA results showed consistency with only two of the dimensions identified in previous studies (Factor 3. Assumptions of traditional gender roles; Factor 4. Second-class citizen), and new components (Factor 1. Weakness of professional authority; Factor 2. Exposure to Abuse of Power; Factor 5. Tendency to Masculine Behavior) were discovered in the current analyses that is thought to be unique to the Turkish culture. Based on an examination of the sums of squared loadings after rotation, these factors explained 23.64%, 8.02%, 7,23%, 6,06%, and 5,23% of the total variance and were labeled as Factor 1: Weakness of Professional Authority (WPA), Factor 2: Exposure to Abuse of Power (EAP), Factor 3: Assumptions of Traditional Gender Roles (ATGR), Factor 4: Second-class Citizen (SCC), Factor 5: Tendency to Masculine Behaviour (TMB) (Table 1).

Table 1. Factor loadings of TPGMS

	Factor 1	**Factor 2**	**Factor 3**	**Factor 4**	**Factor 5**	**h2**	**Item-total correlation**
Factor 1: Weaknes of Professional Authority							
32. I am expected to show more compliant behaviour.	.633	-.040	.104	.038	.173	.445	.375
24. I think that my competence related to my branch is questioned more often.	.616	.323	.037	-.093	.175	.534	.466
35. I think that women parents see women teachers as their friends rather than teachers.	.601	-.044	.138	.215	.026	.439	.373
27. My professional performance is considered to be lower.	.584	.397	.104	.000	.036	.534	.489

26. My command of the classroom is questioned more.	.546	.160	-.024	.323	.118	.465	.441
28. It is thought that I will need more support from the school administration to solve my professional problems.	.504	.263	.146	-.017	.378	.530	.502
Cronbach's α = .724; PoVE= 23.640							
Factor 2: Exposure to Abuse of Power							
36. I think I receive more warnings from school administrators.	.281	.630	-.172	.158	-.027	.567	.375
29. I think I am exposed to more pressure from school administrators.	.192	.630	.108	.085	.062	.503	.437
14. I think I am more exposed to aggressive behavior.	.087	.604	.209	.260	.077	.536	.478
12. I have more problems with men school administrators.	-.029	.557	.108	.261	.405	.561	.420
Cronbach's α = .663; PoVE= 8.029							
Factor 3: Assumptions of Traditional Gender Roles **At school, when compared to men teachers;**							
18. I think that a women teacher having a child is seen as a disadvantage by the school administration.	.198	.123	.791	-.001	-.110	.759	.350
17. I think that pregnancy is seen as a disadvantage by the school administration.	.115	.074	.647	.336	-.119	.741	.359
34. I think that administrative tasks are given less to women teachers.	.159	-.102	.644	-.040	.290	.628	.312
13. I feel that I am criticised more often when I defend my views strongly.	-.152	.374	.470	.058	.188	.431	.300
Cronbach's α = .625; PoVE= 7.323							
Factor 4: Second-Class Citizen **At school, when compared to men teachers;**							
16. I think that the workload of women teachers is less.	.046	.069	.020	.680	.115	.521	.303
8. I think I am less valuable.	.123	.347	.091	.605	-.022	.553	.409
10. I feel less respected	.099	.313	-,011	.569	.101	.485	.388
9. I think I have fewer opportunities.	.073	-.156	.225	.493	.316	.537	.328
Cronbach's α = .589; PoVE= 6,066							
Factor 5: Tendency towards Masculine Behaviour							
31. I feel that I need to show tough behaviour in order to appear more competent.	.215	.011	-.051	.183	.697	.742	.361
30. I think I can exert more authority by taking on masculine roles.	.269	.173	.002	.106	.529	.401	.392
15. I feel that my authority is less recognised.	.064	.367	.332	-.100	.501	.660	.449
Cronbach's α= .492; PoVE= 5.239							
TPGMS Cronbach's α= .837; TVE = 50.298, N=190							

N*otes. 1. Excluded items were not included, 2. The primary loadings for the kept item are emphasized in bold., 3. h2= Communalities, 4. PoVE=Percentage of Variance Explained, 5. TVE=Total Variance Explained*

As can be seen from Table 1, 21 items had factor loading values above .40 in the EFA analysis, were not overlapping, and the dimensions were interpretable, the procedures were continued with reliability analysis. The highest score that can be obtained from the scale is 105 and the lowest score is 21. Increases in scores indicate that teachers experience high levels (5:

Always) of gender microaggression behaviors. All factors were significantly positively correlated with each other, ranging from .257 to .817 ($p < .01$). These relationships are presented in Table 2.

Table 2. Intercorrelations among the factors and descriptive statistics (N=190)

Factor	M	SD	1	2	3	4	5
1. Weakness of Professional Authority	3.82	.90	1				
2. Exposure to Abuse of Power	3.72	.74	.461**	1			
3. Assumptions of Traditional Gender Roles	3.68	.77	.301**	.296**	1		
4. Second-Class Citizen	3.83	.77	.350**	.439**	.257**	1	
5. Tendency towards Masculine Behaviour	3.76	.83	.481**	.422**	.296**	.360**	1
TPGMS Average	3.76**	.57**	.768**	.817**	.597**	.674**	.724**

** $p < .01$

Reliability

To assess the reliability of the scale, Cronbach's alpha for the total scale and sub-dimensions were calculated by examining item-total correlations. Cronbach's alpha signifies the extent to which each item in a scale correlates with the total sum of the other items. An alpha exceeding 0.70 was deemed satisfactory, indicating independence among individual items while belonging to the same scale (Schmitt, 1996).

The 21-item TPGMS demonstrated an acceptable internal consistency reliability, yielding a satisfying coefficient alpha of 0.837 (M = 3.76, SD = .57). Reliability of subscales include the following: Subscale 1: Weakness of Professional Authority (α = .724, M = 3.82, SD = .90); Subscale 2: Exposure to Abuse of Power (α = .663, M = 3.72, SD = .74); Subscale 3: Assumptions of Traditional Gender Roles (α = .625, M = 3.68, SD = 757); Subscale 4: Second-Class Citizen (α = .589; M = 3.83, SD = .77); Subscale 5: Tendency towards Masculine Behaviour (α = .492, M = 3.76, SD = .83). Descriptive information and Cronbach's alpha values of TPGMS are presented in Table 3. Cronbach's alpha values for the total scale are appropriate while subdimensions of "4. Second-Class Citizen" and "5. Tendency towards Masculine Behaviour" are poor. According to Schmitt (1996), if a measurement has good qualities like covering a subject well and being mostly consistent, it might not pose a major obstacle to its utilization. Therefore, other indicators were evaluated to decide on reliability.

CFA

CFA was conducted with the second half of the data set (N = 201). Based on the principal-components factor analysis, five first-order latent variables consisting of 21 items representing the subscales of TPGMS were tested using CFA in LISREL version 8.7. In evaluating CFA, various fit statistics are used to assess the fit of the model to the data from different aspects. The most frequently used fit index, $\chi 2$, is followed by RMSEA, NFI, NNFI, CFI, AGFI, and GFI values (Sümer, 2000). The acceptance criteria used in the CFA (Schermelleh-Engel, Moosbrugger, & Müller, 2003) and the goodness of fit values calculated for TPGMS are presented in Table 3.

Table 3. Model evaluation criteria and the goodness of fit values calculated for TPGMS (N=201)

Fit Measure	Good Fit	Acceptable Fit	TPGMS (First-Order CFA)	TPGMS (Second-Order CFA)

$\chi 2$/df	$0 \leq \chi 2 / df \leq 2$	$2 < \chi 2 / df \leq 3$	2.25	2.060
p value	$.05 < p \leq 1.00$	$.01 \leq p \leq .05$	.00	.00
RMSEA	$0 \leq RMSEA \leq .05$	$.05 < RMSEA \leq .08$	.06	.06
NFI	$.95 \leq NFI \leq 1.00$	$.90 \leq NFI < .95$	.83	.83
NNFI	$97 \leq NNFI \leq 1.00$	$.95 \leq NNFI < .97$	.88	.88
CFI	$.97 \leq CFI \leq 1.00$	$.95 \leq CFI < .97$	.90	.90
GFI	$.95 \leq GFI \leq 1.00$	$.90 \leq GFI < .95$	.88	.87
AGFI	$.90 \leq AGFI \leq 1.00$	$85 \leq AGFI < .90$	.84	.84

Table 3 shows that all the goodness of fit values calculated for TPGMS are in the acceptable and good fit range. Figure 1 shows the standardized path coefficients and error variances of the model.

As shown in Figure 1, the standardized parameter estimates between the latent variable (teacher microaggression scale) and the indicators (Λ) range from .27 to .93 in the first-order CFA. When the t values were analyzed, it was determined that all values were above 2.56 and therefore significant at the .01 level. The second-order CFA is performed to test whether the teachers' perceptions of gender microaggressions converge on a single latent factor (Figure 2).

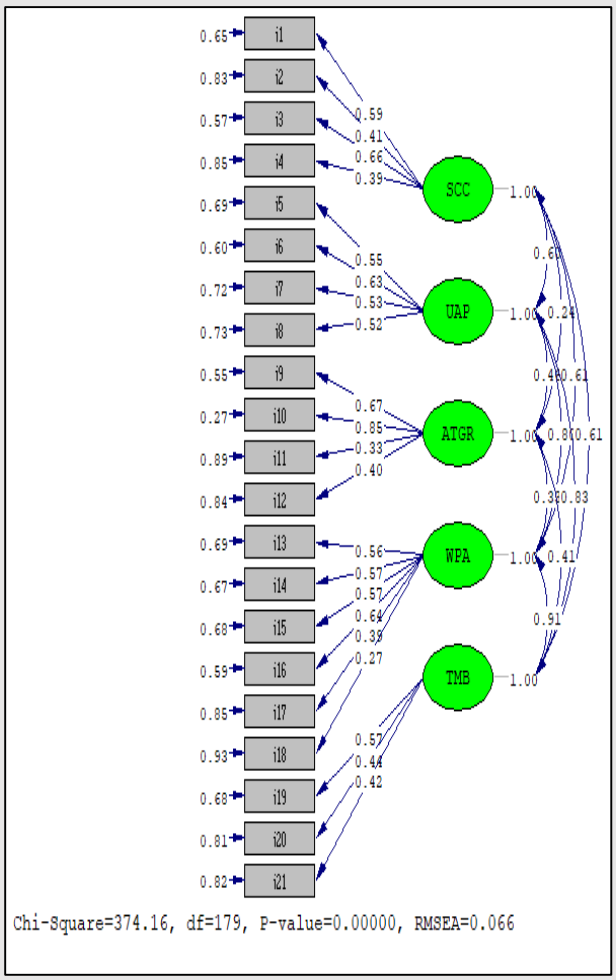

Figure 1. First-order path diagram of the TPGMS

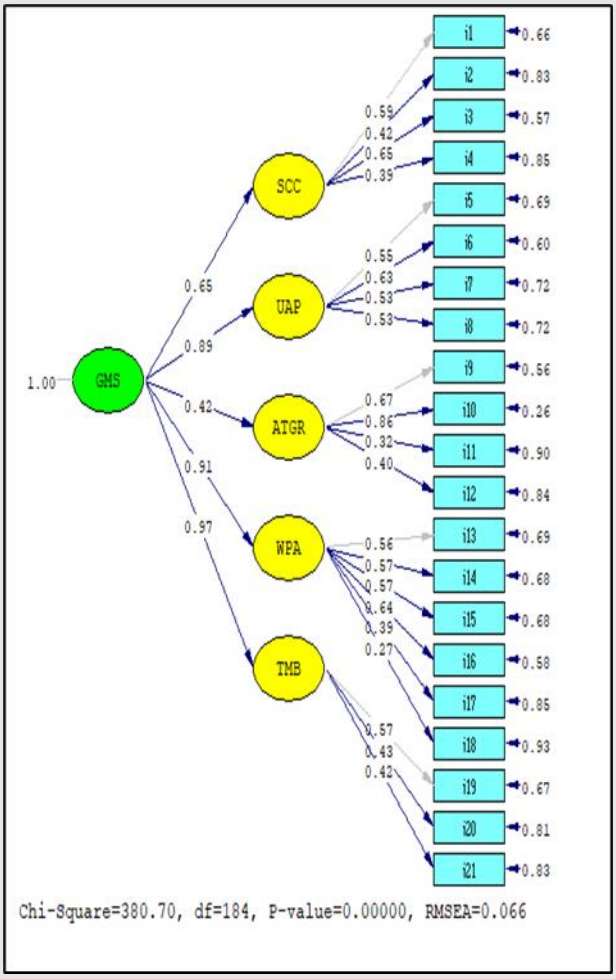

Figure 2. Second-order path diagram of the TPGMS

When the second level CFA results in Figure 2 are analyzed, $\chi 2/SD$ ratio was acceptable ($\chi 2/sd = 2.06$). Other critical indices (RMSEA= .066; SRMR= .070; NFI= .83, NNFI= .88, CFI= .9; GFI= .87; AGFI= .84) showed an acceptable fit. When the relationships between the factors were analyzed, it was determined that the highest relationship was between WPA and TMB (.87) and the lowest relationship was between SCC and ATGR (.27). R^2 for the factors were mostly turned out to be high (SCC = .43; UAP = .80; ATGR = .18; WPA = .82; TMB = .93). AVE and CR values were calculated to determine the convergent validity of the scale, and the square root of the AVE (√AVE), MSV, and ASV were calculated for divergent validity. Convergent validity refers to how much a measurement aligns positively with other measures assessing the same concept. To confirm the convergent validity, composite reliability (CR), and the average variance extracted (AVE) should be considered. A widely used method to assess convergent validity at the construct level is the AVE, where each construct should ideally have an AVE of at least 0.50 (Hair et al, 2021). These values are presented in Table 4.

Table 4. AVE, √AVE CR, MSV and ASV of the TPGMS Scale

Factors	AVE	(√AVE	CR	MSV	ASV
SCC	0.542	0.736	0.822	.090	0.367
UAP	0.493	0.702	0.795	.087	0.167
ATGR	0.474	0.688	0.757	.066	0.082
WPA	0.554	0.744	0.879	.066	0.401
TMB	0.597	0.773	0.815	.087	0.156

As can be seen in Table 4, the AVE values of SCC, WPA, and TMB factors are above .50. On the other hand, although ATGR (.47) and UAP (.49) factors are below the expected value, they are close to .50 and the other criteria have expected values, and it is concluded that discriminant validity is also acceptable (Fornell & Larcker, 1981). Hair et al. (2021) suggest that the CR should be greater than .70 and AVE (CR > .70; CR>AVE). All the constructs (factors) have higher CR values than the AVEs, as follows;

SCC-CR = .822 > AVE = .542,

UAP - CR = .795 > AVE = .493;

ATGR-CR = .757 > AVE = .474;

WPA-CR = .879 > AVE = .554;

TMB - CR = .815 > AVE = .597)

For the divergent validity of TPGMS, √AVE, MSV, and ASV values were measured (Table 4). Discriminant validity signifies the extent of association between related factors within a single measurement tool (Kline, 2023). Scholars typically utilized the Fornell-Larcker criterion as a means of measuring discriminant validity. This criterion involves contrasting the square root of the AVE with the correlations among latent variables. In particular, the AVE for each construct must exceed its maximum correlation with any other construct (Hair et al., 2021). For the present study, all constructs (factors) have higher √AVE values than the maximum correlation with any other construct. Furthermore, other calculations displayed in Table 4 verify the discriminant validity.

The MSV (Maximum Squared Variance) represents the highest variance shared by a factor with any other factor, squared. Meanwhile, the ASV (Average Shared Square Variance) is calculated by dividing the sum of variances a factor shares with other factors by the number of shared variances (Yaşlıoğlu, 2017). To demonstrate divergent validity, it's crucial that both MSV (SCC= .090; UAP = .087; ATGR = .066; WPA= .066; TMB= .087) and ASV (SCC= .367; UAP = .167; ATGR = .082; WPA= .401; TMB= .156) is less than AVE. As can be seen from Table 4, each construct ensures this criterion (MSV<AVE, ASV<AVE, Hair et al., 2014).

Discussion and Conclusion

This research aimed to develop a comprehensive scale for assessing the perception of gender microaggression behaviors directed toward teachers. Data were collected from 391 women teachers working across 45 diverse schools in Kayseri. The study employed a two-phase data collection process, initially gathering information from 190 teachers for EFA analysis. In the subsequent phase, data from an additional 201 teachers, forming a distinct sample, were collected for CFA to validate the developed scale.

The findings revealed that the scale comprises five discernible sub-dimensions, elucidating specific aspects of gender microaggression behaviors towards women teachers. These sub-dimensions include weakness of professional authority, exposure to abuse of power, assumptions of traditional gender roles, second-class citizenship, and tendencies toward masculine behavior. Reviewing the existing literature, it becomes evident that gender microaggression behaviors are intricately associated with various situations, such as exposure to abuse of power, assumptions of traditional gender roles, tendencies toward masculine behavior (associating specific behaviors or professions with gender), and the differential application of authority or power based on gender (Gonzales et al., 2015; Nadal & Haynes, 2012; Sue et al., 2007; Torres-Harding et al., 2012; Watson & Henderson, 2023). Consequently, these behaviors manifest as disturbing phenomena spanning social, psychological, and economic dimensions, particularly impacting women due to their gender (Barthelemy et al., 2016; Miyake, 2018).

Contrary to assumptions of solely gender-based exposure, the study by Basford et al. (2014) revealed that both men and women experience gender microaggression behaviors, although women may be more vulnerable in certain instances. Similarly, recent research by Gartner et al. (2020) underscored the increasing focus on gender microaggression behaviors targeting women. However, the existing knowledge on the subject remains somewhat limited, marked by inconsistencies in the theoretical and conceptual features of gender microaggression behaviors. Consequently, scholars emphasize the necessity of developing a psychometrically sound and standardized criterion valid for women's groups.

The study identified the weakness of professional authority as a pivotal factor contributing to gender microaggression behaviors faced by women. This corroborates with findings from Kawai (2005), Sue et al. (2007), and Wong et al. (2011), highlighting that women often encounter discrimination due to a lack or weakness of authority. The underrepresentation of women in positions of strong authority, coupled with weaknesses in confronting cultural codes, contributes to microaggression behaviors in the form of gender-based discrimination. Moreover, exposure to abuse of power emerged as a substantial factor influencing gender microaggression behaviors toward women. Similar findings were noted in the study by Vyjayanthi et al. (2020), particularly in the field of health, revealing microaggressive behaviors such as underestimating women's abilities, encountering sexually inappropriate comments, being directed to mundane tasks, and experiencing feelings of exclusion or marginalization. These findings collectively contribute to the understanding of gender microaggression behaviors directed toward women teachers. The identified sub-dimensions and associated factors emphasize the nuanced nature of these behaviors, offering insights for future research and interventions to foster more inclusive and equitable educational environments.

Within the scope of this research, second-class citizenship emerged as a pivotal factor influencing gender microaggression behaviors encountered by women. This observation aligns with the findings of a study conducted by Rosemary et al. (2022), which delved into the practical manifestations of gender microaggression behaviors. These behaviors were noted to have detrimental effects on individuals' well-being, perpetuating gender-based inequalities. In the study by Smith et al. (2022), an exploration of gender microaggression behaviors in the context of business life revealed a spectrum of microaggressive behaviors associated with characteristics such as ethnicity, gender, sexual orientation, and age. The research determined that these behaviors contributed to the narrowing of women's professional spheres, leading to their devaluation and relegation to the background.

Miyake (2018) expounded on the persistence of microaggression behaviors faced by women, particularly in business settings, clarifying how these behaviors contribute to the constriction of women's opportunities and their marginalization within the workplace. This resonates with Franklin and Boyd-Franklin's (2000) study, where microaggression behaviors manifested as delegitimization, ignoring, and cultural invalidation. In the comprehensive study conducted by Sue et al. (2007), women were identified as being subjected to gender microaggression behaviors, positioned as second-class citizens with accompanying assumptions of inferiority. This echoes the significance of the second-class citizenship factor in understanding and addressing gender microaggression behaviors.

The research also identified masculine behavior tendencies as a noteworthy factor influencing gender microaggression behaviors experienced by women. This finding is consistent with the study conducted by Kaskan and Ho (2016), which explored the relationship between women athletes and microaggression behaviors. The research highlighted three key themes: objectification towards women, imposition of restrictive gender roles, and the assumption of women's inferiority. It was concluded that societal perceptions often limit the recognition of women's achievements and talents, reinforcing traditional (masculine) roles and perpetuating a sexist approach that diminishes their success. Sprow et al.'s (2021) study, focused on the evaluation of studies related to gender microaggression behaviors, emphasized the persistence of such behaviors across various work domains. It underscored the inadequacy of women's representation in the workforce, particularly highlighting the insufficiency of gender parity in professional settings. Collectively, these findings contribute to a nuanced understanding of the multifaceted impact of gender microaggression behaviors, shedding light on specific factors such as second-class citizenship and masculine behavior tendencies. These insights are crucial for devising strategies to mitigate and eradicate gender-based microaggressions in diverse societal contexts, especially within professional environments.

Limitations

This study sought to construct a comprehensive scale for measuring the gender microaggression behaviors experienced by women teachers in their professional roles. The developed scale, comprising 21 items and organized into 5 sub-dimensions, proved instrumental in assessing and categorizing these behaviors. Utilizing a 5-point Likert scale, with scores ranging from 21 to 105, a higher score on the scale indicates a heightened prevalence of gender microaggression behaviors. The identified sub-dimensions encompass weakness of professional authority, exposure to abuse of power, assumptions of traditional gender roles, second-class citizen treatment, and the manifestation of a tendency towards masculine behavior. TPGMS has been shown to be valid and reliable in identifying gender microaggressions experienced by teachers in their professional lives.

The study’s findings are significant in terms of both the scale’s development process and its intended purpose. Moreover, the alignment of these results with comparable studies in the literature enhances the robustness of the research. However, it is imperative to acknowledge certain limitations, notably the regional specificity of the sample drawn solely from Kayseri province and the exclusive focus on women teachers. Recognizing that gender microaggression behaviors may vary based on factors such as profession, age, and cultural characteristics underscores the need for caution in generalizing the findings beyond the studied demographic.

Suggestions

The findings revealed that gender microaggression behaviors towards women teachers are multifaceted and include various dimensions such as weakness of professional authority and exposure to abuse of power. These behaviors have significant social, psychological, and economic impacts. The study's results align with existing literature, emphasizing the persistence and detrimental effects of gender microaggression behaviors across different contexts. This includes manifestations like delegitimization, cultural invalidation, and imposition of traditional gender roles, which contribute to the marginalization and devaluation of women in professional settings. Policymakers should use the findings from this study to develop and enforce policies aimed at reducing gender microaggressions in educational settings. This includes creating guidelines and support systems for reporting and addressing instances of microaggressions. Specifically, an examination of gender microaggression behaviors can equip school psychologists with insights to effectively address and counteract microaggressions when formulating strategies for their stakeholders. Moreover, heightened awareness of gender microaggression behaviors can empower school administrators within both public and private institutions to implement preventive measures against such behaviors.

This scale offers a versatile tool for identifying the gender microaggression behaviors experienced by women teachers and assessing the severity of these behaviors across diverse samples. Future research should consider expanding the sample population beyond the Kayseri province to include a more diverse demographic. This would help generalize the findings and ensure they apply to a broader range of educational contexts and cultural settings. Future studies should explore the intersectionality of gender microaggressions with other identity factors such as race, socioeconomic status, and sexual orientation. Understanding these intersections can provide deeper insights into the compounded effects of multiple forms of discrimination. Consequently, the scale's utility extends beyond its initial development, offering a robust instrument for ongoing investigations into the nuanced dimensions of gender microaggressions in different contexts and populations.

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Conflicts of Interest

The authors declare that there is no conflict of interest.

Ethics

All ethical rules were followed during the collection and analysis of the research data. The ethics application for the study was made on 21.12.2022 and the research was carried out with the approval of Hacettepe University Educational Sciences Ethics Committee dated 13.12.2022 and numbered 2534752. It was stated that the data obtained from the research will be used only for scientific purposes and will not be shared with third parties.

References

Barreto, M. A., & Pedraza, F. I. (2009). The renewal and persistence of group identification in American politics. *Electoral Studies, 28*(4), 595-605.

Barthelemy, R.S., McCormick, M., & Henderson, C. (2016). Gender discrimination in physics and astronomy: Graduate student experiences of sexism and gender microaggressions. *Physical Review Physics Education Research, 12*(2).

Basford, T.E., Offermann, L. R., & Behrend, T.S. (2014). "Do you see what I see? Perceptions of gender microaggressions in the workplace." *Psychology of Women Quarterly, 38*(3), 340-349.

Beaulieu, R. (2016). A critical discourse analysis of teacher-student relationships in a third-grade literacy lesson: Dynamics of microaggression. Cogent Education, 3(1), 1244028.

Bird, C. (1968). On being born female. *Vital Speeches of the Day, 35*, s. 88–91.

Bolte , E. (2015). *Investigating the Moderating Role of Gender Collective Self Esteem on the Relationship Between the Experience of Gender Microaggressions and Psychological Distress in Women.* Southern Illinois University.

Boysen, G.A. (2012). Teacher and student perceptions of microaggressions in college classrooms. *College Teaching, 60*(3), 122-129.

Capodilupo, C.M., Nadal, K.L., Corman, L., Hamit, S., Lyons, O.B., & Weinberg, A. (2010). The manifestation of gender microaggressions. In D. W. Sue (Ed.), *Microaggressions and marginality: Manifestation, dynamics, and impact* (pp. 193–216).

Cross, E.J., Overall, N.C., Hammond, M.D. & Fletcher, G.J.O. (2017). When does men's hostile sexism predict relationship aggression? The moderating role of partner commitment. *Social Psychological and Personality Science*, *8*(3), 331-340.

Eagly, A., & Mladinic, A. (1989). Gender stereotypes and attitudes toward women and men. *Personality and Social Psychology Bulletin*, 543-558.

Fitzgerald, L., Swan, S., & Fischer, K. (1995). Why didn't she just report him? The psychological and legal implications of women's responses to sexual harassment. *Journal of Social Issues, 51*(1), s. 117-138.

Fornell, C., & Larcker, D.F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research, 18*(1), 39-50.

Franklin, A., & Boyd-Franklin, N. (2000). Invisibility syndrome: A clinical model of the effect of racism on African-American males. *American Journal of Orthopsychiatry, 70*, 33– 41.

Fredrickson, B., & Roberts, T. (1997). Objectification theory: Toward understanding women's lived experiences and mental health risks. *Psychology of Women Quarterly, 21*(2), 173-206.

Gartner, R. (2019). *From gender microaggressions to sexual assault: Measure development and preliminary trends among undergraduate women.* Berkeley: University of California.

Gartner, R. E., Sterzing, P.R., Fisher, C.M., Woodford, M.R., Kinney, M.K., & Victor, B.G. (2020). A scoping review of measures assessing gender microaggressions against women. *Psychology of Women Quarterly, 44*(3), 283-306.

Gerring, J. (2017). Qualitative methods. *Annual Review of Political Science*, *20*(1), 15-36.

Glick, P., & Fiske, S. (1996). The ambivalent sexism inventory: Differentiating hostile and benevolent sexism. *Journal of Personality and Social Psychology, 70*(3), 491–512.

Gonzales, L., Davidoff, K.C., DeLuca, J.S., & Yanos, P.T. (2015). The mental illness microaggressions scale-perpetrator version (MIMS-P): Reliability and validity. *Psychiatry Research*, *229*(1-2), 120-125.

Gutiérrez, L. M., Rodríguez-Newhall, A., Mora, A., Areguin, M. A., & Salazar, M. (2019). 'Too Many to Count': Experiences of Microaggressions for Latinx Students at a Predominantly White Institution in the Age of Trump. *NCID Currents, 1*(1).

Hair J, Black W.C, Babin B.J, Anderson R.E. (2014). Multivariate Data Analysis. 7th edition. Pearson England: Education Limited.

Hair Jr, J.F., Hult, G.T.M., Ringle, C. M., Sarstedt, M., Danks, N.P., Ray, S. (2021). A primer on partial least squares structural equation modeling (PLS-SEM). Sage publications.

Henden, E., & Gümüşeli, A.İ. (2023). School principals and microaggression: what do they think? How do they do it? How do they react to it?. *European Journal of Education Studies*, *10*(8).

Hunter, K., Maxwell, E., & Brunger, F. (2015). Misogyny in Health Professions? An Analysis of The Dalhousie Dentistry Scandal. Commentary, *Bioéthique Online,* 4.

Judson, S. S. (2014). Sexist discrimination and gender microaggressions: An exploration of current conceptualizations of women's experiences of sexism. The University of Akron.

Kandiyoti, D. (2007). The politics of gender and the Soviet paradox: neither colonized, nor modern?. *Central Asian Survey, 26*(4), 601-623.

Kaskan, E.R., & Ho, I.K. (2016). Microaggressions and women athletes. *Sex Roles, 74*, 275-287.

Kawai, Y. (2005). Stereotyping Asian-Americans: The dialectic of the model minority and the yellow peril. *The Howard Journal of Communications, 16*(2), 109–130.

Keum, B.T., Brady, J.L., Sharma, R., Lu, Y., Kim, Y.H., & Thai, C.J. (2018). Gendered racial microaggressions scale for asian american women: development and initial validation. Journal of Counseling Psychology. Advance online publication. http://dx.doi.org/10.1037/cou0000305

Kline, R.B. (2023). Principles and practice of structural equation modeling. Guilford Publications.

Lawson, B.E. (1992). Moral discourse and slavery. H. McGary, & B. Lawson in, *Between slavery and freedom: Philosophy and American Slavery* (s. 76-77). Bloomington: Indiana University.

Lehrer, A. (1974). *Semantic fields and lexical structure.* London: North-Holland.

Lewis, J.A. (2016). Gendered Racial Microaggressions and the Impact on Mental Health Among Black Women. *Journal of Multicultural Counseling and Development, 44*(1), 22-36.

Lewis, J.A. (2018). From modern sexism to gender microaggressions: Understanding contemporary forms of sexism and their influence on diverse women. In C. B. Travis, J. W. White, A. Rutherford, W.S. Williams, S.L. Cook, & K.F. Wyche (Eds.), *APA handbook of the psychology of women: History, theory, and battlegrounds* (pp. 381–397). American Psychological Association. https://doi.org/10.1037/0000059-019

Lewis, J.A., & Neville, H.A. (2015). Construction and initial validation of the Gendered Racial Microaggressions Scale for Black women. *Journal of Counseling Psychology*, *62*(2), 289.

Lewis, J.A., Mendenhall, R., Harwood, S.A., & Browne Huntt, M. (2013). Coping with Gendered Racial Microaggressions among Black Women College Students. *Journal of African American Studies, 17*, 51-73

Lindeman, R.H., Merenda, P.F., & Gold, R.Z. (1980). Introduction to bivariate and multivariate analysis (Vol. 4). Glenview, IL: S. Foresman.

Lobban, R., Luyt, R., & McDermott, D. (2022). (Hetero) sexist microaggressions in practice. *Gender and Language*, *16*(2), 125-148.

McTernan, E. (2018). Microaggressions, equality, and social practices. *Journal of Political Philosophy*, *26*(3), 261-281.

Menegatti, M., & Rubini, M. (2017). Gender Bias and Sexism in Language. Communication. Oxford Research, *Encyclopedia of Communication*.

Miyake, E. (2018). *Female Microaggressions Scale (FEMS): A comprehensive sexism scale*. Doctoral Dissertation, Arizona State University.

Nadal, K., & Haynes, K. (2012). The effects of sexism, gender microaggressions, and other forms of discrimination on women's mental health and development. K. Lundberg Love, K. Nadal, & M. Paludi in, *Women and Mental Disorders (Vols 1-4)* (s. 87-101). CA US: Praeger/ABC-CLIO.

Nadal, K.L. (2011). The Racial and Ethnic Microaggressions Scale (REMS): Construction, reliability, and validity. *Journal of Counseling Psychology, 58*(4), 470-480. https://doi.org/10.1037/a0025193

Nadal, K.L., Issa, M.A., Leon, J., Meterko, V., Wideman, M., & Wong, Y. (2011). Sexual orientation microaggressions:"Death by a thousand cuts" for lesbian, gay, and bisexual youth. *Journal of LGBT Youth, 8*(3), 234-259.

Nadal, K.L., Whitman, C.N., Davis, L.S., Erazo, T., & Davidoff, K.C. (2016). Microaggressions toward lesbian, gay, bisexual, transgender, queer, and genderqueer people: A review of the literature. *The Journal of Sex Research, 53*(4-5), 488-508.

Nunnally, J.C. (1978). *Psychometric Theory*, 2nd edition. New York: McGraw-Hill.

Özmen, M., Yıldırım, O., & Türk, N. (2022). Adaptation of the Racial Microaggression Scale to Turkish Culture: Validity and Reliability Study. *İçtimaiyat*, *6*(2), 717-729.

Periyakoil, V.S., Chaudron, L., Hill, E.V., Pellegrini, V., Neri, E., & Kraemer, H.C. (2020). Common types of gender-based microaggressions in medicine. *Academic Medicine*, *95*(3), 450-457.

Platt, L.F., & Lenzen, A.L. (2013). Sexual orientation microaggressions and the experience of sexual minorities. *Journal of Homosexuality, 60*(7), 1011-1034.

Resnick, C.A., & Galupo, M.P. (2019). Assessing experiences with LGBT microaggressions in the workplace: Development and validation of the microaggression experiences at work scale. *Journal of Homosexuality, 66*(10), 1380-1403.

Sakallı Uğurlu, N. (2002). Çelişik duygulu cinsiyetçilik ölçeği: Geçerlik ve güvenirlik çalışması. *Türk Psikoloji Dergisi, 17*(49), 47-58.

Schermelleh-Engel, K., Moosbrugger, H. & Müller, H. (2003). Evaluating the fit of structural equation models: Tests of significance and descriptive goodness-of fit measures. *Methods of Psychological Research Online, 8*(2), 23-74.

Schmitt, N. (1996). Uses and abuses of coefficient alpha. *Psychological Assessment, 8*(4), 350.

Şencan, H. (2005). *Sosyal ve davranışsal ölçümlerde geçerlilik ve güvenirlik.* Ankara: Seçkin Matbaası.

Shore, L.M., Cleveland, J.N., Sanchez, D. (2018). Inclusive workplaces: A review and model. *Human Resource Management Review*, *28*(2), 176–189.

Shrestha, N. (2021). Factor analysis as a tool for survey analysis. *American Journal of Applied Mathematics and Statistics, 9*(1), 4-11.

Smith, I.A., & Griffiths, A. (2022). Microaggressions, everyday discrimination, workplace incivilities, and other subtle slights at work: A meta-synthesis. *Human Resource Development Review*, *21*(3), 275-299.

Solorzano, D., Ceja, M., & Yosso, T. (2000). Critical race theory, racial microaggressions, and campus racial climate: The experiences of African American college students. *Journal of Negro Education*, 60-73.

Sprow, H.N., Hansen, N. F., Loeb, H.E., Wight, C. L., Patterson, R.H., Vervoort, D., & Chu, K. (2021). Gender-based microaggressions in surgery: a scoping review of the global literature. *World Journal of Surgery*, *45*(5), 1409-1422.

Steketee, A., Williams, M.T., Valencia, B.T., Printz, D., & Hooper, L.M. (2021). Racial and languae microaggressions in the school ecology. *Perspectives on Psychological Science, 16*(5), 1075-1098.

Sue, D.W. (2010). *Microaggressions in everyday life: Race, gender, and sexual orientation*. John Wiley & Sons.

Sue, D.W., Bucceri, J., Lin, A., Nadal, K.L., & Torino, G.C. (2009). Racial microaggressions and the Asian American experience. *Asian American Journal of Psychology*, *S*(1), 88–101. https://doi.org/10.1037/1948-1985.S.1.88

Sue, D.W., Capodilupo, C.M., Torino, G.C., Bucceri, J.M., Holder, A., Nadal, K.L., & Esquilin, M. (2007). Racial microaggressions in everyday life: implications for clinical practice. *American Psychologist, 62*(4), 271.

Sümer, N. (2000). Yapısal eşitlik modelleri: Temel kavramlar ve örnek uygulamalar. *Türk Psikoloji Yazıları, 3*(6), 49-74.

Suveren, Y. (2022). Günümüz Dünyasında Kadın Düşmanlığı (Mizojini) ve Görünümleri. *Sakarya Üniversitesi Kadın Araştırmaları Dergisi*, *1*(1), 19-36.

Swim, J., & Campbell, B. (2003). Sexism: Attitudes, beliefs, and behaviors. R. Brown, & S. Gaertner içinde, *Blackwell Handbook of Social Psychology: Intergroup Processes* (s. 218-237). Blackwell.

Tayınmak, İ. (2020). Önyargılı tutumlar ve saldırganlık. *Uluslararası Sosyal Bilimler Akademik Araştırmalar Dergisi*, *4*(1), 71-87.

Torres-Harding, S.R., Andrade Jr, A.L., & Romero Diaz, C.E. (2012). The Racial Microaggressions Scale (RMAS): A new scale to measure experiences of racial microaggressions in people of color. *Cultural Diversity and Ethnic Minority Psychology*, *18*(2), 153.

Uzun, M., Gümüşçağlayan, G., & Kağnıcı, D.Y. (2021). Examining Microagression Experiences of Women: The Case of İzmir. Kadin/Woman 2000, *Journal for Women's Studies, 22*(2), 1-18.

Vyjayanthi, N. V., Banerjee, D., & Rao, T. S. (2020). The Silent victims of the Pandemic: Children and adolescents during the COVID-19. *Journal of Indian Association for Child and Adolescent Mental Health, 16*(3), 17-31.

Watson, L.B., & Henderson, J. (2023). The relation between gendered racial microaggressions and traumatic stress among highly educated Black women. *The Counseling Psychologist, 51*(2), 210-241.

Wong, Y.J., Owen, J., Tran, K.K., Collins, D.L., & Higgens, C.E. (2012). Asian American men college students' perceptions of people's stereotypes about Asian American men. *Psychology of Men & Masculinity*, *13*(1), 75.

Worthington, R. L., & Whittaker, T. A. (2006). Scale development research: A content analysis and recommendations for best practices. *The Counseling Psychologist, 34(6),* 806-838.

Wright, T.A., Quick, J.C., Hannah, S.T., & Blake Hargrove, M. (2017). Best practice recommendations for scale construction in organizational research: The development and initial validation of the Character Strength Inventory (CSI). *Journal of Organizational Behavior, 38(*5), 615-628.

Yılmaz, Y., Acar, B., & Yaman, Ö. M. (2023). Üniversitelerin ruh sağlığı alanındaki bölümlerinde "toplumsal cinsiyet" konulu derslerin içerik analizi yoluyla incelenmesi. *Yükseköğretim ve Bilim Dergisi, 13(3),* 410-422.

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The Effect of the Use of Educational Digital Comics in Science Teaching on Academic Achievement

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ABSTRACT

This study aims to determine the effect of the use of educational digital comics designed for the topics of "Energy Conversions" and "Food Chain and Energy Flow" within the "Energy Conversions and Environmental Science" unit of the 8th-grade science curriculum on students' academic achievement. The research employed a quantitative methodology and utilized a quasi-experimental design with random sampling, involving 63 eighth-grade students. SPSS 22.0 analysis program was used to analyze quantitative data collected during the study. As a result of the analysis, a significant difference was found between the academic achievement mean scores of the experimental group students, in which the educational comics were used, and the control group students. Based on our finding that using educational comics has a positive effect on students' success, it is thought that the use of these materials, which can make learning more fun and permanent, should be expanded.

Keywords: Educational comics, science education, academic achievement

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Introduction

Technology, which is included in educational and instructional studies, provides significant support to both students and teachers in terms of materials. The utilization of materials in education not only saves time but also enhances academic achievement by facilitating the acquisition of desired skills and ensuring that the knowledge gained becomes more permanent (Cohen, 1992; Çilenti, 1988; Gürbüz, 2006; Karataş & Yapıcı, 2006; Şimşek, 2002; Yanpar-Şahin & Yıldırım, 1999; Yaşar, 2006; Yıldırım, 2016). One of the technological materials used in education is educational digital comics.

In the 21st century, comics have been integrated into the science education process (Aisyah et al., 2017). Although comics which have existed for centuries and were seen as entertainment tools covered topics such as political criticism and social issues, they have now emerged as valuable educational tools (McCloud, 2001; Widyastuti et al., 2017). The interest shown by children in comics is great (Sheu & Chu, 2017). The short structure of comics is regarded as a beneficial feature for students who cannot spend long periods of time reading (Negrete, 2013). Comics utilize a visual language and make learning interesting (Tekin & İlhan, 2021). Educators use plots and funny visuals appropriate to the curriculum in the educational comic book stories they design to attract students' attention (Bitz & Emejulu, 2016). Given that students generally prefer books with visual elements (Lin & Lin, 2016), comics serve as an enjoyable and stimulating learning environment for students across all educational levels (Maryani & Amalia, 2018; Toh, 2009). Therefore, it can be inferred that learning can be more effective as students' reading a book they like will contribute positively to their motivation to learn. By incorporating comics into the curriculum, students' curiosity will remain high, and they will encourage themselves to learn and understand the lesson as intrinsically motivated individuals (Kim, et al., 2017).

Turkey Century 2024 Maarif Model Science Course Curriculum adopts a holistic educational approach that centers on the student. The program aims to raise students as individuals equipped with the comprehensive skills necessary for the modern era, actively participate in group work in cooperation during learning processes, have self-regulation skills, are researching, questioning, critical thinkers, environmentally sensitive, and display scientific attitudes and behaviors. Additionaly, raising individuals who are aware of digital transformation and can adapt to changing technology is shown among the goals of science education (MONE, 2024). The incorporation of digital comics serves as a material that can help achieve these educational goals. Digital comics, as technological tools integrated into educational activities, can significantly support both students and teachers in achieving targeted learning outcomes.

When reviewing the literature, it is evident that numerous studies have examined the effects of using comics in education and instruction. One study found that incorporating comics into educational settings significantly enhanced students' motivation, vocabulary, and writing skills (Themelis & Sime, 2020). The visual elements presents in comics have a positive effect on permanence and remembering as they foster reconstruction in the mind. Foreign language teachers frequently employ this method to make reading more fun and understandable (Liu, 2004). A similar investigation focused on teaching Japanese, where students demonstrated notable improvements in language acquisition through the use of comics and expressed that they found comics interesting (Lai et al., 2002). In another study, it indicated that comics possess a more flexible structure compared to other educational materials, and allowing for a stronger connection with the reader (Guadamillas Gómez, 2014).

Özdemir (2010) revealed that educational comics enhance success in teaching some abstract concepts. Similarly, comics have been recognized as a powerful complementary teaching tool that helps to concretizes abstract concepts (Akcanca, 2020). Toh (2009) stated that students with visual-kinaesthetic intelligence are unsuccessful in today's education system. It was determined that these students generally enjoy reading comics, and the incorporation of comics in education could provide equal opportunities for students. In a study conducted on preschool children concluded that literacy was encouraged with comic books (Muniran & Yusof, 2008). In some studies based on student opinions, it has been stated that educational comics have been reported as interesting and motivating for learning (Bhatia, 2006; Song et al., 2008). Additionaly, Ranker (2008) revealed that comic books play a significant role in developing essential life skills, such as speaking, writing, thinking, and imagination. The effectiveness of comic books in fostering reading habits among children is attributed to their colorful, engaging narratives and visual elements (Cary, 2004). Haugaard (1973) also stated that children's interest in lessons would increase with comics.

Comics created using traditional drawing methods take a long time and require special talent. Digital comics are easier to their traditional counterparts (Balaban, 2007). With Web 2.0 tools, illustrations can be produced quickly, offering limitless coloring options and facilitating easier sharing. A review of the literature reveals that various studies conducted in recent years have demonstrated the positive effects of utilizing Web 2.0 tools in science education (Akbaba, 2019; Arslan & Akçay, 2022; Bilen et al., 2019; Bilgican Yılmaz et al., 2021; Gürleroğlu, 2019; Korucu, 2020;. Uysal, 2020; Yıldırım, 2020).

It is known that visual materials play a crucial role in science education by helping to concretize abstract concepts, thereby effectively enhancing student success. From this perspective, it is obvious that comics should be integrated into in science lessons. Consequently, the current study aims to provide resources for comic-supported learning by developing materials in the field of science and contributing to the literature by measuring the effect of comics on student achievement. At the same time, improving the quality of online science education and revealing the role of educational digital comics as a material that supports online science education are among the expected research outputs. It is also expected to introduce Web 2.0 tools used by educators in times such as the pandemic, where we are familiar with distance education, to eliminate concerns about this issue and to guide science educators in making recommendations about the tools. Using digital tools can also help encourage positive student engagement in the classroom and provide flexible and accessible learning options that are exciting for students. Based on all these points, the aim of the current study is to design educational digital comics on the topics of "Energy Conversion" and "Food Chain and Energy Flow" given within the unit of "Energy Conversions and Environmental Science", which is the 6^{th} unit of the 8^{th} grade science curriculum (MONE, 2018) and to investigate whether the use of digital comics in education has an effect on the academic achievement of students.

Method

Research model

This study was conducted using a quantitative research methodology and a pre-test-post-test quasi-experimental design with a control group (Campbell & Stanley, 1963). Since the quasi-experimental design method is appropriate for studies in which different treatments administered to groups are compared and then the effects of the elements included in the study are examined (Büyüköztürk, 2013), this method was used in the current study. The main stages of the study are illustrated in Figure 1.

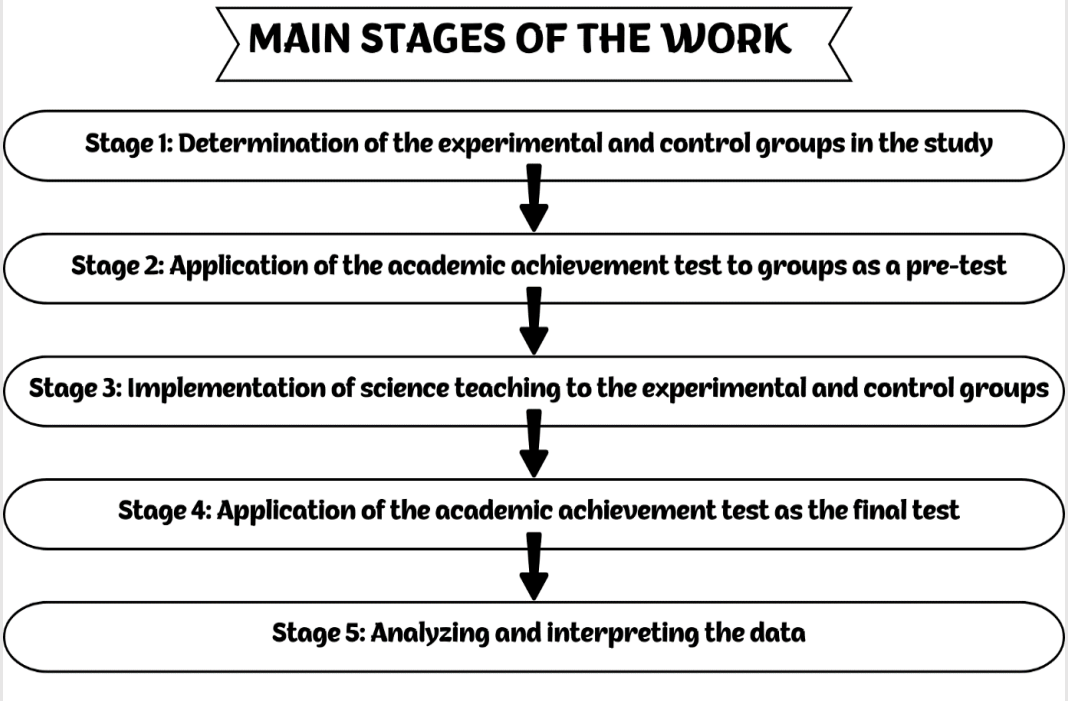

Figure 1. Stages of the research process based on the quasi-experimental design

Group-universe/sample

The study was conducted with 63 eighth-grade students attending a public school in the city of Kırsehir during the 2022–2023 academic year. To enhance the practicality and efficiency of the research, experimental (N=32) and control (N=31) groups were created using the easily accessible sampling method, which is a type of the purposeful sampling types. The experimental group consisted of 14 female and 18 male students, while the control group included 15 female and 16 male students.

Data collection tool

Since the literature review indicated that no existing data collection tool comprehensively addressed the study's subject, the researcher developed an academic achievement test. Initially, a question pool consisting of 45 multiple-choice questions each with four options was created. Subsequently, the researcher sought feedback from nine experts (5 Biology, 3 Science, 1 Turkish) and as a result, the test was reduced to 27 questions. Sample items from the academic achievement test are presented in Figure 2.

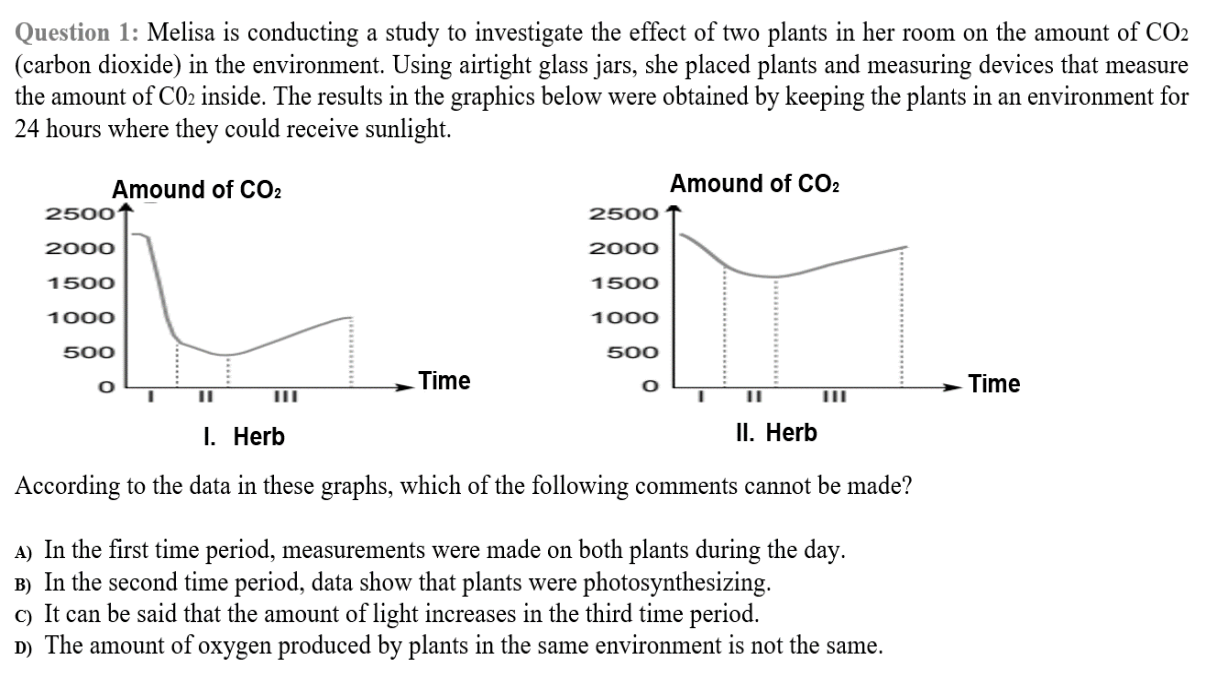

Figure 2. Sample questions from the academic achievement test

Before starting the data collection process, reliability analyses for the "Photosynthesis and Food Chain Academic Achievement Test" were conducted based on self-reports from 150 (9^{th} grade) students who were not part of the study group. In the validity analysis of the test items, a specification table for content validity was created with the assistance of three experts. Item discrimination (0.663), and item difficulty indexes (0.496) were calculated and tabulated. Consequently, three items were not included in the academic achievement test because they were found to not meet the criteria taken as basis in the studies conducted in previous years (Hasançebi et al., 2020; Tan, 2010). For the reliability analysis concerning the internal consistency of the test items, the Kuder-Richardson-21 reliability coefficient was calculated to be 0.761. It was accepted that this result met the reliability criterion that should be found in the academic achievement test (Pallant, 2020). In this connection, it can be said that the academic achievement test is reliable, has medium difficulty, and comprises high-quality items. As a result of the validity and reliability studies, the final version of the academic achievement test was given to be consisted of 24 items. The highest score to be taken from the academic achievement test is 24, and the lowest score is 0.

The normality analysis of the prepared academic achievement test was also performed. As a result of the analysis, it was seen that the Kolmogorov-Smirnov value was not significant ($p>0.05$) and the Skewness-Kurtosis coefficients were found to be between -1 and +1 (Table 1). Based on these results, it was concluded that the academic achievement test data had a normal distribution (Kline, 2011; Tabachnick & Fidell, 2015).

Table 1. The normality analysis results of the academic achievement test

	Statistics	df	Skewness	Kurtosis	p
Sample	.072	150	.204	-.342	.067

The 1st, 4th, 9th, 10th, 12th, 17th, 18th, and 21st items on the academic achievement test are designed to measure the accomplishment of the objective "Gives examples of producers, consumers, and decomposers in the food chain". The 5th, 6th, 7th, 14th, and 20th items are prepared to measure the accomplishment of the objective "Recognizes the importance of photosynthesis in food production in plants". The 2nd, 3rd, 8th, 11th, 13th, 15th, 16th, 19th, 22nd, 23rd, and 24th items are prepared to measure the accomplishment of the objective "Makes inferences about the factors affecting the rate of photosynthesis".

Data collection

Each step of the implementation process for the experimental study was carried out in a total of 20 class hours. The implementation period was shaped based on the data in the annual plan made based on the science curriculum. In the study, students who were taught science using the methods in the science curriculum were determined as the control group, and students who were taught science using the educational comic materials were determined as the experimental group.

Implementation process

The implementation process of the research was completed in 20 class hours. The implementation period and process were structured according to the science curriculum. In this study, students who were taught science using comics were designated as the experimental group, while those who received traditional science instruction were classified as the control group.

Experimental group

A summary of the implementation process utilized in the experimental group of the study is presented in Table 2.

Table 2. Research implementation process flow

Course Hours	Implementation Process
1	Administering of the academic achievement test as a pre-test
1	Filling in the parent and student consent forms
1	Introducing the educational comic material application to students
16	Teaching process using the educational comic material
1	Administering the academic achievement test as a post-test
Total 20 hours	

**Each lesson hour consists of 40 minutes.*

Since there was no comic book to be presented to the experimental group in class, it was created by the researcher in three stages (Şahan & Atlı, 2024).

Scenario stage

In the first stage, a scenario was designed for the 8th Grade Energy Transformations and Environmental Science Unit, specifically focusing on the Food Chain and Energy Flow. A draft text was subsequently created. During the text development stage, the breaking points of the scenario, common language with the reader and common living areas were applied and a connection was established between them. Care was taken to ensure that the scenario comprehensively covered the unit's content and maintained scientific accuracy.

Drawing stage

At this stage, the objective is to align the scenario with the drawing. To achieve this, Storyboard That and Canva tools have been selected as the most suitable Web 2.0 tools, offering a variety of background and character options.

Panel stage

The events narrated in the comics consist of consecutive frames. The arrangement of these frames on the screen in printed works or digital platforms is referred to as a panel, while the transitions between frames are known as a sequence (Alpin, 2002). At this stage, both sequences and panels were developed. Since the comics will be displayed on a smart board to present relevant material prepared for the science course to students, they were designed in a size of 1920 x 1080 mm.

In teaching with the educational comics, which is the most important part of the implementation process, the comics, which were converted into PDF format suitable for the smart board (Figure 3), were voiced by volunteer students, and the interpretation of the flow of the events in the story was made through brainstorming in the class.

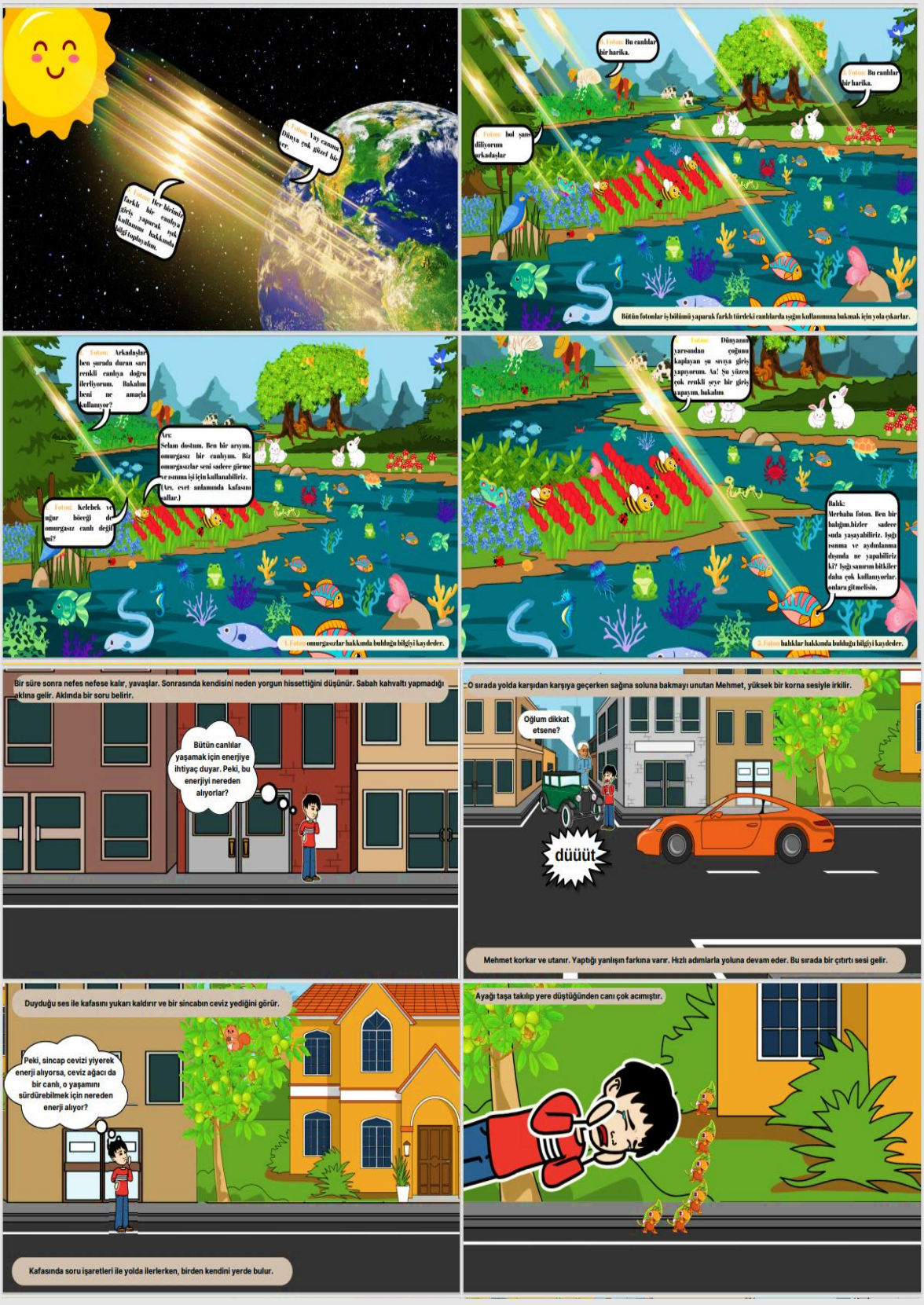

Figure 3. Sample image of the comic book designed in the study

Control group

In the control group, the initial stage of the implementation process involved administering an academic achievement test as a pre-test to assess whether the students' readiness levels were comparable. Subsequently, the course was taught in accordance with the Energy Transformations and Environmental Science Unit achievements in the current curriculum based on the textbook. The students were given the activities in the book and the subject explanations were carried out. At the end of the process, the academic achievement test was administered as a post-test.

Data analyses

The data collected with the academic achievement test were analyzed by using the SPSS 2.0 statistics program. During the analysis, students' correct answers were coded as 1 point, and incorrect answers and unanswered questions were coded as 0 points in the program. Normality analyses of the test results for both the experimental and control groups were conducted using the Shapiro-Wilk test. As a result of this test, independent sample t-test analysis was performed for data with normal distribution and Mann Whitney-U test was performed for groups with non-normal distribution.

Ethics committee approval process

The ethics application for the study was made on 21/10/2022 and the research was carried out with the approval of Nevsehir Haci Bektas Veli University Ethics Commission dated 26/12/2022 and numbered 2022.13.429.

Results

The normality test for the groups to which the academic achievement test was administered was conducted using the Shapiro-Wilk test, and the results are presented in Table 3.

Table 3. Shapiro-Wilk test results of the academic achievement pre-test scores of the experimental and control group students

Groups		Statistics	N	p		Statistics	Standard Deviation
Academic success pre-test	Control Group	.969	31	.492	Skewness	-.241	.421
					Kurtosis	.106	.821
	Experimental Group	.960	31	.298	Skewness	-.170	.421
					Kurtosis	-.311	.821

Since the Shapiro-Wilk coefficient was found to be $p>0.05$, the data were considered to be normally distributed. Furthermore, the Skewness and Kurtosis values were found to be between -1 and +1, which showed that the data exhibited a normal distribution ($Skewness_{Control}$ = -0.241, $Kurtosis_{Control}$ = 0.106, $Skewness_{Experimental}$ = -0.170, $Kurtosis_{Experimental}$ = -0.311).

An independent samples t-test was conducted to determine whether there were any differences in the prior knowledge levels of the students in the groups on the subject, and the results are given in Table 4.

Table 4. Results of the independent samples t-test comparing the pre-test scores of of students in the experimental and control groups

Group	N	$\bar{X}$	SS	sd	t	p
Control Group	31	7.45	2.204	60	.755	.816
Experimental Group	31	7.03	2.236			

The t-test indicated that there was no difference between the experimental and control groups in terms of readiness levels and that there was no prior knowledge level variable in the experimental study to be conducted ($t_{60} = 0.755$, $p>0.05$) (Table 4).

A Shapiro-Wilk test was conducted to determine whether the students' scores from the academic achievement test administered as a post-test exhibited a normal distribution (Table 5).

Table 5. Normality analysis results regarding the academic achievement post-test scores of the control and experimental group students

Groups		Statistics	N	p		Statistics	Standard Deviation
Academic achievement post-test	Control Group	.862	31	.001	Skewness	1.283	.421
					Kurtosis	1.058	.821
	Experimental Group	.955	31	.200	Skewness	-.354	.421
					Kurtosis	-.535	.821

The nonparametric independent samples (post-control and post-experimental), which were determined not to exhibit a normal distribution, were analyzed with the Mann Whitney-U test and the results are presented in Table 6.

Table 6. Results of the Mann-Whitney U analysis comparing the academic achievement post-test scores of students in the control and experimental groups

Groups		N	Mean Rank	Sum of Ranks	U	p
Control Group	Pre-test	31	23.97	743	247.00	.001(*)
Experimental Group	Post-test	31	39.03	1210		

A significant difference was found between the post-test scores of the students in the experimental and control groups in favor of the students in the experimental group ($U=247.00$; $p<0.05$) (Table 6). Accordingly, it can be inferred that the variability observed in the students' academic achievements is due to the educational comics used as instructional materials. Thus, it can be concluded that the teaching delivered by using the educational comics were more efficient in terms of academic achievement compared to the teaching delivered in the control group.

Discussion

Due to the individual differences of students in an educational environment, their perceptions and speeds of learning are different. The methods through which each student comprehends information also differ. Some students learn better visually, some by hearing, and some by writing. At this point, it can be said that the materials used are effective elements in learning (Chamisijatin et al., 2020; Fennema, 1972). As stated in Dale's Cone of Experience, which has been used in many studies in the literature, the increase in the number of sensory organs involved in learning makes learning more permanent. Therefore, the use of materials in science lessons is very important. Using educational comics as materials in lessons creates an enjoyable and remarkable learning environment for students at all levels of education (Badeo & Koc, 2021; Di Fuccia et al., 2012; Orçan, 2013). Comics make students more active in finding solutions to the problems they encounter in daily life (Putranta & Supahar, 2019). Daily language and life-like plots used in comics facilitate the learning of complex and abstract concepts (Lin et al., 2015).

The study aims to investigate the effects of comics created using the Web 2.0-supported applications Storyboard That and Canva in science classes on the academic achievement related to the subjects of "Food chain and energy flow" and "Energy transformations" at the 8th grade level. At the beginning of the study, an academic achievement test was developed for the relevant subjects and with the help of this test, the academic achievement pre-test scores of the control and experimental groups were compared. The results revealed that the academic achievement levels of the group that received science education with the created comics and the academic achievement levels of the group that received traditional science education were equal to each other (Table 3 and Table 4). After the implementation of the designed material, it was determined that there was a significant difference between the post-test scores of the groups in favor of the experimental group (Table 6). Therefore, it was concluded that the educational comics positively affected the accomplishment of the relevant objectives of the unit "Energy Conversions and Environmental Science". When it is not possible for students to make observations, it becomes difficult for them to make sense of some concepts in their minds. These concepts were visualized with the designed comics, making it easier for students to understand and learn the subject.

The use of comics in science education, which is the subject of the current study, has been tested with students in different subject areas and age groups, and similar results have been obtained. It has been concluded that using comics in science lessons increases students' desire to learn the subject and positively affects their attitude toward the lesson (Hermita et al., 2020; Hughes et al., 2011). Krishnan and Othman (2016) investigated the effectiveness of using educational comics as a learning tool in teaching science at the primary school level. The results of the study, conducted with 5th grade students using a quasi-experimental design, confirmed that using educational comics in teaching the subject of energy significantly increased students' achievement and their higher-order thinking skills. In the study conducted by Lin and Lin (2016), it was revealed that comics were more effective in student achievement than traditional science education. Another study investigating the effects of comics on science education concluded that comics were effective in teaching science, finding significant differences in students' pre-test and post-test understanding of science learning (Maryani & Amalia, 2018). Koutnikova (2017) stated that educational comics make the phenomenon of science more interesting. In a qualitative study conducted by Akcanca (2021), it was stated that comics concretize concepts in science classes and are a tool that should be used for effective teaching in schools. In a study using comics in

chemistry teaching, it was emphasized that they entertain students and that every teacher should use them (Weber et al., 2013). In a similar study, Arslan and Akçay (2022) suggested that comics could help students better understand some topics in biology. When the literature is examined, many studies, such as our study, indicate that comics can have a positive effect on the success of science teaching (Badeo ve Koc, 2021; Chamisijatin et al., 2020; Hermita et al., 2020; Hosler & Boomer, 2011; Matuk et al., 2021; Orçan, 2013). In addition, many studies reveal the effects of comics on the teaching process in fields other than science education (Akdağ, 2023; Arı et al., 2019; Canbulut, 2022; Efecioğlu, 2013; Gülersoy & Türkal, 2020; İlhan, 2016; Şeker, 2023; Şentürk, 2020; Tek, 2023).

Suggestions

According to the results of the study, it was revealed that comics created with the Web 2.0 tool had a positive effect on students' academic success in science. Based on this result, it is recommended that teachers who aim to increase student success in science classes should use educational comics in the science teaching process. In addition, it can be said that digital comics can be an effective tool in increasing the participation of students who are not interested in science classes thanks to the visuality, fluency, and easy comprehensibility they provide.

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Conflicts of Interest

No potential conflict of interest was reported by the authors.

Ethics

The ethics application for the study was made on 21/10/2022 and the research was carried out with the approval of Nevsehir Haci Bektas Veli University Ethics Commission dated 26/12/2022 and numbered 2022.13.429.

References

Aisyah, R., Zakiyah, I. A., Farida, I., & Ramdhani, M. A. (2017). Learning crude oil by using scientific literacy comics. *Journal of Physics: Conference Series*, 1–7. https://doi.org/10.1088/1742-6596/895/1/012011

Akbaba, K. (2019). *Fen öğretiminde web 2.0 uygulamalarının öğrencilerin fen bilimleri dersine ve teknoloji kullanımına yönelik tutumlarına etkisi*. (Unpublished master's dissertation). Aksaray University, Aksaray.

Akcanca, N. (2020). An alternative teaching tool in science education: Educational Comics. *International Online Journal of Education and Teaching, 7*(4), 1550-1570.

Akcanca, N. (2021). The opinions of prospective teachers on the design and use of digital educational comics as a technological teaching material in science education: The opinions of prospective teachers on the design and use of digital educational comics. *International Journal of Curriculum and Instruction, 13*(3), 2268-2288.

Akdağ, S. (2023). *Uzaktan öğretimle sosyal bilgiler dersinde eğitici çizgi roman kullanımının öğrencilerin bilişsel ve duyuşsal öğrenmelerine etkisinin incelenmesi* (Unpublished doctoral dissertation). Atatürk University, Erzurum.

Alpin, H. (2002). *1001 soruda çizgi roman*. İnkılap Yayınları.

Arı, A., Demir, B., & Işık, B. B. (2019). Studies investigating the effects of the use of manga comics in mathematics teaching. *Bayburt University Journal of Science, 2*(2), 261-265.

Arslan, K., & Akçay, H. (2022). The effects of science teaching with comics on student achievement. *Science, Education, Art and Technology Journal*, *6*(1),14-31.

Badeo, J. M., & Koc, B. C. O. K. (2021). Use of comic-based learning module in mechanics in enhancing students' conceptual understanding and motivation. *Science Education International, 32*(2), 131-136.

Balaban, Y. (2007). *Üç boyutlu bilgisayar grafiklerinin sinema filmleri içinde kullanımı:" Mumya"" küçük kardeşim" ve" matrix" incelemesi* (Unpublished doctoral dissertation). İstanbul Kültür University, İstanbul.

Bhatia, K. T. (2006). Super-heroes to super languages: American popular culture through South Asian language comics. *World Englishes, 25*(2), 279–297.

Bilen, K., Hoştut, M., & Büyükcengiz, M. (2019). Fen eğitiminde dijital öyküleme yönteminin ortaokul öğrencilerinin akademik başarı, tutum ve motivasyonlarına etkisi. *Pedagojik Araştırma*, *4*(3), 1-12.

Bilgican Yılmaz, F., Karakoç Topal, O., & Öz Aydın, S. (2021). DNA konusunun web 2.0 araçlarının entegre edildiği laboratuvar yöntemi ile öğretimi. *Journal of Instructional Technologies and Teacher Education, 10*(1), 16-36.

Bitz, M., & Emejulu, O. (2016). Creating comic books in Nigeria: International reflections on literacy, creativity, and student engagement. *Journal of Adolescent and Adult Literacy, 59*(4), 431–441. *https://doi.org/10.1002/jaal.451*

Büyüköztürk, Ş. (2013). *Sosyal Bilimler için Veri Analizi El Kitabı İstatistik, Araştırma Deseni SPSS Uygulamaları ve Yorum* (Data Analysis Handbook for Social Sciences Statistics, Research Design SPSS Applications and Interpretation) Pegem Publishing.

Campbell, D. T., & Stanley, J, C. (1963). *Experimental and quasi-experimental designs for research.* Boston: Houghton Mifflin Company.

Canbulut, D. (2022). *Eğitici çizgi romanların ilkokul 2. sınıf bölme işlemi konusunda başarı ve kalıcılığa etkisi.* (Unpublished master's dissertation). Ömer Halisdemir University, Niğde.

Cary, S. (2004). *Going graphic: Comics at work in the multilingual classroom*. Portsmouth NH: Heinemann.

Chamisijatin, L., Lestari, R. D., Husamah, A. F., Fatmawati, D., & Nurhasanah, S. (2020). Developing comic of human skeletal system and its potential in improving junior high school students' learning achievement. *Universal Journal of Educational Research*, *8*(12), 6383-6393.

Cohen, J. (1992). Statistical power analysis. *Current Directions in Psychological Science, 1*(3), 98-101.

Çilenti, K. (1988). *Eğitim Teknolojisi ve Öğretim* (Educational Technology and Teaching). Kadıoğlu Matbaası.

Di Fuccia, D., Witteck, T., Markic, S., & Eilks, I. (2012). Trends in practical work in German science education. *Eurasian Journal of Mathematics, Science and Technology Education, 8*(1), 59–72. *https://doi.org/10.12973/eurasia.2012.817a*

Efecioğlu, E. (2013). *The role of graphic novels in teaching English as a foreign language.* (Unpublished master's dissertation). Hacettepe University, Ankara.

Fennema, E. (1972). The relative effectiveness of a symbolic and a concrete model in learning a selected mathematical principle. *Journal for Research in Mathematics Education, 3*(4), 233-238.

Guadamillas Gómez, M. V. (2014). Reading, speaking and writing through creative resources: comics in second language teaching. *Arab World English Journal*, *5*(4), 443-453.

Gülersoy, A. E., & Türkal, B. (2020). Use of comics as a teaching material in social studies education in terms of its composition and development. *Journal of International Social Science Education, 6*(2), 299-326.

Gürbüz, R. (2006). Olasılık kavramlarıyla ilgili geliştirilen öğretim materyallerinin öğrencilerin kavramsal gelişimine etkisi (The effect of teaching materials developed on probability concepts on students' conceptual development). *Dokuz Eylül University The Journal of Buca Faculty of Education, 20*(1), 59-68.

Gürleroğlu, L. (2019). *5E modeline uygun web 2.0 uygulamaları ile gerçekleştirilen fen bilimleri öğretiminin öğrenci başarısına motivasyonuna tutumuna ve dijital okuryazarlığına etkisinin incelenmesi.* (Unpublished master's dissertation). Marmara Üniversitesi, İstanbul.

Hasançebi, B., Terzi, Y., & Küçük, Z. (2020). Distractor analysis based on item difficulty index and item discrimination index. *Gümüşhane University Journal of Science, 10*(1), 224-240.

Haugaard, K. (1973). Comic books: Conduits to culture? *Reading Teacher*, *27*, 54-55.

Hermita, N., Ningsih, H. S., Alim, J. A., Alpusari, M., Putra, Z. H., & Wijaya, T. T. (2020). Developing science comics for elementary school students on animal diversity. *Solid State Technology*, *63*(1s), 2492-2500.

Hosler, J., & Boomer, K. B. (2011). Are comic books an effective way to engage nonmajors in learning and appreciating science? *CBE—Life Sciences Education*, *10*, 309-317

Hughes, J. M., King, A., Perkins, P., & Fuke, V. (2011). Adolescents and "autographics": reading and writing coming-of-age graphic novels. *Journal of Adolescent & Adult Literacy*, *54*(8), 601-612.

İlhan, G. O. (2016). *Sosyal bilgilerde çizgi romanların kullanımı*. (Unpublished doctoral dissertation). Afyon Kocatepe University, Afyon.

Karataş, S., & Yapıcı, M. (2006). The process and application samples of teaching technologies and material development. *Afyon Kocatepe University Journal of Social Sciences*, *8*(2), 311-325.

Kim, J., Chung, M. S., Jang, H. G., & Chung, B. S. (2017). The use of educational comics in learning anatomy among multiple student groups. *Anatomical Sciences Education*, *10*(1), 1–8. *https://doi.org/10.1002/ase.1619*

Kline, R. B. (2011). *Principles and Practice of Structural Equation Modeling*. Guilford Press.

Korucu, A. T. (2020). Fen eğitiminde kullanılan dijital hikâyelerin öğretmen adaylarının akademik başarısı, sayısal yetkinlik durumları ve sorgulama becerileri üzerindeki etkisi. *Kastamonu Eğitim Dergisi*, *28*(1), 352-370.

Koutnikova, M. (2017). The application of comics in science education. *Acta Educationis Generalis, 7*(3), 88- 98.

Krishnan, S., & Othman, K. (2016). The effectiveness of using comic to increase pupils' achievements and higher order thinking skills in science. *International Journal of English and Education*, *5*(3), 281-293.

Lai, C. H., Bjornerud, P. M., Akahori, K., & Hayashi, S. (2002). The design and evaluation of language learning materials based on comic stories and comic strips. *Proceedings of International Conference on Computers in Education IEEE 1*, 677-678. *https://doi.org/0.1109/CIE.2002.1186040*

Lin, S. F., & Lin, H. S. (2016). Learning nanotechnology with texts and comics: the impacts on students of different achievement levels. *International Journal of Science Education*, *38*(8), 1373–1391. *https://doi.org/10.1080/09500693.2016.1191089*

Lin, S. F., Lin, H., Lee, L., & Yore, L. D. (2015). Are science comics a good medium for science communication? The case for public learning of nanotechnology. *International Journal of Science Education, Part B, 5*(3), 1–19. *https://doi.org/10.1080/21548455.2014.941040*

Liu, J. (2004). Effects of comic strips on L2 learners' reading comprehension. *TESOL Quarterly, 38*(2), 225-243.

Maryani, I., & Amalia, L. (2018). The development of science comic to improve student's understanding in elementary school. *Jurnal Inovasi Pendidikan IPA*, *4*(1), 75-82.

Matuk, C., Hurwich, T., Spiegel, A., & Diamond, J. (2021). How do teachers use comics to promote engagement, equity, and diversity in science classrooms? *Research in Science Education*, *51*(3), 685- 732.

McCloud, S. (2001). *Understanding Comics: The Invisible Art*. William Morrow Paperbacks

MONE [Ministry of National Education]. (2018). Science course curriculum (3, 4, 5, 6, 7 and 8thgrades). Presidency of the Board of Education.

MONE [Ministry of National Education]. (2024). Science course curriculum (3, 4, 5, 6, 7 and 8thgrades). Presidency of the Board of Education.

Muniran, F., & Yusof, R. (2008). *Using comics and graphic novels in schools and libraries to promote literacies* [Paper presentation]. ICOLIS 2008, Kuala Lumpur, Malaysia.

Negrete, A. (2013). Constructing a comic to communicate scientific ınformation about sustainable development and natural resources in Mexico. *Procedia - Social and Behavioral Sciences*, *103*, 200–209. *https://doi.org/10.1016/j.sbspro.2013.10.327*

Orçan, A. (2013). *Çizgi-roman tekniği ile geliştirilen bilim-kurgu hikâyelerinin öğrencilerin yaratıcı düşünme becerilerinin ve fiziğe ilişkin tutumlarının gelişimine etkisi.* (Unpublished master's dissertation). Gazi University, Ankara.

Özdemir, M. (2010). Qualitative data analysis: A study on methodology problem in social sciences. *Eskişehir Osmangazi University Journal of Social Sciences*, *11*(1), 323-343.

Pallant, J. (2020). *SPSS survival manual: A step by step guide to data analysis using IBM SPSS.* McGraw-Hill Education.

Putranta, H, & Supahar, S. (2019). Synthesis of the cognitive aspects' science literacy and higher order thinking skills (HOTS) in chapter momentum and impulse. *Journal of Physics: Conference Series, 1397*, 012014. *https://doi.org/10.1088/1742- 6596/1397/1/012014*

Ranker, J. (2008). Using comic books as read-alouds: İnsights on reading instruction from an English as a second language classroom. *Reading Teacher*, *61*(4), 296-305.

Sheu, J. J., & Chu, K. T. (2017). Mining association rules between positive word-of-mouth on social network sites and consumer acceptance: A study for derivative product of animations, comics, and games. *Telematics and Informatics*, *34*(4), 22–33. *https://doi.org/10.1016/j.tele.2016.12.010*

Song, Y., Heo, M., Krumenaker, L., & Tippins, D. (2008). Cartoons-an alternative learning assessment. *Science Scope, 32*(1), 16-21.

Şahan, Z., & Atlı, E. (2024). Enerjinin yolculuğu: Fen bilimlerinde bir çizgi roman örneği. *Nevşehir Hacı Bektaş Veli Üniversitesi SBE Dergisi, 14*(4), 2349-2364. *https://doi.org/10.30783/nevsosbilen.1512674*

Şeker, S. (2023). *İlkokul sosyal bilgiler dersinde eğitici çizgi romanların kullanımı: Bir eylem araştırması.* (Unpublished master's dissertation). Marmara University, İstanbul.

Şentürk, M. (2020). *Eğitici çizgi roman ve çizgi film kullanımının derse ilişkin tutum, motivasyon ve başarıya etkisi*. (Unpublished doctoral dissertation). Atatürk University, Erzurum.

Şimşek, N. (2002). BİG 16 learning modality inventory. *Educational Sciences Practices 1*(1), 33-47.

Tabachnick, B., & Fidell, L. S. (2015). *Using Multivariate Statistics*. (M. Baloğlu, Ed.) Nobel Akademik Yayıncılık.

Tan, Ş. (2010). *Ölçme ve Değerlendirme* (Quantification and Consideration). Pegem Akademi.

Tek, Ş. (2023). *6. sınıf cebir konusunun eğitici çizgi romanlarla öğretiminin motivasyon, başarı ve kalıcılığa etkisi*. (Unpublished master's dissertation). Gazi University, Ankara.

Tekin, E., & İlhan, G. O. (2021). An overview on the use of comics in foreign language teaching. *Anasay*, *17*, 105-124.

Themelis, C., & Sime, J. A. (2020). Comics for inclusive, technology-enhanced language learning. In S. Mavridi, & V. Saumell (Eds.), *Digital innovations and research in language learning* (pp. 93-114). IATEFL.

Toh, T. L. (2009). Use of Cartoons and Comics to Teach Algebra in Mathematics Classrooms. *Papers from mathematics – of prime importance: The 2009 MAV Annual Conference*. 230-239 *https://www.mav.vic.edu.au/Tenant/C0000019/00000001/downloads/Resources/annual-conferences/2009/12Toh.pdf*

Uysal, M. (2020). *İlkokul 4. sınıf fen bilimleri dersinde web 2.0 animasyon araçları kullanımının çeşitli değişkenlere etkisi.* (Unpublished master's dissertation). Niğde Ömer Halisdemir Üniversitesi, Niğde.

Weber, K. C., Saldanha, T. C, Silva, K. K. D. S. E., Santos, P. M., Souza, D. D., & Arroio, A. (2013). Introducing comics as an alternative scientific narrative in chemistry teaching. *The Western Anatolia Journal of Educational Sciences (WAJES), 4*(8), 1-14.

Widyastuti, P. D., Mardiyana, M., & Saputro, D. R. S. (2017). An instructional media using comics on the systems of linear equation. *Journal of Physics: Conference Series, 895*, 012039. *https://doi.org/10.1088/1742-6596/895/1/012039*

Yanpar-Şahin, T., & Yıldırım, S. (1999). *Öğretim Teknolojileri ve Materyal Geliştirme* [Instructional technologies and material development]. Anı Yayıncılık.

Yaşar, I. Z. (2006). *Fen eğitiminde zihin haritalama tekniğiyle not tutmanın kavram öğrenmeye ve başarıya etkisi.* (Unpublished doctoral dissertation). Marmara University, İstanbul.

Yıldırım, C. (1999). *Eğitimde Ölçme ve Değerlendirme* (Measurement and Evaluation in Education). ÖSYM.

Yıldırım, E. (2016). Examining opinions of classroom teacher candidates on educational comics. *Kilis 7 Aralik University Journal of Social Sciences, 6*(11), 52-70.

Yıldırım, İ. (2020). *7. sınıf ışığın madde ile etkileşimi ünitesinde web 2.0 araçlarının kullanılmasının öğrencilerin akademik başarılarına, teknoloji ile kendi kendine öğrenme düzeylerine ve fene yönelik tutumlarına etkisinin incelenmesi*. (Unpublished master's dissertation). Kocaeli Üniversitesi, Kocaeli.

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Development and Initial Validation of Leadership for Technology Integration Scale in Schools

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ABSTRACT

The literature highlights the critical role of principals in fostering a digitally-enabled educational environment. In this sense, this study aims to develop and validate "The Leadership for Technology Integration Scale for School Principals (LETIS-SP)". The scale measures the principals' technology integration leadership behaviors based on teachers' perceptions. A thorough literature review was conducted and an item pool of 60 items were created. Following expert opinions and content validity ratios a draft scale with 18 items emerged. First, exploratory factor analysis (EFA) was conducted with a sample of 225 teachers. The EFA findings showed that the scale was uni-dimensional. Then, confirmatory factor analysis confirmed the uni-dimensional structure of the scale. In this step, 200 teachers participated in the study. Consequently, the findings showed that the scale included 18 items. Cronbach's Alpha internal consistency coefficient was .96 which was satisfactory. Based on these findings, it can be concluded the scale has adequate psychometric properties sought in the literature.

Keywords: Leadership, technology integration, school principal, teacher, technology, effective schools

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Introduction

The rapidly changing digital environment of the 21st century urges educational systems to adapt to technology to effectively satisfy the needs of society (Van Niekerk & Blignaut, 2014). Integrating information and communication technologies (ICT) into schools is considered one of the main challenges of this century and is of critical importance (i.e., Durnalı, 2013; Voogt et al., 2018). The practical use of ICT in education can improve instructional methods and enhance student performance (Durnalı & Limon, 2020). Many countries initiated projects to ensure ICT integration (Leonard & Leonard, 2006), such as FATIH project in Türkiye (Durnalı et al., 2019). Drawing from a good deal of literature (i.e., Durnalı, 2019a; Durnalı, 2019b; Durnalı, 2022a; Erçetin et al., 2018; Watts, 2009), we can understand that the success of such projects, however, depends largely on the role of school leaders in technology integration. Technology integration leadership should address teachers' intrinsic commitment or moral purpose to improve student learning. As well as being aware of the informal environment, effective leaders of organizational change need to work to build a sense of moral purpose among teachers to ensure the sustainability of technology integration.

UNESCO's (2020) report "The digital transformation of education: connecting schools, empowering learners" defines educators as critical elements of the digital transformation process. For this process to run smoothly, it is emphasized that the professional development of educators should be modernized and updated. In this way, educators can effectively integrate technology into educational processes and provide students with a more motivating learning experience (Gökbulut & Durnalı, 2023; Sepúlveda, 2020). Thus, it is essential not only to provide access to technology but also to create inclusive learning environments that will reduce inequalities under the guidance of competent educators. It is recommended that school administrators provide teachers with time and space so that they can develop innovative approaches to technology integration (Byrom & Bingham, 2001). Educational leaders should create the necessary conditions for teachers to use technology effectively by supporting them in developing classroom practices (Durnalı & Akbaşlı, 2020). In this context, it is essential to provide appropriate guidance to increase educators' technology integration skills. For technology integration to be achieved effectively, such guidance and orientations will support teachers to use the tools more efficiently (Durnalı, 2019a; Gümüş et al., 2024).

Challenges persist, especially in contexts such as Türkiye, where educational technology is not included in school principal training programs. This gap requires school principals to independently develop their vision and strategies focusing on both technical knowledge and the emotional and social needs of teachers and students (Durnalı, 2019b; Erçetin et al., 2018; Tannimalai & Raman, 2018). Fullan (1991) emphasizes that principals often report that teachers need more time and resources to implement curriculum changes, including technology integration. Given the central role of principals in technology integration, professional development in technology education should be prioritized for both principals and teachers (Dawson & Rakes, 2003; Gökbulut & Durnalı, 2023). Ertmer (2005) describes the barriers to using technology in the classroom as external (e.g., lack of resources and support) and internal (e.g., teachers' self-confidence and beliefs about the value of technology). While technology coaches can support teachers' attitudes toward technology integration, the practical applicability and sustainability of this training are still being debated. Lu and Overbaugh (2009) show that providing a teacher with time and support positively impacts their ability to use technology effectively. School principals are important in providing this support and encouraging teachers' professional development to sustain successful technology integration. Social and educational change has been driven by rapid

technological advances. As new and emerging technologies provide competitive advantages to instruction, developing the next generation of teachers and leaders with technology skills is more critical than ever (Gao et al., 2010).

Technology Integration in Education

Technology integration in educational settings constitutes a sustainable and ongoing transformation in the prevailing social order within academic institutions; and this integration is precipitated by the implementation of technological resources to facilitate students' construction of knowledge (Thannimalai, & Raman, 2018; Tosuntaş et al., 2019). The effective integration of technology into teaching and learning processes emerged as a pivotal concern in numerous educational systems. A substantial body of research revealed that investment in technology increased in many countries to integrate technology into the educational environment (Tilya, 2008). Countries made a considerable amount of financial resources, expertise, and research in order to facilitate the integration of technology into education in a manner that optimizes the classroom environment for enhanced teaching and learning (Jhuree, 2005).

Teachers usually learn about technology integration during undergraduate education or through professional development (Gökbulut & Durnalı, 2023; Schrum et al., 2011). The conditions under which technology can be used to improve student learning effectively in the classroom is a fundamental issue surrounding the interaction between technology and education. For technology to have an impact on learning, regardless of its claimed educational benefits, it must be implemented (Zhao et al., 2002). In today's world, schools are expected to integrate learning technologies in a course or unit to facilitate students' self-directed learning skills, e-learning styles, deeper or critical thinking, creativity, or metacognition (Durnalı et al., 2022; Durnalı, 2022b; Mcload, 2015). It is accepted that technology integration can contribute to transforming education. However, it should be noted that these tools offer the potential to improve the quality of learning only when used appropriately and integrated into teaching processes. Digital technologies can make educational systems more innovative, durable, and resistant to external factors by facilitating communication, collaboration, and access to more comprehensive resources. However, these technologies are only considered as tools to achieve a higher purpose (Sepúlveda, 2020).

Technology Integration Leadership in Educational Organizations

Before explaining the technology integration leadership behavior of school principals, it is noteworthy to explain the technological leadership behavior of school principals. These concepts refer to two important leadership approaches that are frequently discussed in the educational administration literature and are related to each other but have different focal points. Technological Leadership Behavior is explained with the leadership characteristics that encourage school principals to use technology effectively and efficiently in educational environments, monitor technological innovations and support the integration of these into the school (Bülbül & Çuhadar, 2012; ISTE, 2009; Thannimalai & Raman, 2018b). Technological leadership includes elements such as administrators' developing a technological vision, a digital age learning culture, digital citizenship, excellence in professional practice, motivating teachers to use technology and providing the necessary infrastructure (Dinç & Göksoy, 2020; ISTE 2009). Technology Integration Leadership is a leadership approach that focuses on how to integrate technology into education training processes. This behavior includes guiding how to use technology for pedagogical purposes, how to include it in the curriculum, and how teachers will achieve this integration (Leonard & Leonard, 2006).

Being a digital education leader requires using information technologies and applications effectively, understanding the dynamics of institutional change, and developing a vision of the role of technology integration in education (Berkovich & Hassan, 2024; Durnalı, 2022a). In addition, educational leaders are expected to be able to integrate technology in a way that creates professional development opportunities. Educational leaders are expected to provide conditions to enhance teachers' learning experiences during the technology integration (Barton & Dexter, 2020). Educational leaders can contribute to the effective progress of this process by encouraging technology integration in schools and classrooms (Larson et al., 2010). In this context, principals are essential in directing educational processes by regulating teachers' working conditions and indirectly supporting students' academic success (Dexter & Richardson, 2020). Leadership is becoming even crucial for successfully implementing technology integration, especially in 21st-century educational environments.

School leaders should set goals for teachers and students and create the conditions to facilitate their achievement (Durnalı, 2022a; Raman & Thannimalai, 2019). Researchers also suggested that effective leadership is essential for implementing ICT in schools. The contribution of principals to the successful and sustainable implementation of ICT in education became the focus of past research (Antonietti et al., 2023; Dinç & Göksoy, 2020; Leonard & Leonard, 2006; Vallance, 2008).

Today, teaching and learning processes have a very different structure than a few decades ago due to the profound effects of technology in these areas. Digital technologies offer many advantages to improve learning and teaching processes by allowing the adoption of innovative pedagogical approaches in education. In this context, educators must have the skills to transform their teaching. It has become essential for schools to support and empower educators in this transformation process, as they strive for sustainable digital transformation (Krabonja et al., 2024). Byrom and Bingham (2001) stated that school administrators are "the most important factor affecting the successful integration of technology in schools."

Effective technology leadership is not only a technical task but also includes meeting teachers' and students' social and emotional needs (Dexter et al., 2016; Durnalı, 2022a). McKenzie (1999) argues that the curriculum should include strategies that require the effective use of technology, which should be supported by strong leadership. This perspective emphasizes that school leaders should see technology as an integral part of a culture that improves the educational process (Dexter & Richardson, 2020). As Ritchie (1996) suggested, principals should be able to mobilize staff to create a technology-friendly culture. In addition, today, it is essential for educational leaders to focus on integrating technology into classrooms in a way that best serves students' needs. The observable use of these tools in learning and teaching processes and discussions on these tools will contribute to students' global competitiveness in the 21st century. The opportunities offered by the future should be evaluated with a positive approach to reshaping education and adapting to educational processes (Larson et al., 2010). Moreover, if school administrators want teachers to integrate technology into their teaching meaningfully, they should give their educators reasonable time and space to change and improve their classroom practices (Mcload, 2015).

In line with all this literature, as the importance of technology integration increases, the leadership roles and effects of school principals in this process still need to be examined sufficiently. This study aims to develop the Leadership for Technology Integration Scale in Schools. There are tools in the literature to measure teachers' technology integration (Antonietti et

al., 2023; Finger et al., 2006). There are also scales for school principals' technology leadership (Banoğlu, 2012; Bülbül, & Çuhadar, 2012; Dinç & Göksoy, 2020; Hacıfazlıoğlu et al., 2011; Raman et al., 2019; Sincar, 2009). In addition, there is a scale development study on school principals' leadership for technology by Leonard and Leonard, (2006). However, the scale of Leonard and Leonard, (2006) is evaluated according to the opinions of principals. Therefore, according to the opinions of teachers, a comprehensive assessment tool that allows school principals to effectively manage technology integration has not been found. Therefore, the scale developed within the scope of the current research provides a comprehensive assessment tool that allows school principals to effectively manage technology integration. In addition to addressing these gaps in the literature, this study aims to understand the competencies of school principals in using technology integration and to examine teachers' views on this issue. In this context, this study seeks to answer the question of whether the Leadership for Technology Integration Scale in Schools is a reliable and valid measurement tool.

Method

This is a scale development study which followed the fundamental steps such as content validity, (literature review for draft item generation, revising items, applying to expert opinions, content validity ratios etc.), construct validity (exploratory factor analysis (EFA) and confirmatory factor analysis (CFA)) and reliability analysis. All analyses were conducted on MS Excel, SPSS, and AMOS software's. To collect data, we used a purposeful sampling strategy. Explanatory Factor Analysis (EFA) involved 225 teachers whereas Confirmatory Factor Analysis (CFA) 200 teachers.

Participants

Two distinct study groups were reached for this research. Data from the first study group was used for the EFA, while data from the second study group for the CFA. The first group comprised 229 teachers employed in public secondary schools in Ankara, whereas the second group included 206 teachers from public secondary schools in Zonguldak. With 18 items, the data collected for our EFA and CFA analyses is supported as sufficient by the literature. For instance, it is stated that the sample size should be at least five times the number of observed variables (Tabachnick & Fidell, 2012). Similarly, Tavşancıl (2014) emphasized that in scale development studies, the sample size should be at least five times, or preferably ten times, the number of items. A purposeful sampling strategy was employed to select participants. This approach allows researchers to target individuals who minimize the margin of error in the required data, are easily accessible, and are geographically convenient, thereby offering significant efficiency and practicality within a limited timeframe. Additionally, this method is cost-effective. As highlighted in the literature, purposeful sampling is advantageous because selecting participants with well-defined characteristics simplifies the research process (Yıldırım & Şimşek, 2016). Table 1 presents the demographics of participants from both study groups.

Table 1. Demographics of the participants

EFA				CFA			
Variable		**Frequency (*f*)**	**Percent (%)**	**Variable**		**Frequency (*f*)**	**Percent (%)**
Gender	*Female*	129	57.33	**Gender**	*Female*	113	56.50
	Male	96	42.67		*Male*	87	43.50
Educational level	*Undergraduate*	164	72.89	**Educational level**	*Undergraduate*	156	78.00
	Graduate	61	27.11		*Graduate*	44	22.00
Experience	*0-5 years*	53	23.56	**Experience**	*0-5 years*	35	17.50
	6-10 years	41	18.22		*6-10 years*	42	21.00
	11-15 years	63	28.00		*11-15 years*	47	23.50
	15-20 years	42	18.67		*15-20 years*	48	24.00
	21 years and above	26	11.56		*21 years and above*	28	14.00
Age	*20-30 years*	42	18.67	**Age**	*20-30 years*	39	19.50
	31-40 years	121	53.78		*31-40 years*	98	49.00
	41-50 years	45	20.00		*41-50 years*	44	22.00
	51 year and over	17	7.56		*51 year and over*	19	9.50
Total		225	100	**Total**		200	100

As Table 1 illustrates, the first study group, utilized for Exploratory Factor Analysis (EFA), comprises 225 participants. Of these participants, 129 (57.33%) are female, and 96 (42.67%) are male. As for educational level, 164 participants (72.89%) have undergraduate, while 61 participants (27.11%) have graduate degrees. The second study group, employed for Confirmatory Factor Analysis (CFA), consists of 200 participants. Within this group, 113 participants (56.50%) are female, and 87 participants (43.50%) are male. Regarding educational level, 156 participants (78.00%) have undergraduate degrees, whereas 44 participants (22.00%) have graduate degrees.

Scale Development Steps

Data Analysis

We utilized a substantial sample size (225 for EFA and 200 for CFA) and adhered to Field's (2009) recommendation, emphasizing the importance of visually examining the distribution's shape alongside evaluating the skewness and kurtosis coefficients, rather than focusing solely on their statistical significance. That said, our analysis revealed that the skewness and kurtosis values for both EFA and CFA datasets fell within the acceptable range of ±1.96. Furthermore, the visual assessment of the distribution's shape confirmed compliance with the criteria for normality assumptions.

A data screening process was conducted prior to the factor analysis. To identify and address outliers, the Boxplot technique was applied, resulting in the removal of four data for the EFA and six for the CFA. Both datasets have no missing data as we collected the data online using Google Forms, ensuring there were no missing responses, as the platform requires participants to complete all survey items before submission.

Generating Item Pool and the Content Validity of the Instrument

Firstly, the literature was thoroughly reviewed, and a conceptual framework was established based on the existing literature. An item pool for the technology integration leadership behaviors that the school principal exhibits in the process of integrating technology into the school

organization was generated. When delving into literature to develop scale items, we found a good deal of studies using this approach (i.e., Durnalı, 2022a) which yielded a pool of 60 items. Table 2 presents two sample expressions.

Table 2. The sample items

Reference	Item
Among the behaviors that should be exhibited by school principals who will contribute to the successful integration of technology in schools… there is the behavior of sharing leadership roles (Byrom & Bingham, 2001:6-7).	shares leadership roles to contribute to successful technology integration in schools.
One of the ten items taken from successful projects that will guide school principals in integrating successful technology applications with the school is to involve teachers in the process (Meltzer & Sherman, 1997:23-31).	involves teachers in the process of integrating successful technology applications with the school.

Then, the expressions were carefully examined again. Expressions stating similar behaviors were combined during this process. Additionally, expressions that did not fit the aforementioned leadership behaviors were excluded from the item pool. 32 items in the draft instrument item pool were still open for expert review at the end of the procedure. On the basis of the following three criteria, professional views were sought for each item: items' clarity, content validity, and suitability for the intended sample readers.

The Lawshe technique's Content Validity Ratio (CVR) was employed to examine the validity of the instrument. This method suggested by Lawshe (1975) was used by some other scholars (i.e., Durnalı, 2022a). In this method, researchers can apply to the opinion of experts between five and forty. In this study, 32-items were emailed to twelve academicians in the field of educational sciences holding a variety of majors across nine different universities. Within a week, seven academicians sent their feedback. The expert views were then compiled in accordance with Lawshe's (1975) formula, and the CVR was computed independently for each item.

For each item to be retained, the cut-off points for CVR value suggested by Lawshe (1975) is .75. Finally, there were a total of 18 items which satisfied this criterion. Two Turkish language experts examined the items to see whether they were correctly written, grammatically accurate, and effectively communicated. The items were then evaluated for comprehension by two teachers. The necessary modifications were made based on their comments, and before the EFA, the instrument’s final draft had 18 items.

The Construct Validity

The EFA and the CFA were performed to evaluate the construct validity of the LETIS-SP.

Exploratory Factor Analysis (EFA)

The findings suggested that The Kaiser-Meyer-Olkin (KMO) was .79 which showed that the data was suitable for factor analysis since Field (2009) suggested that the KMO should be higher than .50.

On the other hand, Bartlett's Test of Sphericity, Chi-Square and degree of freedom values were found to be significant ($X^2_{(df)}= 1051.13_{233.32}$; $p<.05$). Furthermore, the evaluation of

multivariate normality assumptions through Mardia's (1974) test for multivariate skewness and kurtosis indicated significant results ($p<.001$), with values surpassing the critical threshold of 5.00. Consequently, multivariate non-normality was assumed. In response to this non-normality, the "principal axis factoring" extraction method was employed, recognizing that alternative factor extraction methods typically produce comparable results (Tabachnick et al., 2019). The only factor with an eigenvalue of higher than 1.00 explained 63.35 of the total variance. Additionally, scree plot with the sharp elbow after one factor confirmed the unidimensional structure of the scale (See Fig. 1).

Figure 1. Scree plot

Prior to "Varimax with Kaiser Normalization" rotation, no items were discarded as all items had factor loadings higher than .40. For this, we followed the suggestions of the scholars (i.e., Büyüköztürk, 2016; Çokluk et al., 2012; Worthington & Whittaker, 2006). They emphasized that factor loadings should be ≥.40.

Corrected item-total correlations show the correlations between each item and the total score from the scale. To ensure the reliability of the scale these values should exceed .30 which suggests that items correlate well with the total (Field, 2009). As Table 3 indicates, these values range between .62-.91 for the scale. Thus, it can be concluded that each item has a high correlation with the total and supports reliability.

Table 3. EFA item-total correlations after rotation

Item No	Corrected Item Total Correlations	Item No	Corrected Item Total Correlations
1	.62	10	.88
2	.70	11	.81
3	.70	12	.69
4	.70	13	.75
5	.73	14	.72
6	.79	15	.75
7	.71	16	.77
8	.78	17	.89
9	.91	18	.89

Table 4. t-test results for item means of %27 of the Lower and Upper groups of the LETIS-SP

Item No	Group	N	Mean Difference	Sd	t	*p*
I1	Upper % 27	61	-1.79	.07	17.87	.00
	Lower % 27	61	-1.79	.07		
I2	Upper % 27	61	-1.54	.13	11.50	.00
	Lower % 27	61	-1.54	.13		
I3	Upper % 27	61	-1.72	.12	14.49	.00
	Lower % 27	61	-1.72	.12		
I4	Upper % 27	61	-1.69	.12	13.69	.00
	Lower % 27	61	-1.69	.12		
I5	Upper % 27	61	-1.85	.14	13.56	.00
	Lower % 27	61	-1.85	.14		
I6	Upper % 27	61	-1.46	.14	10.26	.00
	Lower % 27	61	-1.46	.14		
I7	Upper % 27	61	-1.69	.13	12.83	.00
	Lower % 27	61	-1.69	.13		
I8	Upper % 27	61	-1.70	.15	11.72	.00
	Lower % 27	61	-1.70	.15		
I9	Upper % 27	61	-1.90	.13	15.20	.00
	Lower % 27	61	-1.90	.13		
I10	Upper % 27	61	-2.08	.11	18.92	.00
	Lower % 27	61	-2.08	.11		
I11	Upper % 27	61	-1.87	.12	15.23	.00
	Lower % 27	61	-1.87	.12		
I12	Upper % 27	61	-2.05	.13	15.31	.00
	Lower % 27	61	-2.05	.13		
I13	Upper % 27	61	-1.69	.14	12.49	.00
	Lower % 27	61	-1.69	.14		
I14	Upper % 27	61	-1.69	.13	12.90	.00
	Lower % 27	61	-1.69	.13		
I15	Upper % 27	61	-1.80	.14	12.92	.00
	Lower % 27	61	-1.80	.14		
I16	Upper % 27	61	-1.59	.11	14.24	.00
	Lower % 27	61	-1.59	.11		
I17	Upper % 27	61	-1.59	.12	13.60	.00
	Lower % 27	61	-1.59	.12		
I18	Upper % 27	61	-2.28	.12	19.48	.00
	Lower % 27	61	-2.28	.12		

*%27 Upper-Lower, t-test, N= 225, %27 n1=n2=61, sd= 164, *p=.01*

The differences between the Upper-Lower 27% groups' means scores for all items are significant, as seen in Table 4. These findings suggest that all items can differentiate individuals in terms of their perceptions of technological leadership well.

Confirmatory Factor Analysis (CFA)

The CFA can be used to test a hypothesized measurement model (Kline, 2013). Thus, we employed a CFA test on the data including 200 teachers with the LETIS-SP's 18-item framework, which EFA revealed. To test multivariate normality assumption, we ran Mardia's (1974) test for multivariate skewness and kurtosis. The analysis yielded significant results ($p<.001$), with values exceeding the critical threshold of 5.00, indicating multivariate non-normality. Accordingly, we applied the Robust Maximum Likelihood (MLR) estimation method. The findings showed that all the items had standardized factor loadings higher than .50 which satisfied the cut-off point suggested by Hair Jr et al. (2019) and they were all significant. Table 5 presents the standardized factor loadings.

Table 5. CFA standardized regression weights

Item No	SRW value	Item No	SRW value	Item No	SRW value
I1	.65*	I7	.74*	I13	.78*
I2	.72*	I8	.78*	I14	.73*
I3	.74*	I9	.92*	I15	.77*
I4	.74*	I10	.90*	I16	.81*
I5	.75*	I11	.83*	I17	.90*
I6	.81*	I12	.70*	I18	.92*

**p<.01*

As shown in table 5, standardized factor loadings range between .65 (Item1) and .92 (Items 9 and 18). Figure 2 below depicts the path diagram for the model.

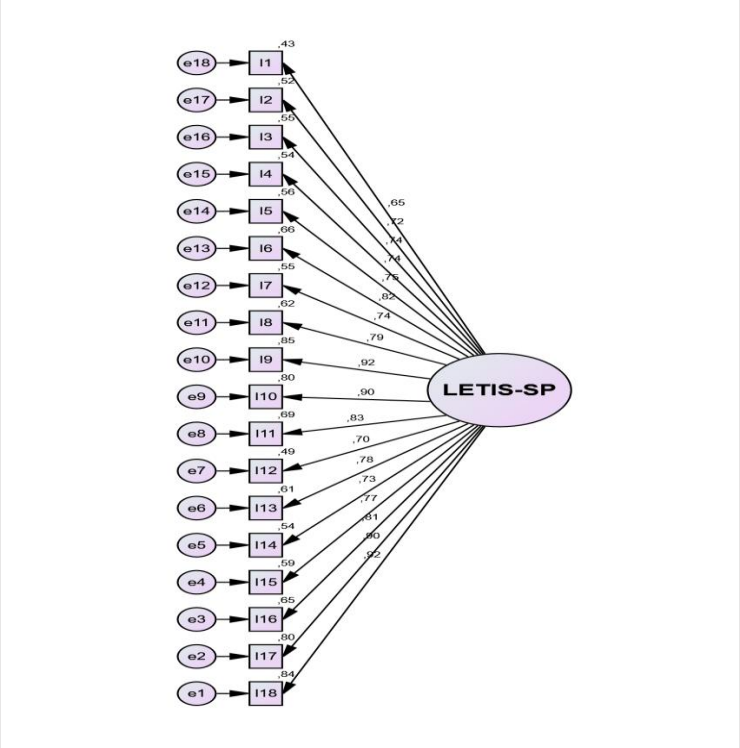

Figure 2. Path diagram of the LETIS-SP model

Table 6. Model fit indices

Indices	Perfect fit	Acceptable fit	LETIS-SP	Interpretation
x2 /df [1,5]	<2.00	<5.00	4.85	Acceptable
RMSEA[3,5]	<.05	<.08	.079	Acceptable
SRMR[4,5]	<.05	<.08	.074	Acceptable
CFI[3,5]	>.95	>.90	.90	Acceptable
NFI[3,5]	>.95	>.90	.89	Acceptable
NNFI[1,5]	>.95	>.90	.88	Acceptable
GFI[2,5]	>.95	>.90	.90	Acceptable

[1] (Hoe, 2008), [2] (Schermelleh-Engel, Moosbrugger, and Müller, 2003), [3] (Hooper, Coughlan, and Mullen, 2008), [4] (Hu and Bentler, 1999), [5](Wang and Wang, 2012). RMSEA: Root Mean Squared Error of Approximation; SRMR: Standardized Root Mean Square Residual; CFI: Comparative Fit Index; NFI: Normed Fit Index; NNFI: Non-Normed Fit Index; GFI: Goodness of Fit Index

In Table 6, fit indices for the unidimensional structure of the scale are presented. The findings showed that the fit indices of the model were as follows: $\chi 2/sd = 4.85$, RMSEA=.079, SRMR=.074, CFI=.90, NFI=.89, NNFI=.88, and GFI=.90. According to Hu and Bentler (1999) these values were acceptable. Based on these findings, it can be concluded that the unidimensional structure of the scale was confirmed by the CFA.

Reliability

In order to evaluate the reliabilityof the LETIS-SP, Cronbach's Alpha, the McDonald's Omega (ω), and Correlation Coefficient were also computed in this study. Table 7 shows the means, standard deviations, correlation coefficients' between the items, and Cronbach's Alpha coefficient.

Table 7. The mean (M), standard deviation (SD), correlation coefficients and Cronbach's Alpha coefficients for the scale

	M	*SD*	*I1*	*I2*	*I3*	*I4*	*I6*	*I7*	*I8*	*I10*	*I11*	*I12*	*I14*	*I15*	*I16*	*I17*	*I18*	*I5*	*I9*	*I13*
I1	3.77	.95	1																	
I2	3.93	.93	.51	1																
I3	3.96	.95	.42	.70	1															
I4	3.86	.97	.51	.56	.50	1														
I6	3.69	.92	.42	.61	.57	.55	1													
I7	3.81	.96	.48	.47	.46	.52	.61	1												
I8	3.84	.96	.39	.53	.56	.53	.72	.57	1											
I10	3.84	.87	.65	.68	.68	.72	.64	.64	.67	1										
I11	3.74	.99	.54	.51	.52	.54	.66	.68	.69	.66	1									
I12	3.42	.94	.37	.37	.38	.48	.58	.55	.62	.58	.72	1								
I14	3.60	1.00	.36	.51	.49	.51	.65	.52	.81	.62	.61	.56	1							
I15	3.97	.80	.46	.56	.58	.52	.62	.39	.70	.73	.50	.54	.58	1						
I16	4.00	.80	.54	.56	.63	.52	.61	.59	.47	.74	.59	.51	.41	.78	1					
I17	3.67	1.01	.57	.63	.61	.58	.75	.67	.73	.70	.81	.71	.74	.65	.69	1				
I18	3.80	.94	.70	.68	.70	.63	.72	.57	.63	.86	.73	.61	.58	.74	.78	.82	1			
I5	3.83	.88	.50	.45	.54	.48	.57	.59	.56	.67	.60	.49	.55	.54	.66	.66	.68	1		
I9	3.83	.93	.54	.68	.70	.70	.75	.64	.77	.83	.81	.68	.60	.72	.76	.80	.82	.68	1	
I13	3.76	.93	.49	.54	.47	.69	.60	.59	.47	.71	.63	.54	.62	.50	.62	.72	.70	.59	.67	1
Cronbach Alpha Coefficient							*.96*													
McDonald's Omega Coefficients (ω)							*.91*													

N=225; ***I1****: Item 1*

The Cronbach's Alpha internal consistency coefficient was .96, as shown in Table 7. With the coefficient of. 96 we obtained for the instrument, we can confidently infer from the research of the scholars (Kalaycı, 2010; Kline, 2009) that the items constituting the instrument were found to have a high level of reliability and were suitable for measuring the same behavior.

Additionally, as shown in Table 6, the Pearson correlation coefficients between the items range from r=.36 to .82. These findings show that the relationships shown in Table 6 are linear, positive and significant (Russo, 2004) which is another sign of the instrument's internal consistency.

Discussion and Conclusion

This study focuses on technology integration leadership, which attracts a growing interest in educational administration and technological leadership. An item pool was created for the technology integration leadership behaviors that the school principal might exhibit in integrating technology into the school organization. When we reviewed the literature to develop and generate the scale items, we found many studies that adopted the same technique (i.e., Durnalı, 2022a). The sentences quoted regarding the focus of the scale items were rephrased without changing their core meaning. The scale development process was initiated with a draft item pool of 60 items. With the revisions and suggestions of experts, the draft form of LETIS-SP was ready for implementation with 32 items. We calculated the CVR values for these items which resulted in the exclusion of 14 items. Finally, exploratory factor analysis (EFA) including 225 teachers, and confirmatory factor analysis (CFA) including 200 teachers were conducted with 18 items.

Firstly, in order to reveal the factor structure of LETIS-SP, EFA was performed. At this stage, a unidimensional structure emerged. Thus, a valid scale with 18 items and a unidimensional structure was obtained with the EFA. After the EFA, the structure consisting of 18 items was tested through CFA. The fit indices indicated an "acceptable" fit (Çokluk et al., 2020; Kline, 2009). Proctor et al. (2003) developed the technological integration scale, consisting of a single dimension and forty-five items. A 10-item unidimensional scale was also used in the studies of Karaca et al. (2013). The scales developed in the these studies were reported to be highly valid which were consistent with the current study's findings. In Sincar's (2009) study, a 29-item scale was developed and its validity and reliability were found to be high. Similarly, Antonietti et al., (2023) developed a 12-item technological integration scale for teachers and found its validity and reliability to be high. It is consistent with the Curriculum Integration Performance scale developed by Finger et al., (2006).

The reliability of LETIS-SP was examined for the overall scale using a dataset of 225 teachers. To this end, Cronbach's alpha coefficient suggested that LETIS-SP is a highly reliable data collection tool. This finding is consistent with the studies of Finger et al., (2006), Raman,et al. (2019), Proctor et al. (2003) and Karaca et al. (2013). The technological integration scale used in the relevant studies was reported to be highly reliable. In addition, the correlation coefficients between the items of LETIS-SP were positive and significant. This indicates that the measurement tool's internal consistency was achieved, as in the studies of Proctor et al. (2003) and Antonietti et al., (2023) which support the findings of the current study.

Finally, the unidimensional structure of LETIS-SP developed in the current study is consistent with the studies in the literature. When both EFA and CFA results are examined, it is concluded that LETIS-SP is a valid and reliable measurement tool that will reveal school principals' technology integration leadership behaviors based on teachers' perceptions. This study is limited to the development of LETIS-SP. The validity and reliability of the scale can be tested again with the participation of more teachers in further studies and on different samples. The

relationships between LETIS-SP's technology integration leadership of school principals and teachers' innovation competencies, school climate, technology use levels, and other variables related to organizational behavior can be examined.

Suggestions

Conducting validity and reliability analyses of the scale in different cultures may contribute to understanding cross-cultural differences in technological leadership. It is recommended that studies be conducted comparing technology integration leadership with different leadership models (e.g., transformational leadership or distributed leadership). Longitudinal studies should be conducted to examine the change in technology integration leadership over time. Focus can be placed on studies investigating the effects of technology integration leadership on teachers and students.

Regular training programs should be developed to increase school leaders' awareness of technology integration. Support mechanisms can be established where experienced leaders can act as mentors to develop technology integration leadership. Technology integration should be considered as a process in which not only leaders but also teachers, students and parents contribute to. Strategic planning and policies should be created to support technology integration leadership. Guidance materials can be prepared to enable school leaders to effectively manage technological resources.

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Conflicts of Interest

No potential conflict of interest exists between authors.

Ethics

The ethics application for the study was made on 04/10/2024 and the research was carried out with the approval of Zonguldak Bülent Ecevit University Ethics Commission dated 01/11/2024 and numbered 816. After approval by the Ethics Committee, voluntary participation was obtained from the participants through informed consent forms. During the research process, utmost care was taken to ensure the privacy and anonymity of the participants, and the data obtained were used only for research purposes.

References

Antonietti, C., Schmitz, M. L., Consoli, T., Cattaneo, A., Gonon, P., & Petko, D. (2023). Development and validation of the ICAP Technology Scale to measure how teachers integrate technology into learning activities. *Computers & Education, 192*, 104648.

Banoğlu, K. (2012). Eğitim yöneticilerinin teknoloji liderliği yeterlikleri ölçeğinin geliştirilmesi: Geçerlik ve güvenirlik çalışması. *İnönü Üniversitesi Eğitim Fakültesi Dergisi, 13*(3), 43-65.

Barton, E. A., & Dexter, S. (2020). Sources of teachers' self-efficacy for technology integration from formal, informal, and independent professional learning. *Educational Technology Research and Development, 68*(1), 89–108. https://doi.org/10.1007/s11423-019-09708-4.

Berkovich, I., & Hassan, T. (2024). Principals' digital instructional leadership during the pandemic: Impact on teachers' intrinsic motivation and students' learning. *Educational Management Administration and Leadership, 52*(4), 934–954. https://doi.org/10.1177/17411432221113411

Bülbül, T., & Çuhadar, C. (2012). Okul yöneticilerinin teknoloji liderliği öz-yeterlik algıları ile bilgi ve iletişim teknolojilerine yönelik kabulleri arasındaki ilişkinin incelenmesi. *Mehmet Akif Ersoy Üniversitesi Eğitim Fakültesi Dergisi, 1*(23), 474-499.

Büyüköztürk, Ş. (2016). *Veri analizi el kitabı.* Pegem Akademi.

Byrom, E., and Bingham, M. (2001). *Factors influencing the effective use of technology for teaching and learning: Lessons learned from the SEIR-TEC intensive site schools.* Retrieved from: https://eric.ed.gov/?id=ED471140 on 01.01.2025.

Çokluk, Ö., Şekercioğlu, G., ve Büyüköztürk, Ş. (2012). *Sosyal bilimler için çok değişkenli istatistik: SPSS ve LISREL uygulamaları.* Pegem Akademi.

Dawson, C., & Rakes, G. C. (2003). The influence of principals' technology training on the integration of technology into schools. *Journal of Research on Technology in Education, 36*(1), 29-49.

Dexter, S., & Richardson, J. W. (2020). What does technology integration research tell us about the leadership of technology? *Journal of Research on Technology in Education, 52*(1), 17-36.

Dexter, S., Richardson, J. W., & Nash, J. B. (2016). A review of the empirical research and implications for leadership preparation. In M. D. Young, & G. M. Crow (Eds.), *Handbook of research on the education of school leaders* (pp. 202–228). Routledge.

Dinç, H., & Göksoy, S. (2020). Okul müdürlerinin teknoloji liderliği yeterlilikleri. *International Journal on Lifelong Education and Leadership, 6*(1), 20-35.

Durnalı, M. & Akbaşlı, S. (2020). Okul müdürleri teknolojik liderlik davranışlarının okulda bilgi yönetiminin gerçekleşme düzeyine etkisi. *Milli Eğitim Dergisi, 49*(225), 23-54.

Durnalı, M. & Limon, İ. (Eds.). (2020). *Enriching teaching and learning environments with contemporary technologies*. IGI Global. https://doi.org/10.4018/978-1-7998-3383-3

Durnalı, M. (2013). *The contributions of E-School, a student ınformation management system, to the data process, environment, education, and economy of Turkey*. In Proceedings of the International Academic Forum (IAFOR) Official Conference: The Third Asian Conference on Technology in the Classroom 2013, 170–84. Osaka, Japan: Ramada Hotel.

Durnalı, M. (2019a). Technological leadership behavior level of secondary schools principals according to teachers' views. *Journal of Theoretical Educational Science, 12(*2), 401-430. https://doi: 10.30831/akukeg.449484.

Durnalı, M. (2022a). The development and validation of technological leadership behavior ınstrument for school principal. *Journal of Learning and Teaching in Digital Age*, *7*(2), 210-221.

Durnalı, M. (2022b). Destroying barriers to critical thinking' to surge the effect of self-leadership skills on electronic learning styles. *Thinking Skills and Creativity*, *46*, 101130.

Durnalı, M. (Ed.). (2019b). *Utilizing technology, knowledge, and smart systems in educational administration and leadership*. IGI Global.

Durnalı, M., Orakcı, Ş., & Aktan, O. (2019). The smart learning potential of Turkey's Education System in the context of FATIH Project. In A. Darshan Singh, S. Raghunathan, E. Robeck, & B. Sharma (Eds.), *Cases on Smart Learning Environments* (pp. 227-243). Hershey, PA: IGI Global. doi:10.4018/978-1-5225-6136-1.ch013

Durnalı, M., Orakcı, Ş., & Çetin T. (2022). Distance education students' acceptance of online learning systems, attitudes towards online learning and their self-directed learning skills. *Malaysian Online Journal of Educational Technology*, *10*(2),1-19.

Erçetin, Ş. Ş., Akbaşlı, S., & Durnalı, M. (2018). Dijital teknolojilere erişim motivasyonu ölçeğinin Türkçe'ye uyarlanması: Geçerlik ve güvenirlik çalışması. *Sakarya University Journal of Education, 8*(4), 75-88, doi: 10.19126/suje.431126.

Ertmer, P. (2005). Teacher pedagogical beliefs: The final frontier in our quest for technology integration? *Educational Technology Research and Development, 53*(4), 25-39.

Field, A. (2009). *Discovering statistics using SPSS (Third Edition)*. London: SAGE Press.

Finger, G., Jamieson-Proctor, R., & Watson, G. (2006, January). Measuring learning with ICTs: an external evaluation of Education Queensland's ICT curriculum integration performance measurement instrument. In *Proceedings of the Australian Association for Research in Education Annual Conference (AARE 2005)*. University of Southern Queensland. https://research-repository.griffith.edu.au/server/api/core/bitstreams/9306953c-f4d0-5bd8-95c5-d1d6f1998736/content

Fullan, M.G. (1991). The new meaning of educational change. Teachers College Press.

Gao, P., Wong, A. F., Choy, D., & Wu, J. (2010). Developing leadership potential for technology integration: Perspectives of three beginning teachers. *Australasian Journal of Educational Technology*, *26*(5).

Gökbulut, B., & Durnalı, M. (2023). Professional skills training in developing digital materials through augmented and virtual reality applications. *Psychology in the Schools*, *60*(11), 4267-4292.

Gümüş, M. M., Kayhan, O., Kukul, V., & Korkmaz, Ö. (2024). Preparing teachers to integrate technology in education according to SQD model: Scale development and validation. *Education and Information Technologies, 29*, 3993–4023. https://doi.org/10.1007/s10639-023-11978-0.

Hacıfazlıoğlu, Ö., Karadeniz, Ş., & Dalgıç, G. (2011). Eğitim yöneticileri teknoloji liderliği öz-yeterlik ölçeğinin geçerlik ve güvenirlik çalışması. *Kuram ve Uygulamada Eğitim Yönetimi, 2*(2), 145-166.

Hair Jr., J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2019). Multivariate data analysis. Cengage: Hampshire.

Hoe, S. L. (2008). Issues and procedures in adopting structural equation modelling technique. *Journal of Applied Quantitative Methods, 3*(1), 76-83.

Hooper, D., Coughlan, J., & Mullen, M. (2008). Structural Equation Modelling: Guidelines for determining model fit. *Electronic Journal of Business Research Methods, 6*(1), 53-60.

Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6*(1), 1-55.

ISTE (2009). NETS for administrators 2009. Retrieved from https://cdn.iste.org/www-root/Libraries/Images/Standards/Download/ISTE%20Standards%20for%20Administrators%2C%202009%20(Permitted%20Educational%20Use).pdf 21.01.2025.

Jhurree, V. (2005). Technology integration in education in developing countries: Guidelines to policy makers. *International Education Journal, 6*(4), 467-483.

Kalaycı, Ş. (2010). Faktör analizi, (Ed. Şeref Kalaycı), *Spss uygulamali çok değişkenli istatistik teknikleri*, Asil Yayın Dağıtım.

Karaca, F., Can, G., & Yildirim, S. (2013). A path model for technology integration into elementary school settings in Turkey. *Computers & Education, 68*, 353-365.

Kline, R. B. (2009). *Becoming a behavioral science researcher: A guide to producing research that matters.* The Guilford Press.

Kline, R. B. (2013). Exploratory and confirmatory factor analysis. In Y. Petscher & C. Schatsschneider (Eds.), *Applied quantitative analysis in the social sciences* (pp. 171–207). Routledge.

Krabonja, M. V., Kustec, S., Skrbinjek, V., Aberšek, B., & Flogie, A. (2024). Innovative professional learning communities and sustainable education practices through digital transformation. *Sustainability, 16*(14), 1-19.

Larson, L., Miller, T., & Ribble, M. (2010). 5 Considerations for Digital Age Leaders: What Principals and District Administrators Need to Know about Tech Integration Today. *Learning & Leading with Technology, 37*(4), 12-15.

Lawshe, C. H. (1975). A quantitative approach to content validity. *Personnel Psychology, 28*(4), 563-575.

Leonard, L. J., & Leonard, P. E. (2006). Leadership for technology integration: Computing the reality. *Alberta Journal of Educational Research, 52*(4).

Lu, R., & Overbaugh, R. C. (2009). School environment and technology implementation in K–12 classrooms. *Computers in the Schools, 26*(2), 89-106.

Mardia, K. V. (1974). Applications of some measures of multivariate skewness and kurtosis in testing normality and robustness studies. Sankhyā: *The Indian Journal of Statistics, Series B, 36*(2), 115-128.

McLeod, S. (2015). Facilitating administrators' instructional leadership through the use of a technology integration discussion protocol. *Journal of Research on Leadership Education, 10*(3), 227-233. https://doi.org/10.1177/1942775115623393

McKenzie, J. (1999). *How teachers learn technology best*. Bellingham, WA: FNO Press.

Meltzer, J., and Sherman, T. M. (1997). Ten commandments for successful technology implementation and staff development. *NASSP Bulletin, 81*(585), 23-32.

Proctor, R. M. J., Watson, G., & Finger, G. (2003). Measuring information and communication technology (ICT) curriculum integration. *Computers in the Schools*, *20*(4), 67–87. https://doi.org/10.1300/J025v20n04_06

Raman, A., & Thannimalai, R. (2019). Importance of technology leadership for technology integration: Gender and professional development perspective. *Sage Open*, *9*(4), 2158244019893707.

Raman, A., Thannimalai, R., & Ismail, S. N. (2019). Principals' technology leadership and its effect on teachers' technology integration in 21st century classrooms. *International Journal of Instruction*, *12*(4), 423-442.

Ritchie, D. (1996). The administrative role in the integration of technology. *Nassp Bulletin*, *80*(582), 42-52.

Russo, R. (2004). *Statistics for the behavioural sciences: An introduction.* Psychology Press

Schermelleh-Engel, K., Moosbrugger, H., & Müller, H. (2003). Evaluating the fit of structural equation models: Tests of significance and descriptive goodness-of-fit measures. *Methods of Psychological Research Online, 8*(2), 23-74.

Schrum, L., Galizio, L. M., & Ledesma, P. (2011). Educational leadership and technology integration: An investigation into preparation, experiences, and roles. *Journal of School Leadership*, *21*(2), 241-261.

Sepúlveda, A. (2020). The digital transformation of education: connecting schools, empowering learners. [Survey on the Use of Information and Communication Technologies in Brazilian Schools] *TIC EDUCAÇÃO, 249.*

Sincar, M. (2009). *İlköğretim okulu yöneticilerinin teknoloji liderliği rollerine ilişkin bir inceleme* (Gaziantep ili örneği). (Unpublished doctoral dissertation). İnonü University, Malatya.

Tabachnick, B. G., & Fidell, L. S. (2012). *Using multivariate statistics (6 Ed.).* Pearson.

Tabachnick, B. G., Fidell, L. S., & Ullman, J. B. (2019). *In Using multivariate statistics* (Vol. 7). Pearson.

Tavşancıl, E. (2014). *Tutumların ölçülmesi ve SPSS ile veri analizi.* Nobel.

Thannimalai, R., & Raman, A. (2018). Principals technology leadership and teachers technology integration in the 21st century classroom. *International Journal of Civil Engineering and Technology*, *9*(2), 177-187.

Thannimalai, R., & Raman, A. (2018b). The influence of principals' technology leadership and professional development on teachers' technology integration in secondary Schools. *Malaysian Journal of learning and Instruction*, *15*(1), 201-226.

Tilya, F. (2008). IT and educational policy in the sub-Saharan African region. In J. Voogt & G. Knezek (Eds.), *International handbook of information technology in primary and secondary education: Part one* (pp. 1145–1160). Springer.

Tosuntaş, Ş. B., Çubukçu, Z., & İnci, T. (2019). A holistic view to barriers to technology integration in education. *Turkish Online Journal of Qualitative Inquiry*, *10*(4), 439-461.

UNESCO. (2020). The digital transformation of education: connecting schools, empowering learners. Retrieved from: https://unesdoc.unesco.org/ark:/48223/pf0000374309 on 21.01.205.

Vallance, M. (2008). Beyond policy: Strategic actions to support ICT integration in Japanese schools. *Australasian Journal of Educational Technology*, *24*(3), 275-293.

Van Niekerk, M., & Blignaut, S. (2014). A framework for information and communication technology integration in schools through teacher professional development. *Africa Education Review*, *11*(2), 236-253.

Voogt, J., Knezek, G., Christensen, R., & Lai, K. W. (2018). Developing an understanding of the impact of digital technologies on teaching and learning in an ever-changing landscape. In J. Voogt, G. Knezek, R. Christensen, & K. W. Lai (Eds.), *Second handbook of information technology in primary and secondary education (Springer International Handbooks of Education)*. Springer, Cham. https://doi.org/10.1007/978-3-319-53803-7_113-1

Wang, J., & Wang, X. (2012). *Structural equation modeling: Applications using MPLUS: Methods and applications*.John Wiley & Sons.

Watts, C. D. (2009). *Technology leadership, school climate, and technology integration: A correlation study in K–12 public schools* (Unpublished doctoral dissertation), The University of Alabama).

Worthington, R. L., ve Whittaker, T. A. (2006). Scale development research: A content analysis and recommendations for best practices. *The Counseling Psychologist, 34*(6), 806-838

Yıldırım, A. & Şimşek, H. (2016). *Sosyal bilimlerde nitel araştırma yöntemleri.* Seçkin.

Zhao, Y., Pugh, K., Sheldon, S., & Byers, J. L. (2002). Conditions for classroom technology innovations. *Teachers College Record*, *104*(3), 482-515.

Appendix A: The Scale of Leadership for Technology Integration in Schools (Okul Teknoloji Bütünleşme Liderlik Ölçeği)

My School Principal (Okul müdürüm)	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
1. The school principal guides others through an example to contribute to school technology integration. (Okul müdürü, okul teknoloji bütünleşmesine katkı sağlamak için bir örnek üzerinden yol gösterir.)					
2. The school principal displays supportive behaviors toward staff in the process of school technology integration. (Okul müdürü, okul teknoloji bütünleşmesi sürecinde çalışanları destekleyici davranışlar sergiler.)					
3. The school principal fosters a supportive school environment during the technology integration process.(Okul müdürü, okul teknoloji bütünleşme sürecinde destekleyici bir okul ortamının gelişimini sağlayıcı davranışlar sergiler.)					
4. The school principal shares leadership roles with subordinates to contribute to school technology integration.(Okul müdürü, okul teknoloji bütünleşmesine katkı sağlamak için liderlik rollerini astlarıyla paylaşır.)					
5. The school principal builds networks/connections to achieve school technology integration goals.(Okul müdürü, okul teknoloji bütünleşme amaçlarını gerçekleştirmek için ağlar/bağlantılar oluşturur.)					
6. The school principal provides a necessary technology coordinator for school technology integration.(Okul müdürü, okul teknoloji bütünleşmesi noktasında gerekli teknoloji koordinatörünü sağlar.)					
7. The school principal procures technological tools to support school technology integration.(Okul müdürü, okul teknoloji bütünleşmesini desteklemek için teknolojik gereçleri temin eder.)					
8. The school principal ensures that staff have equal access to technology in the school technology integration process.(Okul müdürü, okul teknoloji bütünleşmesi sürecinde çalışanların teknolojiye eşit oranda erişimini sağlayıcı davranışlar sergiler.)					
9. The school principal promotes the development of the school's technology infrastructure during the technology integration process.(Okul müdürü, okul teknoloji bütünleşme sürecinde okul teknoloji altyapısının gelişimini sağlayıcı davranışlar sergiler.)					
10. The school principal supports my development in terms of school technology integration.(Okul müdürü, okul teknoloji bütünleşme konusunda gelişimimi sağlayıcı davranışlar sergiler.)					
11. The school principal assesses hardware to determine the level of school technology integration.(Okul müdürü, okul teknoloji bütünleşme seviyesini belirlemek için donanımı değerlendirir.)					

My School Principal (Okul müdürüm)	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
12. The school principal assesses software to determine the level of school technology integration.(Okul müdürü, okul teknoloji bütünleşme seviyesini belirlemek için yazılımı değerlendirir.)					
13. The school principal evaluates educators' use of technology to determine the level of school technology integration.(Okul müdürü, okul teknoloji bütünleşme seviyesini belirlemek için teknolojinin eğitimcilerce kullanımını değerlendirir.)					
14. The school principal evaluates students' use of technology to determine the level of school technology integration.(Okul müdürü, okul teknoloji bütünleşme seviyesini belirlemek için teknolojinin öğrencilerce kullanımını değerlendirir.)					
15. The school principal reflects their knowledge of technology in their actions.(Okul müdürü, teknoloji hakkında bilgi sahibi olduğunu davranışlarına yansıtır.)					
16. The school principal facilitates technology integration into the teaching and learning process.(Okul müdürü, öğretme ve öğrenme sürecine teknoloji bütünleşmesini kolaylaştırıcı davranışlar sergiler.)					
17. The school principal demonstrates a focus on in-class applications for school technology integration.(Okul müdürü, okul teknoloji bütünleşmesi için sınıf içi uygulamalara odaklandığını gösteren davranışlar sergiler.)					
18. The school principal applies strategies to support teachers with technology integration in classroom activities.(Okul müdürü, sınıf içi etkinliklere teknoloji bütünleşmesi sürecinde öğretmenlere yardımcı olacak stratejiler uygular.)					

***Note**: You can use the scale for your scientific research, provided that you cite it without getting permission from the authors. However, if you are going to use it for projects that have a budget, or for some efforts to generate income, it is mandatory to contact the authors for the license*

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Views of Different School Stakeholders on Middle School Students' Learning Losses*

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ABSTRACT

This study examines the perspectives of diverse school stakeholders regarding student learning loss, contextualized through an analysis of policy documents on academic attrition issued by the Ministry of National Education. Employing a qualitative case study design, the research adopts extreme/outlier case sampling—a purposive sampling strategy—to select two contrasting school contexts: one characterized by acute learning loss and another exhibiting mitigated attrition. The participant cohort (n=18) comprised school psychological counsellors, branch teachers (Mathematics, Turkish, Science, English), and administrators from both school tiers, identified in collaboration with the Provincial Directorate of Education. Semi-structured interview protocols, tailored to distinct stakeholder roles, served as the primary data collection instrument. Thematic content analysis of responses revealed pronounced learning loss in Mathematics across both school contexts, with English additionally emerging as a critical domain in high-attrition settings. Stakeholders unanimously emphasized the necessity of early targeted interventions, evidence-based guidance systems, and contextual adaptation of pedagogical environments—integrating school, familial, and community resources—to align with student needs. These findings underscore the imperative of multidimensional strategies to address learning loss, as advocated in Ministry's policy frameworks, while highlighting subject-specific vulnerabilities requiring prioritized remediation.

Keywords: Learning loss, stakeholder perceptions on learning loss

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Introduction

Learning constitutes a dynamic process characterized by the transmission of knowledge from proficient individuals to learners within interactive frameworks (Selvi, 2020). Senemoğlu (2010) further conceptualizes learning as an experiential phenomenon that induces enduring and measurable behavioral modifications, distinguishable from transient physiological alterations associated with maturation. For such learning processes to materialize effectively, the interdependent stages of input (knowledge acquisition), process (cognitive integration), and output (behavioral manifestation) within educational systems must operate cohesively and efficiently. Concurrently, Yeşilyurt (2021) underscores the necessity for all institutional stakeholders—including educators, administrators, and policymakers—to adopt a concerted focus on student behavior, oriented toward facilitating constructive behavioral transformations aligned with pedagogical objectives. These intentional behavioral shifts, when systematically cultivated, serve to cultivate metacognitive awareness and facilitate meaningful learning outcomes within learners.

The absence of sustained learning engagement among students precipitates a narrowing of the input-output gap within educational systems (Education Reform Initiative [ERI], 2022). This phenomenon, termed "unlearning," is underpinned by multiple factors, including challenges in retrieving prior knowledge due to inadequate reinforcement (Baz, 2021) and cognitive attrition resulting from temporal displacement (Sulak & Çapanoğlu, 2022). Such impediments are exacerbated during prolonged discontinuities in formal education, including scheduled academic breaks or unanticipated disruptions. The Ministry of National Education (MoNE) codifies these disruptions in Article 7 of its Regulation on Preschool Education and Primary Education Institutions (2023a), delineating "extraordinary circumstances" as events—such as natural disasters, adverse meteorological conditions, pandemics, or socio-political crises—that impede institutional operations. Extended scholastic absences under such conditions correlate strongly with regression in academic proficiency, a trend empirically documented as learning loss (Özgürden & Okur, 2022).

Learning loss has emerged as a critical concern within global educational dislesson, particularly in light of the United Nations Sustainable Development Goal 4 (SDG 4), which prioritizes universal access to inclusive, equitable quality education and lifelong learning by 2030. Despite this imperative, the Global Education Monitoring Report (2017/18) underscores persistent systemic failures, with millions of children remaining excluded from primary and secondary education and failing to attain foundational competencies. To mitigate such disparities, Gökalp (2005) advocates for institutional and pedagogical continuity as a cornerstone of skill acquisition, positing that uninterrupted learning trajectories are essential for fostering cognitive and adaptive capacities. This perspective aligns with the epistemic frameworks of the information society, which emphasize the centrality of perpetual learning in addressing contemporary educational inequities.

The literature identifies significant learning losses in particular fields, including Turkish, mathematics (Alkan & Özdemir, 2023; Sulak & Çapanoğlu, 2022), science (Ceran-Aydın & Ergül, 2022), English (Saygılı, 2023), and social studies (Arıkan & Kaya, 2023). Other studies link learning losses to prolonged school closures during summer holidays (Arı, 2005; Arı, 2004; Blazer, 2011; Cooper, 2003; Doğuş, 2022), the COVID-19 pandemic (Akkaş-Baysal & Ocak, 2021; Çelik, 2020; Di Pietro, Biagi, Costa, Karpiński, & Mazza, 2020; Dorn, Hancock, Sarakatsannis, & Viruleg, 2020; Sezgin, Erdoğan, & Dağ, 2020; Sulak & Çapanoğlu, 2022), and disruptions caused by migration due to disasters and war (Atalay, 2023; Güneş, 2023; Ulutaş & Kuzucu-Aydoğdu,

2022; Yavuz & Çetin, 2022).Studies focusing on middle school level education have proliferated, underscoring the prevalence of learning loss at this level (Balcı, 2020; Bayram, Bıyık, & Gölbaşı, 2021; Baz, 2021; Can, 2021; Carlana, Eliana, & Lopez, 2023; Ceran-Aydın & Ergül, 2022; Dündar & Kızık, 2023; Filiz & Gökmen, 2022; Kayır & Özçelik, 2018; Kuhfeld, Tarasawa, Johnson, Ruzek, & Lewis, 2020; Yüksel, 2023). However, a gap in the literature exists regarding studies that integrate the perspectives of multiple school stakeholders—teachers, psychological counsellors, and administrators—on the issue of learning loss.

To address this lacuna in the scholarly and operational landscape, the selection of three distinct school stakeholders—notably school psychological counsellors—as the research sample was necessitated by Article 5 of the MoNE Guidance and Psychological Counselling Regulation (2020). This provision stipulates that "guidance and psychological counselling shall be conducted through an accountable, collaborative approach involving all stakeholders, unified in their commitment to fostering student development." Consequently, the interdependent roles of these stakeholders—teachers, psychological counsellors, and school administrators—constitute the tripartite focus of this inquiry. Teachers, functioning as pedagogical facilitators, are instrumental in attenuating and preempting learning loss through curriculum delivery and adaptive instructional strategies. Psychological counsellors, operating at the nexus of educational, personal, and social domains, mitigate learning loss by providing empathetic, individualized support that addresses cognitive and affective barriers to academic engagement. School administrators, tasked with cultivating an institutionally aligned, resource-efficient environment, assume a systemic role in combatting learning loss by ensuring operational coherence and equitable access to institutional supports. Their collective agency, as delineated in the MoNE framework, underscores the necessity of multi-stakeholder collaboration in bridging the gap between policy imperatives and educational outcomes.

This study aims to explore the perspectives of school stakeholders on the phenomenon of learning loss in middle school level. The research seeks to answer the following questions:

1. What are the views of different stakeholders on learning loss among middle school students?
2. How is learning loss addressed in the reports and official documents published by the Ministry of National Education?

Method

This study adopts a case study design (Yıldırım & Şimşek, 2021) to examine the perspectives of school administrators, psychological counsellors, and teachers from subject areas notably affected by learning loss. The research explores their experiences and reflections on the challenges associated with this phenomenon. This methodological approach was chosen to provide a comprehensive understanding of the difficulties encountered in teaching within school settings, with the aim of enhancing instructional quality and improving overall school effectiveness (Özenç-Yeşilbaş, 2022). By collecting insights from key stakeholders—namely, school administrators, psychological counsellors, and teachers—the study seeks to elucidate the educational challenges they face and their evaluative responses to these issues.

Study Group

This study employed extreme/outlier case sampling, a purposeful sampling technique, to identify schools within the city where learning loss is observed at the highest and lowest levels of severity. Extreme/outlier sampling involves the examination of both typical and atypical cases within a research context (Yağar & Dökme, 2018). Data regarding these schools were obtained from the City Provincial Directorate of National Education, and one school from each category was selected following consultations with the respective school administrations. The study sample consisted of psychological counsellors, subject teachers specializing in Mathematics, Turkish, Science, and English—areas most impacted by learning loss—as well as school administrators from the selected schools. The inclusion criteria for participation in the study were as follows:

- Employment in the district of the province.
- Active service in the school with the highest level of learning loss.
- Employment in the school with the least adverse impact from learning loss.
- Professional roles as psychological counsellors, branch teachers, or school principals in the identified schools.

In this context, the inclusion of diverse participants and varying situations in the study demonstrates the achievement of maximum variation. The demographic characteristics of the study group are presented in Table 1.

Table 1. Demographic variables of the study group

Learning Loss Level of the School	Code	Branch	Years of Experience
The most frequently victimised school	P1	School Administrator	8
	P2	School Psychological Counsellor	16
	P3	Maths	15
	P4	Maths	6
	P5	Maths	14
	P6	Turkish	14
	P7	Turkish	25
	P8	Science	18
	P9	English	13
	P10	English	4
	P11	Social Studies	16
	P12	Social Studies	13
The school with the least victimisation	P13	School administrator	18
	P14	School Psychological Counsellor	18
	P15	Maths	10
	P16	Turkish	17
	P17	Science	29
	P18	English	25

Data Collection Tools

The primary data collection instrument was an interview form designed to gather insights from various school stakeholders, including psychological counsellors, subject teachers, and administrators from the selected schools. The interview questions, developed as parallel forms tailored to address the issue of learning loss, were informed by an extensive literature review. For these questions, an examination was made in the literature, especially on the definition of learning loss, the reason for it, and the lessons with the most learning loss (Baz, 2021; Blazer, 2011; Carlana et al, 2023; Kaffenberger, 2021; Kuhfeld et al, 2020; Raharjo & Nurhayati, 2024; Rediani & Kaize,

2023; Sulak & Çapanoğlu, 2022; Ulutaş & Kuzucu-Aydoğdu, 2022; Yüksel, 2023). The interview form was piloted with two teachers, revised accordingly, and finalized to include six main questions with accompanying probes. In addition to the interviews, official documents published by the Ministry of National Education related to learning loss in schools were also analysed to complement the data collection process.

Data Collection

Ethical approval was obtained prior to data collection. Data were collected during the 2023–2024 academic year in collaboration with the Aydın Provincial Directorate of National Education. Schools were selected based on the severity of learning loss, with one school representing high levels of learning loss and another representing low levels. Face-to-face interviews were conducted with psychological counsellors, subject teachers, and school administrators from the selected schools, with participants' consent for audio recording. In total, data were collected from 18 participants using a semi-structured interview format.

Data Analysis

Thematic content analysis method was used to analyse the data obtained as a result of the research. Thematic content analysis refers to the process of systematic identification, coding and interpretation of specific themes, patterns or meaningful units in a data set. This method is generally preferred within the scope of qualitative data analysis and for in-depth understanding of the research phenomenon. In summary, content analysis is an examination method in which data are systematically analysed in depth and coding such as concepts and themes are created (Altunışık, Coşkun, Bayraktaroğlu & Yıldırım, 2010; Yıldırım & Şimşek, 2008/2016/2021). To enhance rigor, two researchers independently coded the data at different times. These initial codes were subsequently reviewed and refined based on feedback from a field expert. The finalized codes and themes were presented in the findings section.

Validity and Reliability

Validity, which ensures the research remains objective and aligned with its purpose, and reliability, which reflects the consistency of research results, were key considerations (Yıldırım & Şimşek, 2021; Karataş, 2015). Lincoln and Guba's (1982) framework of credibility, transferability, consistency, and confirmability guided the establishment of validity and reliability. In order to ensure validity, the criteria of credibility in internal validity and transferability in external validity are considered. The way to ensure reliability is through the realisation of the criteria of consistency and confirmability (Arslan, 2022). Credibility was established by formulating interview questions grounded in a comprehensive literature review and by consulting field experts during the question development process. Additionally, detailed pre-interview briefings with participants were conducted to further enhance credibility. Transferability was ensured through purposive criterion sampling for participant selection and by providing a detailed account of the data collection and analysis procedures. Consistency was maintained by involving two researchers who independently coded the data and by incorporating direct quotations in the findings section. Confirmability was achieved through the secure storage of collected data, thereby ensuring transparency and traceability throughout the research process.

Ethics Committee Approval Process

This study was carried out with the approval of Aydın Adnan Menderes University Ethics Commission dated 01/12/2023 and issued 2023/10-XXII.

Findings

Learning Loss in Students and Factors Affecting Learning Loss

The first theme identified in the study is 'Learning Loss and Contributing Factors.' The categories, codes, and frequencies related to this theme are presented in Table 2. The findings associated with this theme provide insights into the perspectives of various school stakeholders working in the school with the highest incidence of learning loss and the school with the lowest incidence. Specifically, the findings explore stakeholders' views on the definition of learning loss among middle school students and the factors influencing this phenomenon.

Table 2. Findings related to the theme of 'learning loss and affecting factors'

School's Level of Learning Loss	Categories	Codes	*f*
School with the most intense learning loss	Definition of learning loss	Forgetting information over time	7
		Not having normal intelligence	1
		Inability to use intelligence correctly	5
		Defocusing	1
	Factors influencing learning loss	Students' perspective	9
		Student's working style	9
		Family and environment	8
		Classroom environment	2
		Technology	4
School with the least learning loss	Definition of learning loss	Forgetting information over time	3
		Inability to express knowledge verbally/written	1
		Exposure to negative experiences	2
		Defocusing	1
	Factors influencing learning loss	Students' perspective	3
		Student's working style	3
		Family and environment	3
		Classroom environment	1
		Technology	4

When the definition of learning loss of the most intensive school in Table 2 is analysed, it is seen that seven participants explained this situation in terms of forgetting the information over time. P1 expressed learning loss as "I perceive it as the inability of students to recall the information they have learnt after a while". P2, who presented a different opinion from the other two participants by using the expressions of not having normal intelligence and not being able to use intelligence correctly for the definition of learning loss, said, "If a person does not have a mental disability from birth, in my opinion, he/she is born with normal intelligence". According to the situation of using this normal intelligence, if we use our intelligence in the right direction, when we use it in school-related lessons, there is a possibility of being successful in the lessons.

In the same school, nine participants each stated that the student's perspective and the student's study style affected the learning loss. For this, P1's quote "It is something related to the student's perspective and attitude towards the lesson. The fact that the child does not forget something he/she learnt in the physical education lesson, or forgets it in the mathematics lesson, actually the reasons for these need to be looked into. If the student's attitude towards that lesson is positive, he/she does not forget. School stakeholders stated that the factors affecting learning loss are family and environment (f:8), classroom environment (f:2) and technology (f:4). The crucial quotations for these factors are presented below.

"*...the effects of the environment, if the family is not very conscious about this issue or if the classroom environment is not suitable for learning conditions, of lesson the child will experience learning loss. The environment, the family, the school, the classroom environment, from the teacher to the parents, these are the factors that affect the child's development and learning process*." P2

"*We are in the age of technology. Since they spend a lot of time on social media, students' priority is no longer the lesson, subject, academic process. Since their priorities are channelled in different ways, they experience a loss in learning*." P6

An analysis of the school with the least learning loss reveals a consensus with the school experiencing the most severe learning loss that knowledge is forgotten over time. The perspective of one of the three participants who argued that learning loss occurs due to the gradual forgetting of information is presented below.

"*Forgetting the subjects and achievements related to the lesson in a short time after learning them is a learning loss*." P16

In the same school, for the definition of learning loss, one participant explained it as the inability to express the information verbally/written and to move away from the focus, while the other two participants thought that this situation was caused by exposure to negative experiences. For example, one of these views, 'defocusing', emphasises that students shift their attention and energy to other areas other than the lessons they should prioritise. Statements regarding these definitions are given below.

"*The inability of the student to remember the information he/she has learnt before after a certain period of time or to express them verbally or in writing.*" P13

"*If students are exposed to negative experiences, it causes situations that hinder their learning both perceptually and cognitively*." P14

"*I think this loss occurs because students cannot give themselves too much in the learning phase as a result of distraction*." P15

The belief that the factors affecting learning loss are the student's point of view, the student's study style, family and environment was stated by three participants each, the classroom environment was stated by one participant, and technology was stated by four participants. Some crucial quotations are stated below.

"*...it is necessary to explain why the subject should be learnt before the lesson starts. When the student realises why he/she needs to learn that subject, his/her perspective changes a little more. And he/she tries not to forget that information*." P16

"*Repetition, lack of study, loss of motivation can be all of these*." P13

"*One of the most basic problems of learning loss is not revisiting this subject at home. Of lesson, it is forgotten when there is no extra work*." P16

"*It may be due to reasons such as the fact that we do not use alternative assessment and evaluation techniques much in schools and we do not ensure students' participation in the activities much*." P17

"*Since our students spend a lot of time with technology, they have problems with attention. This situation causes difficulties in focusing and perception*." P14

Lessons with the Most Learning Loss, Reasons and Improvement Methods

The second theme of the research is "the lessons with the most learning loss, the reasons and the improvement methods". This theme expresses the lesson with the most learning loss in middle school students, the reason for this lesson and the method that can be done to improve this lesson. The findings obtained are shown in Table 3.

Table 3. Findings related to the theme 'the lessons with the highest learning loss, reasons and improvement methods'

School's Level of Learning Loss	Categories		Codes	*f*
School with the most intense learning loss	The lesson, reason, method with the highest learning loss	Lesson	Turkish	5
			Maths	6
			English	6
			Science	4
			Social Studies	4
		Reason	Not repeating	4
			Lack of sound basic education	1
			Sequentiality of the subjects	2
			Lack of source books	1
			Lack of working environment	1
			Too much information and not utilised	2
		Method	Increasing subject repetition and question solution	4
			Improvement of educational environments	9
School with the least learning loss		Lesson	Turkish	2
			Maths	3
			English	2
			Science	1
			Social Studies	2
		Reason	Failure to bond with the teacher	1
			Difficulties in focusing and perception	4
		Method	Increasing subject repetition and question solution	2
			Improvement of educational environments	5

An analysis of Table 3 indicates that the school experiencing the most severe learning loss reported this phenomenon most prominently in Mathematics (f: 6) and English (f: 6) lessons. Additionally, during the study, learning loss was also identified in Social Studies, a subject not initially included in the research focus. Consequently, interviews were conducted with two Social Studies teachers from the same school, and the findings from these interviews are presented in the tables. Furthermore, in this school, Science (f: 4) and Social Studies (f: 4) were reported as the subjects with relatively lower occurrences of learning loss compared to other branches. To support these findings, direct quotations from selected participants deemed particularly relevant are included.

> "*Learning loss is very common in English and maths. These are lessons that are placed on top of each other. If the foundation is not strong, the floors you build on it are not very strong*." P9

"*Since Turkish, mathematics, science and social studies are theoretical knowledge-based lessons, learning loss is higher in these lessons*." P7

Participants attributed this learning loss primarily to a lack of repetition (f: 4). Additionally, they identified other contributing factors, including insufficient foundational education (f: 1), a lack of reference materials (f: 1), and an inadequate study environment (f: 1). The relevant statement is provided below.

"*No repetition, no reinforcement, no working environment. The absence of a source book may also affect the loss a little bit.*" P4

It is believed that the methods to reduce learning loss will be realized primarily through the improvement of educational environments (f: 9) and, to a lesser extent, by increasing subject repetition and question solving (f: 4). Some statements regarding this are presented as follows.

"*In order to reduce the loss, educational environments can be improved by making the information concrete, combining it with an event they have experienced or with materials they use more actively in their daily lives, using maps, etc.*" P11

"*First of all, the student should have an order and have regular repetitions at home*." P5

When examining the school with the least learning loss, it is the opinion of the participants that the loss is most pronounced in mathematics (f: 3). The least learning loss is observed in science (f: 1). Some statements from the participants are provided below as examples.

"*Since it is an additive lesson, I think it is experienced more in the maths lesson."* P15

Apart from science, which is my branch, it can also be seen in maths and social studies lessons." P17

The opinions of both schools provide important insights into the difficulties encountered in mathematics education. In addition, the fact that learning loss was also observed in the social studies lesson indicates that there are difficulties in verbal areas. In the same school, it was stated that learning loss was mostly caused by difficulties in focusing and perception (f:4) and least by not being able to connect with the teacher (f:1). P15 reveals the difficulties in focusing with the statement "When we cannot include the student in the lesson or when his/her attention is distracted, even if he/she thinks he/she has learnt, he/she can forget it very quickly." P13, on the other hand, stated that "If the student could not understand the lesson, if he/she could not establish a bond with the teacher, if the student did not experience any motivation related to that lesson, losses can be seen." He stated the other reason with his statement. They think that the methods that should be applied to improve learning loss are mostly possible by improving the educational environment (f:5), and the least possible by increasing subject repetition and question solving (f:2). The related opinions are as follows.

"*Planning can be done. It would be more useful if there are restrictions on certain hours and games of students*." P18

Things to be Done to Minimise Learning Loss

The last theme of the research, "What can be done to reduce learning loss" focuses on the findings gathered from various school stakeholders regarding potential measures to reduce learning losses in students. These findings are presented in Table 4.

Table 4. Findings related to the theme 'things to be done to minimise learning loss'

School's Level of Learning Loss	Categories	Codes	*f*
School with the most intense learning loss	Strategy developed to reduce learning loss	Don't spend too much time reminding subjects	5
		Getting down to the level of the student	3
		Organising seminars	1
		Focus on increasing school achievement in specific goals	1
		Getting support from parents	1
		Supporting their socialisation	2
		Making the lesson fun	7
	What students and other relevant stakeholders can do to reduce learning loss	Raising the level of education of parents	8
		MoNE's resource, keeping the curriculum up to date	4
		The administration motivates teachers to reduce learning losses	5
		Teachers try different methods for students to understand the lesson	7
		Self-discovery of the student	4
	To be added about the subject	Early intervention in learning problems, correct orientation	2
		School, family and environment should be adapted to the student	5
School with the least learning loss	Strategy developed to reduce learning loss	Don't spend too much time reminding subjects	1
		Getting down to the level of the student	1
		Organising seminars	1
		Getting support from parents	2
		Supporting their socialisation	1
		Making the lesson fun	3
	What students and other relevant stakeholders can do to reduce learning loss	Raising the level of education of parents	6
		MoNE's resource, keeping the curriculum up to date	1
		The administration motivates teachers to minimise learning losses	3
		Teachers try different methods for students to understand the lesson	5
		Self-discovery of the student	5
	To be added about the subject	Early intervention in learning problems, correct orientation	1
		School, family and environment should be adapted to the student	2
		The habit of reading books should be acquired	2
		Communication skills should be acquired	1

When Table 4 is analysed, it is observed that in the school with the highest learning loss, efforts were primarily made to make the lesson enjoyable (f: 7) in order to reduce learning loss. One participant stated that seminars were attempted, a focus was placed on increasing school success through special targets, and support was sought from parents. The opinions of the participants on the subject are presented as follows.

> "*I generally try to make it fun such as concretisation, associating with concepts, turning it into a song, rhythmic work, drama, theatre.*" P3

"*We definitely organise seminars for students to support their personal development and to increase their school success as a special target every year*." P2

"First of all, parents should support their children in every field and be intertwined with the teacher during the education process." P9

It was the opinion of the participants that the most important action to reduce learning loss is raising the level of education among parents (f: 8). It was stated by four participants that learning loss can be reduced through MoNE's resources, the updating of the curriculum, and students' self-discovery. Direct quotations related to these views are provided below.

"*Parents should be interested in students' lessons so that they can learn with them.*" P11

"*There will be various needs in schools. Improvement of the physical conditions of schools should be supported regionally, especially at the ministry level regarding these needs.*" P8

"As he reads books, he will improve himself more, open his mind and focus more on the lesson." P1

The contributions of the participants regarding the issue of learning loss were shaped by the view that the most important factor was making the school, family, and environment suitable for the student (f: 5), while the least important was early intervention in learning problems and correct orientation (f: 2). Some excerpts of the participants' opinions on the subject are provided below.

"*Middle school minds are numbed by imitating what they see on TV and Instagram. The student focuses on short videos. Since they cannot focus on the 40-minute lesson time, a subject that is 100% explained remains around 20%. These subjects should be limited in accordance with the student and his/her environment.*" P1

"*I think that some things will improve if the causes of learning loss are learnt and intervened early."* P2

Looking at the school with the lowest learning loss in Table 4, it is seen that the participants mostly used the strategy of making the lesson fun (f:3) to reduce learning loss. One participant stated that they preferred strategies such as spending a lot of time to remind the subjects, going down to the level of the students, giving seminars and supporting their socialisation to reduce learning loss. Related participant quotations are given below.

"*I try to make the lesson more fun. I make the activity I do a game, I make it a story. I try to make them like school, the school environment and support their socialisation.*" P16

"*First of all, it is necessary to get along well with the students, establish a good dialogue and get down to the level of the student*." P13

"*We organise seminars especially as the guidance service*." P14

"*We do more repetition, we give examples from daily life*." P18

Participants thought that the most that students and other relevant stakeholders could do to reduce learning loss would be to increase the level of education of parents (f:6). At least, it was stated that MoNE could reduce learning loss by keeping the resources and curriculum up to date (f:1). The statements related to these views are given below.

"*We will be able to solve these problems by increasing the level of education of parents*." P16

"*I believe that if the exercises and subjects in the books are up-to-date, appropriate to the level of the students and in a way that can attract their interest, they will be more permanent for the students*." P18

The contributions of the participants on the subject are related to making the school, family, and environment suitable for the student (f: 2), fostering the habit of reading books (f: 2), early intervention in learning problems, providing correct orientation, and developing communication skills. The opinions of the participants are provided below as examples.

"*The physical conditions of all schools should be improved and since the neighbourhood or environment where each student is located is different, an education-teaching plan should be made accordingly*." P17

"*It is necessary to analyse the students in a very good way and examine the underlying causes of learning loss.*" P14

"*Students' inability to understand what they read and communication problem is one of the biggest problems. Solving this and gaining communication skills will be better for the student, the country and the future*." P13

"*Reading books is also essential. To exercise our mind. This will prevent learning loss*." P16

Learning Loss in Reports and Written Documents Published by the Ministry of National Education

In this part of the study, the report on formal education for the years 2022-2023 from the official statistics published by the Ministry of National Education (MoNE), documents on learning loss from OECD reports, UNESCO reports, reports prepared by UNICEF, and documents on learning loss from educational research and development reports were analysed. The findings related to the way learning loss is included in these published reports/written documents are shown in Table 5.

Table 5. The way in which learning loss is included in the reports published by MoNE

Reports/Written documents	***The way in which the learning loss takes place***
National education statistics formal education 2022-2023 OECD reports (documents on learning loss) UNESCO reports UNICEF reports Educational research and development reports (documents on learning loss)	In the MoNE's statistical report, under the heading of non-formal education, the phrase 'Teaching literacy, preparing continuing education opportunities to complete their incomplete education (MoNE, 2023b)' is used: ***Incomplete education*** In educational research and development reports, learning is referred to as 'the process of acquiring knowledge (Ministry of National Education (MoNE) (EARGED), 2011)'. The way in which this process is not realised: ***Inadequacy in teaching the prescribed information*** The definition of learning loss in EdGlossary (2013): Outcomes of Education (Düşkün and Korlu, 2021) is the loss of knowledge and skills acquired by the learner, usually when education is interrupted or interrupted: ***Loss of academic progress*** The way in which a student is 10 years old and has difficulty in reading and understanding a text at a basic level (The World Bank, UNESCO, and UNICEF, 2021; ERI, 2023): ***Learning poverty***

Upon examining Table 5, it is observed that learning loss in the reports is categorized under headings such as incomplete education, insufficiency of projected knowledge in teaching, loss of academic progress, learning poverty, and similar topics.

Discussion and Conclusion

Learning loss has been defined by both school levels examined in this study as the gradual forgetting of information over time, based on findings derived from the perspectives of various school stakeholders regarding middle school students' academic regression. A higher prevalence of learning loss was reported by the school demonstrating the most significant decline, with this phenomenon being attributed by stakeholders to the influence of students' perspectives and study styles. Conversely, technology was identified by the school exhibiting the lowest level of learning loss as the primary contributing factor. In existing literature, definitions analogous to those articulated by research participants have been employed, including "the inability to recall information not reviewed over time" (Sulak & Çapanoğlu, 2022) and "the difficulty experienced when information is not used for an extended period" (Dündar & Kızık, 2023). Furthermore, in an investigation into the effects of distance education on Turkish language instruction, it was reported by Bayram et al. (2021) that technology was perceived by participants to induce distractions among students, thereby impeding their capacity to maintain focus. These assertions align with the conclusion drawn in the present study that concentration challenges and learning losses are exacerbated by technological influences. As evidenced by the findings, it is posited that the academic performance of students in institutions with elevated learning loss is adversely affected by their perspectives and study habits. In contrast, technology is emphasized by schools with minimal learning loss as a catalyst for such decline. A consensus, however, is reflected across all stakeholders: the necessity of repetition for effective learning retention is universally acknowledged.

The study found that in the school with the highest level of learning loss, mathematics and English lessons showed the greatest losses, while social studies exhibited the least. Conversely, in the school with the lowest level of learning loss, mathematics showed the highest losses, and science the least. In a study on learning losses in science among middle school students, Hamidi, Jumadi, Nurohman, and Febrian (2023) concluded that students began to forget the learning environment and showed decreased interest in this subject, although they also found that the ease of access to information became appealing for students. Yüksel (2023), in his study on learning loss in mathematics lessons in Anatolian high schools, found that only 40% of 12th-grade students achieved the expected learning outcomes, indicating a high level of learning loss in mathematics. Several studies in the literature have also shown that learning loss is more pronounced in mathematics and reading (Betthäuser, Bach-Mortensen, & Engzell, 2023; Carlana et al., 2023; Kuhfeld et al., 2020), while other studies have highlighted significant losses in English vocabulary and grammar due to the summer break (Kayır & Özçelik, 2018). In the study conducted by Akkaş-Baysal and Ocak (2021), it was found that learning loss was most pronounced in Turkish, mathematics, science, physics, chemistry, and English lessons, while losses were minimal in subjects such as social studies, biology, history, music, and art. This finding aligns with other research results, indicating that participants experienced learning loss in mathematics and English lessons and, to a lesser extent, in social studies and science lessons. Based on the findings of the research, it is observed that learning loss in mathematics is present in both schools. This result indicates that difficulties are encountered by students in the development of metacognitive skills, including problem-solving, mathematical literacy, and arithmetic operations. In social studies and science lessons, where learning loss has been identified, challenges in memorizing previously acquired knowledge, particularly in areas such as environmental literacy, are evident. In the English lesson, where the highest level of learning loss is recorded, despite the acquisition of the necessary knowledge for written and spoken communication, students are unable to perform

effectively. Considering these findings, it is concluded that a greater focus should be placed on mathematics in both schools, while English should be prioritized in the school experiencing high learning loss, and science should be emphasized in the school with lower levels of learning loss.

The study also revealed that the school with the highest level of learning loss attributed this loss to the lack of review. In contrast, the school with the lowest level of learning loss believed that the loss was due to students' difficulties in focus and perception. Both schools agreed that improving educational environments would be an effective method to mitigate this loss. Similar to the research result, a study on learning loss has linked one of the reasons for the loss to students not repeating the information they have acquired (Kaffenberger, 2021). Dündar and Kızık (2023) included in their research that activities for students' socialization and parent-student interactions should be provided.

As a result of the research, it was agreed at both school levels that the strategy developed to mitigate learning loss was to make lessons more engaging. The only distinction observed in the strategies formulated at the two school levels was that, in the school experiencing the highest level of learning loss, an emphasis was placed on incorporating specific goals aimed at enhancing overall academic achievement. Furthermore, the findings of the research indicated a shared perspective at both school levels that increasing the educational attainment of parents and other relevant stakeholders is essential for reducing students' learning loss. Raharjo and Nurhayati (2024) found in their research that in order to reduce learning loss, strategies such as utilising different strategies, resources such as social media and learning, making improvements in education, ensuring the active participation of students through question-answer method, and determining the role of parents in education should be emphasised. In another study, it was mentioned that cooperation in education is necessary, especially the effectiveness of school stakeholders and parents in the learning phase is important in reducing learning loss (Rediani & Kaize, 2023). These results show that there is a similarity between the strategies developed by the participants in the study on learning loss and what other stakeholders should do.

In addition, opinions such as early intervention in learning difficulties, appropriate guidance, and the adaptation of the school, family, and environment to the student's level were included at both school levels. Furthermore, in the school experiencing the least learning loss, the importance of fostering students' reading habits and communication skills as a means of mitigating learning loss was emphasized. In the research conducted by Kaffenberger (2021), it was stated that curricula should be designed to align with students' learning levels. Additionally, it was highlighted that improvements would be more effective if planned in advance, followed by a structured transition to the curriculum phase. This finding aligns with the results of the study, which emphasize early intervention in preventing learning loss and ensuring that the student's environment is appropriately structured. In the research conducted by Akbaş-Baysal and Ocak (2021) on addressing learning loss resulting from the pandemic, various suggestions were made by teachers, among which the inclusion of more reading activities was emphasized. In this context, it can be said that the teachers and the participants of this study agree on gaining the habit of reading books to reduce learning loss. In addition, Ergin and Birol (2005), who emphasised the relationship between learning and communication, stated that the realisation of learning would be possible with the acquisition of communication skills. In relation to the research, it can be said that the participants attribute the reduction of learning loss to the healthy realisation of the communication process during learning. As a result, it has been observed that similar results in the literature for learning loss related to this study are intense and different results are less.

From the research, it can be inferred that the learning loss observed in mathematics and English lessons in schools with high levels of learning loss is attributable to students' perception of these subjects as difficult to understand and their lack of effective study strategies. Additionally, in the same schools, the learning loss identified in social studies is attributed to the subject's requirement for frequent repetition. In contrast, the relatively lower learning loss in science lessons in schools with less overall learning loss is associated with the availability of more favourable opportunities for practical application. This finding aligns with the impact of technology on mitigating learning loss in schools. Based on these results, it is recommended that educational guidance services be provided in schools with significant learning loss to support students in developing effective study habits. Furthermore, in schools where learning loss is lower, implementing strategies to minimize distractions is anticipated to be beneficial.

Suggestions

Based on these findings, several suggestions were presented to researchers:

- To mitigate learning loss, a curriculum may be designed in accordance with improvement methods identified by participants, such as gamification of activities, the inclusion of case studies, rhythmic exercises, drama, and conceptual associations.
- Textbooks incorporating game-based content, appropriate for students' age groups and designed to prevent disengagement, can be developed for different subject areas.
- Curricula may be diversified to address the specific needs of different regions.
- A collaborative process planning may be conducted by experts in the field of education and psychological counsellors to enable the early analysis of learning losses.
- It may be ensured that basic education is completed without learning loss, and to achieve this, in-service training can be provided to both teachers and parents to facilitate full learning.

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Conflicts of Interest

The first author is responsible for the conduct of the study. Both authors contributed equally to the planning of the study, discussion and interpretation of the findings, and reporting of the study. There is no conflict of interest.

Ethics

This study was conducted with the approval of the Ethics Committee, in accordance with the decision dated December 1, 2023, and numbered 2023/10-XXII, as issued by the Aydın Adnan Menderes University Educational Research Ethics Committee.

References

Akkaş-Baysal, E., & Ocak, G. (2021). Opinions of the teachers on the compensation of learning loss caused by covid-19 outbreak. *Kastamonu Eğitim Dergisi*, *29*(4), 173-184. https://doi.org/10.24106/kefdergi.811834

Alkan, N., & Özdemir, S. M. (2023). Uzaktan eğitim sürecinde ilkokul öğrencilerinin matematik dersi öğrenme kayıplarına ilişkin öğretmen görüşleri. *Eğitim Ve Toplum Araştırmaları Dergisi, 10*(2), 196-223. https://doi.org/10.51725/etad.1397515

Altunışık, R., Coşkun, R., Bayraktaroğlu, S., & Yıldırım, E. (2010). *Sosyal bilimlerde araştırma yöntemleri SPSS uygulamalı* (6. baskı). Sakarya.

Arı, A. (2004). Yaz tatili öğrenme kaybı. *Gazi Üniversitesi Gazi Eğitim Fakültesi Dergisi*, *24*(2), 243-258.

Arı, A. (2005). *İlköğretim okulu öğrencilerinin yaz tatilindeki öğrenme kayıpları* [Yayınlanmamış doktora tezi]. Gazi Üniversitesi.

Arıkan, B., & Kaya, E., (2023). Uzaktan eğitim sürecinde sosyal bilgiler öğretmenlerinin EBA canlı ders uygulamasına ilişkin görüşleri. *Uluslararası Sosyal Bilgilerde Yeni Yaklaşımlar Dergisi*, *7*(1), 97-122. https://doi.org/10.38015/sbyy.1270150

Arslan, E. (2022). Nitel araştırmalarda geçerlik ve güvenilirlik. *Pamukkale Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, (51), 395-407. https://doi.org/10.30794/pausbed.1116878

Atalay, A. (2023). Afet sonrası iç göç ve eğitimde zincirleme reaksiyonlar. *Dokuz Eylül Üniversitesi Buca Eğitim Fakültesi Dergisi*, (57), 1716-1734. https://doi.org/10.53444/deubefd.1282994

Balcı, A. (2020). Covid-19 özelinde salgınların eğitime etkileri. *Uluslararası Liderlik Çalışmaları Dergisi: Kuram ve Uygulama*, *3*(3), 75-85.

Bayram, E., Bıyık, Z., & Gölbaşı, M. (2021). Covid-19 pandemi sürecinde ortaokul öğrencilerinin uzaktan eğitimle gerçekleştirilen Türkçe dersine yönelik algıları. *Uluslararası Karamanoğlu Mehmetbey Eğitim Araştırmaları Dergisi*, *3*(Özel sayı 1), 28-41. https://doi.org/10.47770/ukmead.966343

Baz, B. (2021). COVID-19 salgını sürecinde öğrencilerin olası öğrenme kayıpları üzerine bir değerlendirme. *Temel Eğitim*, *3*(1), 25-35. https://doi.org/10.52105/temelegitim.3.1.3

Bettha¨user, B. A., Bach-Mortensen, A. M., & Engzell, P. A. (2023). Systematic review and meta-analysis of the evidence on learning during the covid-19 pandemic. *Nature Human Behaviour*, *7*(3), 375-385. https://doi.org/10.1038/s41562-022-01506-4

Blazer, C. (2011, May). *Summer learning loss: Why its effect is strongest among low-income students and how it can be combated: Information capsule*. Miami-Dade County Public Schools, Research Services. https://eric.ed.gov/?id=ED536514

Can, E. (2021). Covid 19 salgının Türkçe eğitiminde neden olduğu öğrenme kayıplarına ilişkin öğretmen görüşleri. *International Journal of Languages' Education and Teaching*, *9*(2), 62-76. https://doi.org/10.29228/ijlet.49737

Carlana, M., Eliana L. F., & Lopez, C. (2023). Exacerbated inequalities: The learning loss from covid-19 in Italy. *AEA Papers and Proceedings*, *113*, 489-493. https://doi.org/10.1257/pandp.20231010

Çelik, Z. (2020, Ağustos). *Covid-19 salgınının gölgesinde eğitim: Riskler ve öneriler.* (Odak Analiz No. 5). Eğitim-Bir-Sen Stratejik Araştırmalar Merkezi, https://doi.org/10.13140/RG.2.2.34400.30723

Ceran- Aydın, S., & Ergül, E. (2022). Covid-19 pandemi sürecinde ilkokul fen bilimleri dersi kapsamında öğrenme kayıplarının tespiti ve telafi yöntemleri. *Educational Academic Research*, (45), 35-50. https://doi.org/10.54614/AUJKKEF.2022.1006145

Cooper, H. M. (2003). *Summer learning loss: The problem and some solutions. ERIC Digest.* ERIC Clearinghouse on Elementary and Early Childhood Education Champaign IL. https://files.eric.ed.gov/fulltext/ED475391.pdf

Di Pietro, G., Biagi, F., Costa, P., Karpiński, Z., & Mazza, J. (2020, June 24). *The likely impact of Covıd-19 on education: Reflections based on the existing literature and recent international datasets*. Publications Office of the European Union. https://doi.org/10.2760/126686

Doğuş, Y. (2022). Türk eğitim sisteminde ilk ara tatil: Okul paydaşlarına göre güçlü ve zayıf yanlar. *Trakya Eğitim Dergisi*, *12*(3), 1718-1736. https://doi.org/10.24315/tred.1081943

Dorn, E., Hancocok, B., Sarakatsannis, J., & Viruleg, E. (2020, June). *COVID-19 and student learning in the United States: The hurt could last a lifetime*. McKinsey & Company. https://www.mckinsey.com/industries/public-and-social-sector/our-insights/covid-19-and-student-learning-in-the-united-states-the-hurt-could-last-a-lifetime

Dündar, R., & Kızık, M. M. (2023). Ortaokul öğretmenlerinin pandemi sonrasında öğrencilerde meydana gelen öğrenme ve davranış kayıpları ile ilgili görüşleri. *Yaşadıkça Eğitim Dergisi, 37*(3), 670-682. https://doi.org/10.33308/26674874.2023373445

Düşkün, Y., & Korlu, Ö. (2021, March 9*). Eğitim izleme raporu 2020: Eğitimin çıktıları*. Eğitim Reformu Girişimi. https://www.egitimreformugirisimi.org/egitim-izleme-raporu-2020-egitimin-ciktilari/

EdGlossary (2013). *Learning loss*. EdGlossary (The Glossary of Education Reform). https://www.edglossary.org/learning-loss/

Education Reform Initiative [ERI] (2022). *Öğrenme kaybı*. Education Reform Initiative [ERI]. https://www.ogretmenagi.org/duyurular/arka-plan-ogrenme-kaybi

Education Reform Initiative [ERI] (2023). *Krizler çağında eğitim*. Education Reform Initiative [ERI]. https://egitimreformugirisimi.org

Ergin, A., & Birol, C. (2005). *Eğitimde iletişim* (3. baskı). Anı.

Filiz, S., & Gökmen, F. (2022). Pandemi sürecinde ortaokul öğretmenlerinin online eğitimden yüz yüze eğitime geçişlerde yaşananlara ilişkin görüşleri. *Eğitim ve Toplum Araştırmaları Dergisi, 9*(2), 297-326. https://doi.org/10.51725/etad.1134572

Global Education Monitoring Report (GEM). (2017/18). *Accountability in education: Meeting our commitments.* Global Education Monitoring Report (GEM). https://unesdoc.unesco.org/ark:/48223/pf0000259338

Gökalp, N. (2005). Öğrenme ve etkin öğrenme. *Journal of Istanbul Kültür University*, *3*(1), 1-8.

Güneş, F. (2023). *Uzaktan eğitim döneminde Suriyeli sığınmacı çocuklar (Şanlıurfa)* [Yayınlanmamış yüksek lisans tezi]. Harran Üniversitesi.

Hamidi, A., Jumadi, J., Nurohman, S., & Febrian, A. (2023). Teacher and parent perceptions of student's learning loss in post-pandemic science learning. *Jurnal Penelitian Pendidikan IPA*, *9*(8), 6439-6444. https://doi.org/10.29303/jppipa.v9i8.3603

Kaffenberger, M. (2021). Modelling the long-run learning impact of the covid-19 learning shock: Actions to (more than) mitigate loss. *International Journal of Educational Development*, *81*(2021) 102326, 1-8. https://doi.org/10.1016/j.ijedudev.2020.102326

Karataş, Z. (2015). Sosyal bilimlerde nitel araştırma yöntemleri. *Manevi Temelli Sosyal Hizmet Araştırmaları Dergisi*, *1*(1), 62-80.

Kayır, G., & Özçelik, F. U. (2018). İngilizce dersindeki yaz tatili öğrenme kayıplarına ilişkin öğretmen görüşleri. *Turkish Journal of Primary Education*, *3*(1), 33-45.

Kuhfeld, M., Tarasawa, B., Johnson,A., Ruzek, E., & Lewis, K. (2020, November). *Learning during covid-19: Initial findings on students' reading and math achievement and growth*. NWEA. https://www.nwea.org/research/publication/learning-during-covid-19-initial-findings-on-students-reading-and-math-achievement-and-growth/

Lincoln, Y. S., & Guba, E. G. (1982). Epistemological and methodological bases of naturalistic inquiry. *Educational Communication and Technology Journal*, *30*(4), 233-252. https://doi.org/10.1007/BF02765185

Ministry of National Education (MoNE) (EARGED). (2011). MoNE 21st Century Student Profile. *MoNE.* https://www.meb.gov.tr/earged/earged/21.%20yy_og_pro.pdf

Ministry of National Education (MoNE). (2020). Ministry of National Education Guidance and Psychological Counselling Services Regulation. https://orgm.meb.gov.tr/meb_iys_dosyalar/2020_08/14231603_Rehberlik_ve_Psikolojik_DanYYma_Hizmetleri_YonetmeliYi_2.pdf

Ministry of National Education (MoNE). (2023a). Ministry of National Education Regulation Amending the Regulation on Preschool Education and Primary Education Institutions. https://www.mevzuat.gov.tr/mevzuat?MevzuatNo:19942&MevzuatTur:7&MevzuatTertip:5

Ministry of National Education (MoNE). (2023b). National Education Statistics Formal Education 2022/2023. *MoNE*. https://sgb.meb.gov.tr/www/icerik_goruntule.php?KNO:508

Özenç-Yeşilbaş, Y. (2022). Eğitim araştırmalarında durum çalışması deseni nasıl kullanılır?. *Uluslararası Eğitimde Nitel Araştırmalarda Mükemmellik Arayışı Dergisi (UEMAD)*, *1*(2), 57-67.

Özgürden, S., & Okur, M. R. (2022). Pandemi dönemi acil uzaktan eğitim uygulamalarında K12 düzeyinde öğrenme kayıplarının incelenmesi. *Açıköğretim Uygulamaları ve Araştırmaları Dergisi*, *8*(2), 36-54. https://doi.org/10.51948/auad.1092674

Raharjo., & Nurhayati, A. (2024). Pandemic learning loss recovery strategy in the new normal period. *European Journal of Education and Pedagogy*, *5*(1), 15-22. https://doi.org/10.24018/ejedu.2024.5.1.731

Rediani, N. N., & Kaize, B. R. (2023). Learning loss. Why is collaboration between educators and parents important?. *Indonesian Journal of Educational Development (IJELD)*, *4*(3), 284-294. https://doi.org/10.59672/ijed.v4i3.3202

Saygılı, S. (2023). *Uzaktan eğitim sürecinde ortaöğretim İngilizce dersine yönelik öğretmen ve öğrenci görüşleri* [Yayınlanmamış yüksek lisans tezi]. Mersin Üniversitesi.

Senemoğlu, N. (2010). *Gelişim, öğrenme ve öğretim: Kuramdan uygulamaya* (16. baskı). Pegem Akademi.

Selvi, K. (2020). Felsefe ve eğitim arasındaki ilişki: Bilgi ve öğrenme. G. Ekici ve M. Güven (Eds.), *Yeni öğrenme-öğretme yaklaşımları uygulama örnekleri* (s.1-34). Pegem Akademi.

Sezgin, F., Erdoğan, O., & Dağ, S. (2020). Ortaöğretim öğrencilerinin yaz tatili öğrenme kayıpları: Aile eğitim düzeyine ilişkin bir analiz. *Milli Eğitim Dergisi*, 49(226), 35-52. https://dergipark.org.tr/tr/pub/milliegitim/issue/54184/732689

Sulak, S. E., & Çapanoğlu, A. Ş. (2022). Sınıf öğretmenlerinin görüşleri doğrultusunda uzaktan eğitim sürecinde yaşanan öğrenme kayıplarının incelenmesi. *Gümüşhane Üniversitesi Sosyal Bilimler Dergisi*, *13*(2), 588-603. https://doi.org/10.36362/gumus.1036653

The World Bank, UNESCO, & UNICEF (2021, December 6). *The state of the global education crisis: A path to recovery*. Washington D.C., Paris, New York: The World Bank, UNESCO, and UNICEF. https://documents1.worldbank.org/curated/en/416991638768297704/pdf/The-State-of-the-Global-Education-Crisis-A-Path-to-Recovery.pdf

Ulutaş, Z., & Kuzucu- Aydoğdu, S. (2022). Zorunlu göçten eğitim yoksunluğuna. D. Ustabaşı-Gündüz (Ed.), *Göçmen Refahı Disiplinler Arası Bakış (*1. baskı, s. 31-54). Eğitim Yayınevi.

Yağar, F., & Dökme, S. (2018). Niteliksel araştırmaların planlanması: Araştırma soruları, örneklem seçimi, geçerlik ve güvenirlik. *Gazi Sağlık Bilimleri Dergisi*, 3(3), 1-9.

Yavuz, Y., & Çetin, E. (2022). Öğretmen ve okul yöneticilerinin gözünden covid-19: Kriz yönetimi. *Batı Anadolu Eğitim Bilimleri Dergisi*, 13(1), 354-377. https://doi.org/10.51460/baebd.1035514

Yeşilyurt, E. (2021). Öğrenme stratejileri. *OPUS Uluslararası Toplum Araştırmaları Dergisi*, 18 (Eğitim Bilimler Özel Sayısı), 5116-5139. https://doi.org/10.26466/opus.901943.

Yıldırım, A., & Şimşek, H. (2008). *Sosyal bilimlerde nitel araştırma yöntemleri* (6. baskı). Seçkin.

Yıldırım, A., & Şimşek, H. (2016). *Sosyal bilimlerde nitel araştırma yöntemleri* (11. baskı). Seçkin.

Yıldırım, A., & Şimşek, H. (2021). *Sosyal bilimlerde nitel araştırma yöntemleri* (12. baskı). Seçkin.

Yüksel, N. (2023). *Matematik dersi öğrenme kayıpları ve nedenleri* [Yayınlanmamış yüksek lisans tezi]. Aydın Adnan Menderes Üniversitesi.

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Comparison of Classification Accuracy and Consistency Indices Under the Item Response Theory*

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ABSTRACT

In educational settings, individual diagnostic and placement decisions are made based on several measures, and classification accuracy indicates how accurate these decisions are. In this study, the effectiveness of Lee's, Guo's, and Rudner's methods in assessing classification accuracy and consistency were examined under Dichomotous IRT models in terms of different sample sizes and test lengths. The data were generated using the 'irtoys' package in R Studio. Classification accuracy and consistency indices and bias values related to these indices were calculated using the 'cacIRT' package. As the number of items increased, the classification accuracy and consistency indices showed a remarkable difference; for Kappa values calculated using Lee's method and FP and FN rates calculated using Guo's method, higher bias values were observed. Rudner indices were observed to have lower “absolute values of the bias” than other methods. In terms of classification decisions, it is considered that Rudner's method would work better when applied to large sample sizes.

Keywords: Classification accuracy, classification consistency, Item Response Theory

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Introduction

The ultimate goal of many educational tests is to place individuals into appropriate categories based on their test performance and predetermined criteria. Based on test scores, diagnostic and placement decisions are made about individuals, and they are chosen and placed in several educational institutions. Since these decisions directly affect the lives of individuals, examining the accuracy and appropriateness of these decisions is of great importance for individuals and society (Cizek & Bunch, 2007). The two indices that can be used in assessing such classification and placement decisions in educational settings are classification accuracy (CA) and classification consistency (CC). Classification consistency refers to the degree to which individuals are consistently classified in the same category based on repeated or parallel measures. Classification accuracy provides information on the accuracy of classification decisions. Classification accuracy measures how well individuals' classifications based on observed test scores agree with their "true classifications," assuming the individuals' "true classifications" are known (Lee et al., 2000). Based on Item Response Theory (IRT) and Classical Test Theory (CTT), various methods and techniques have been developed to examine classification consistency and classification accuracy. For some CTT-based or IRT-based methods, researchers need to administer the same test or a parallel form of the test. In practice, only one form of the test is usually used. In examining classification accuracy, the "true" scores of individuals are not known, and they should be estimated. For these reasons, methods for examining classification consistency and accuracy based on a single administration were developed. The methods developed based on the CTT are based on the observed test scores and assume that the cut-scores are on the raw score scale (Cohen, 1960; Hanson & Brennon, 1990; Huynh, 1976; Lee et al., 2009; Livingston & Lewis, 1995; Subkoviak, 1976). Although the methods developed under the IRT framework are based on IRT models, the distributional assumptions underlying these methods are different. While in some methods, the classification decisions are based on a raw score scale, in others, these decisions are based on a latent trait scale. The advantage of IRT-based methods is that they provide flexibility to researchers (Guo, 2006; Lee, 2010; Rudner, 2001). The most commonly used IRT-based methods based on single administration are Rudner's method, Lee's method, and Guo's method (Lathrop & Cheng, 2013; Lee, 2010).

Rudner's method

Rudner's (2001) method assumes that the cut scores and the individuals' test scores are both mapped on the continuous theta scale (θ). Another assumption is that theta scores estimated based on individuals' item responses are directly compared to theta cut scores placed on the continuous theta scale. If there are K categories of classification, K-1 theta cut scores ($\lambda 1 < \lambda 2 < ... < \lambda K-1$) are set on the theta scale. To estimate Rudner-based indices, as lower and upper limits, two additional theta scores ($\lambda 0 = -\infty$ and $\lambda K = \infty$) are included. If the individual's estimated theta (θ_i) is higher than or equal to $\lambda k-1$ and smaller than λk, this individual is classified into category k. The probability for classifying into category k is given as:

$$\Pr(K = k|\theta_i) = \Phi\left(\frac{\lambda_k - \theta_i}{se(\theta_i)}\right) - \Phi\left(\frac{\lambda_{k-1} - \theta_i}{se(\theta_i)}\right) \quad (1)$$

ϕ is the "cumulative normal distribution function" with mean θ_i, and the standard error of the estimate is se(θ_i).

The "true" classification of the individuals is unknown. The classifications based on observed test scores could be treated as the best estimation of the "true" classification. The probability of an individual being classified into their "true" category is called conditional classification accuracy ($\gamma\theta_i$). This equals the area between the two theta cut-scores under the normal distribution curve. The area under the normal distribution curve in the relevant regions can be calculated, and conditional false positive and false negative rates can be obtained (Rudner, 2005). The original Rudner method was developed just to calculate classification accuracy indices. As an extension of this method, a method for calculating classification consistency indices was suggested (Wyse & Hao, 2012). Assume that a parallel test form is administered to individuals, in which the same cut-scores are employed as the administered form of the test, and the items comprising the test have the same IRT item parameters. Using Equation 1, the probabilities of the same individual with the same latent trait score (θ_i) being classified into each category can be computed. Conditional classification consistency ($p\theta_i$) is calculated by using the following equation under the assumption that test forms are independent:

$$p_{\theta_i} = \sum_{k=1}^{K}[\Pr(K = k|\theta_i)]^2 \quad (2)$$

K represents the number of classification categories. The probability of an individual with ability θ_i being classified into category k based on the administered test form ($(\Pr(K = k|\theta_i))$ is computed. This probability is calculated for each k category, and the conditional classification consistency is obtained by summing these probabilities (Rudner, 2001; 2005).

Guo's method

Guo's (2006) method was developed by extending Rudner's method. The indices are calculated using the likelihood functions of individuals' ability estimates, so Guo's method does not require the normality assumption. It is based on the assumption that observed test scores and cut-scores are both mapped on the continuous theta scale. The lowest and the highest theta cut scores are replaced with some relatively large values, as demonstrated in Guo's (2006) original study. Conversely, in Rudner's method, positive and negative infinities are considered the borders of cut scores. In Guo's method, a set of theta points (e.g., 100 points) is created with equal intervals between the cut-scores. The expected probability of an individual with any θ being classified in category K could be computed as:

$$p_{ic}=\frac{\sum_{\theta=\kappa_{ci}}^{\kappa_{ci+1}} L(u_{1i}, u_{2i}, \ldots, u_{ji}|\theta)}{\sum_{h=1}^{C+1} \sum_{\theta=\kappa_h}^{\kappa_{h+1}} L(u_{1i}, u_{2i}, \ldots, u_{ji}|\theta)} \quad (3)$$

To compute this probability, the sum of the likelihood functions from category C to the succeeding category (C+1) for a set of theta points (e.g., 100 points) created with equal intervals between the cut-scores should be calculated. Then, the sum of all cross-category likelihood functions is computed (Guo, 2006). Guo (2006) only developed a method for calculating classification accuracy. The extension of this method for calculating classification consistency was proposed by Wyse and Hao (2012). The rationale behind this method is like the rationale of the extension of Rudner's method. Assume that a parallel test form is administered, consisting of the same items as those in the administered form of the test and employing cut-scores the same as the ones employed in the administered test form. In this case, the probability of being classified in each category in both forms of the test would be the same for an individual who gives the same responses to items in both test forms. The conditional classification consistency (pi) could be computed by assuming that two test forms are independent:

$$p_i = \sum_{k=1}^{K}\left[Pr(K = k|u_{i1}, u_{i2}, \ldots, u_{iJ})\right]^2 \quad (4)$$

The conditional classification consistency is the sum of "the normalized probability of being classified into category k" $Pr\ (K = k|ui1, ui2, ..., uiJ)$ across categories (Guo, 2006; Wyse & Hao, 2012).

Lee's method

In Lee's method, the cut-scores are taken in the raw-score metric and compared with the raw scores of individuals. Consider that respondents are classified into k categories based on their scores on a test of dichotomous items. The probability of obtaining each raw score depending on the individual's θi and item parameters is computed. The raw score (x) is a function of the response pattern to test items. There would be many item response patterns giving x raw score, and the probabilities of all these patterns should be summed. While "true" ability is estimated in theta scale, the classification decisions are based on the raw score scale. For "true" classification, θ_i is transformed into the expected or "true" raw score($\tau\theta_i$) with a test characteristic curve. $\tau\theta_i$, as measured on a raw score scale and compared to raw cut-scores for true classification, can be considered the best estimate of the examinee's true 'ability.' Once transformed, cut-scores are rounded to the nearest possible raw score. The following equation can be used to compute the probability of being classified into the "true" category k:

$$\Pr(K = k|\widehat{\theta_\iota}) = \sum_{x=c_{k-1}}^{c_{k-1}} \Pr(X = x|\widehat{\theta_\iota}) \quad (5)$$

The term $\Pr(K = k|\theta\text{ı})$ is computed using Equation 5. The above-mentioned conditional indices give information for a particular individual or a theta level. However, they are generally not preferred for examining overall classification consistency and classification accuracy for decisions made for a group (Chau, 2018; Lee, 2010).

Comparison of Rudner's method, Guo's method, and Lee's method

There are some similarities and differences between these three methods. In Rudner's method, there is an assumption that ability estimates are normally distributed. However, in Guo's method, no single distribution assumption is accepted, and expected probabilities are used in calculating the indices. In Lee's method, cut-scores are used on the raw score scale, and for the decisions regarding classification, the raw scores of individuals are compared with the raw cut-scores. In Rudner's and Guo's methods, the observed test scores and cut-scores are assumed to be mapped onto theta scale. In Lee's method, the "true ability" of the individual is estimated in theta scale, whereas classifications are made in the raw score scale. The assumptions underlying these methods can lead to different classification accuracy and consistency estimates (Guo, 2006; Lee, 2010; Rudner, 2001). In studies examining classification accuracy and consistency indices using IRT-based methods, it has been observed that model misspecification (Chau, 2018; Lathrop & Cheng, 2013), sample size (Chau, 2018; Martineau, 2007; Sen & Cohen, 2020), test length (Chau, 2018; Wyse & Hao, 2012), choice of model (Lathrop & Cheng, 2013; Lee et al., 2002), cut scores (Chau, 2018), ability distribution, and ability estimator (Wyse & Hao, 2012) affect these indices. Wyse and Hao (2012) proposed two new classification consistency indices based on IRT. They compared Rudner-based indices and Guo's indices with "IRT-Recursive-Based Indices." The researchers noted that Guo's method generally resulted in the highest overall classification accuracy and classification consistency rates, followed by Rudner's and then Lee's methods. Only a few studies have been found in which the methods of Rudner, Guo, and Lee have been comparatively examined (Chau, 2018; Lathrop& Cheng, 2013; Wyse & Hao, 2012). In one study

(Chau, 2018), these three methods were considered together. However, the researcher only examined the effectiveness of these three methods in assessing CA and CC by generating data in a simulation condition in which the 60-item test was applied to a sample of 5000 individuals, and the cut-off score was fixed at 1. In real test applications, tests with fewer items are widely used. In addition, Chau (2018) considered a large sample size in his study. In educational settings, tests such as the English Proficiency test, which are used to determine the proficiency levels of individuals, are frequently administered to smaller samples/groups. In these applications, decisions are made about individuals based on different cut-off scores corresponding to different proficiency levels. This indicates a need to investigate which of these three methods leads to more accurate results in assessing classification accuracy and classification consistency under which conditions for different cut-off scores in relatively smaller samples. In their article, Diao and Sireci (2018) explained Rudner's, Lee's, and Guo's methods and the package programmes used to calculate CA and CC indices using these methods. However, researchers have not examined the effectiveness of these methods in assessing classification accuracy and classification consistency based on real data or simulation data. In Lathrop and Cheng's (2013) study, the effectiveness of Lee's and Rudner's methods in just assessing classification accuracy under different sample sizes, test lengths, and cut score conditions was examined, but Guo's method was not taken into consideration. However, according to the authors' review of the literature, there is no comprehensive study examining the effectiveness of Rudner's, Lee's, and Guo's methods for different cut-off scores when tests with fewer items are administered to smaller samples (both for correct IRT model specification and model misspecification) to assess classification accuracy and classification consistency. Therefore, in the current study, as an extension of the previous research, it was aimed to examine the effectiveness of Rudner's, Lee's, and Guo's methods in assessing classification accuracy and classification consistency when short and medium-length tests were administered to small and medium-sized samples for different cut scores. In this context, it is considered that the findings of this study will guide educational practitioners and researchers about which of these methods would be more appropriate to use in examining classification accuracy and classification consistency in real testing settings under these conditions. Accordingly, the effectiveness of these methods was comparatively examined under the 1-Parameter logistic model (1PLM), 2-Parameter logistic model (2PLM), and 3-Parameter logistic model (3PLM) in terms of different sample sizes and test lengths. Also, the effect of the cut-score was examined by calculating the classification accuracy and consistency indices based on three different cut-scores (-0.75, 0, 0.75). Additionally, the accuracy of classification accuracy and consistency indices were examined by calculating absolute values of the bias (related to these indices) in the study (Wang & Wang, 2001).

Method

Simulation study

Since this study aims to compare the classification accuracy and consistency indices under different conditions, simulation data sets were generated and analyzed. For this reason, this is a simulation study. The dichotomous data was simulated in the R software environment under 1PLM, 2PLM, and 3PLM, based on two different test lengths (15 items and 30 items) and two different sample sizes (500 and 1000). Reviewing the literature (Lathrop & Cheng, 2014; Lee, 2010; Wyse & Hao, 2012), it is seen that large samples ($n \geq 1000$) are used to examine classification accuracy and consistency. However, no study examined how effective Guo's, Lee', and Rudner's methods were in assessing classification accuracy and consistency with small samples. Therefore, in this study, to examine how these methods work in smaller samples, the effectiveness of these methods was examined under the conditions of a sample size of 500 and a sample size of 1000. In the previous studies, 15-item tests are considered short tests, and 30-item tests are considered long tests (Chen et al., 2013; Minchen & de la Torre, 2018; Terzi & de la Torre, 2018). Accordingly, 15 items and 30 items were chosen for this study. This study simulated data sets separately for the 12 simulation conditions using the "irtoys" package (Partchev, 2017) in the R Studio program. The simulation conditions are presented in Table 1. For data simulation, a total of 500 and 1000 values from the normal distribution (N(0,1)), in the range of (-4, +4) for the ability parameters were randomly drawn in the R software. These values are considered as “true” theta values.

Table 1. Simulation conditions.

Simulation condition	Data generating IRT model	Sample size	Number of items
1	1PLM	500	15
2	1PLM	500	30
3	1PLM	1000	15
4	1PLM	1000	30
5	2PLM	500	15
6	2PLM	500	30
7	2PLM	1000	15
8	2PLM	1000	30
9	3PLM	500	15
10	3PLM	500	30
11	3PLM	1000	15
12	3PLM	1000	30

The following procedure was followed in determining the item parameters to generate data for each simulation condition: (1) Values for the a-parameter were drawn from a uniform distribution as U[0.5, 2.0] to represent medium and high discrimination levels (Kingsbury &Weiss, 1980); (2) the values for the b-parameter were drawn from the normal distribution as N(-0.5, 1.5) to be close to the values in the actual administration and (3) the values the c-parameter were drawn from the normal distribution as N(0.20, 0.05), again considering an actual administration (Thompson, 2009). These values are considered as “true” item parameters. Data sets were generated under 1PLM using 15 random values drawn for the b-parameter for the first and third simulation conditions. Data sets were generated under 2PLM using random values drawn for the b-parameter and a-parameter for the fifth and seventh simulation conditions. Data sets were generated under 3PLM using random values drawn for the b-parameter, a-parameter, and c-parameter for the ninth and eleventh simulation conditions. For even-numbered simulation

conditions, data sets were generated using 30 random values drawn for the a-parameter, b-parameter, and c-parameter data sets under the related IRT models.

Validity and reliability evidence

Exploratory Factor Analysis (EFA) was applied to each generated data set by using the "psych" package in the R Studio program (Revelle, 2015). For each data set, single-factor solutions were obtained (eigenvalues between 3.00 and 9.63). Factor loadings were observed to be higher than 0.25(factor loadings between λ=.25 and λ=.78). These findings were considered evidence for construct validity. Marginal reliability coefficients calculated for each generated data set (varied between .647-.842) had an acceptable level of reliability (Md Desa, 2012).

Data analysis

It was first examined whether the IRT assumptions were met for the simulated data sets. Results of a series of EFAs also indicated that the unidimensionality assumption was met for each generated data set. For the local independence assumption, the Q3 statistic (Yen, 1984) for all item pairs under 1PLM, 2PLM, and 3PLM was calculated using the "sirt" package (Robitzsch, 2020) in the R Studio environment. This assumption was met for each item pair. For the overall model fit for each model, model fit statistics were calculated using the "mirt" package (Chalmers, 2020) in the R studio environment. Each data set was tested under the IRT model on which it was generated. To examine the sensitivity of classification consistency and accuracy indices to model misspecification, each data set was also tested under two other IRT models different from the IRT model on which data generation was based. The calculated model fit statistics and error values (Comparative Fit Index: CFI, Tucker Lewis Index: TLI, Root Mean Square Error of Approximation: RMSEA, Standardized Root Mean Square Residual: SRMR) were presented in the supplementary file (Supplementary File, S-1). The model better fit the data when the data sets were tested under IRT models on which data generation was based.

The classification accuracy indices, consistency indices, and absolute values of the bias were estimated using the package 'cacIRT (Lathrop, 2020). False Negative (FN) and rates False Positive (FP), Classification Accuracy (CA), Classification Consistency (CC), and Kappa (κ) values were calculated based on each method. These values were calculated for each simulation condition, under each IRT Model, and for three different cut-scores (-0.75, 0.00,0.75). Absolute values of the bias were calculated to assess the accuracy of the classification consistency and classification accuracy indices. All these values were calculated and compared for both correct model specification and model misspecification. In Rudner and Guo's methods, the "true" theta values used in data generation are compared with cut-scores ("true" classification). Based on the data sets generated, a classification is made by comparing the "theta" values estimated (with Maximum Likelihood estimation) under the relevant IRT model with the cut scores. CA is obtained as the proportion of agreement between these two classifications. FP was the rate of simulees being incorrectly classified in a category above the "true" classification. FN, the rate of incorrectly being classified in a lower category, was also calculated based on these two classifications. In Lee's method, "true" thetas and cut scores are transformed into raw score scales and then compared (true classification). Based on the generated data, observed raw scores are obtained by summing up the item scores for each simulee. Another classification is made by comparing these scores with raw cut-scores. Then, CA, FP, and FN rates are calculated based on these two classifications. To calculate the CC values, which indicate the degree to which individuals are classified in the same category in repeated or parallel measurements, a second data set is generated using the same "true" thetas and "true" item parameters (as a parallel form of the first test). In Rudner and Lee's method,

a classification is made by comparing thetas estimated based on the second data set and theta cut-scores. In Lee's method, classification is made by transforming thetas estimated based on the second data set into a raw score scale and comparing them with the raw cut-scores. Regardless of the method used, CC values were calculated as the proportion of agreement between classifications based on the data sets generated. Cohen's Kappa coefficient refers to the proportion of consistent classifications above and beyond what would be expected by chance. Assuming two simulation data sets as measures obtained from independent test forms, Cohen's kappa coefficient was calculated by using the following equation and the marginal rates of the simulees classified based on these measures:

$$p_c = \sum_{k=1}^{K} (p_{.k})(p_{k.}) \quad (6)$$

Here pc is the degree of consistency obtained by chance between the two test forms; $p \cdot k$ and pk, are the marginal proportions of individuals classified in the category k in both test forms (Cohen, 1960; Chau, 2018; Lathrop & Cheng, 2013).

Results

Initially, each data set was tested under the IRT model on which it was generated. The overall CA and CC rates, Kappa values, and FP and FN rates were calculated to examine the classification consistency and accuracy based on Guo's, Rudner's, and Lee's methods. The results are given in Table 2. The absolute values of the bias for these indices were also calculated and presented in the Supplementary file (See Supplementary file, S-2). The findings obtained when the data sets that were generated under 1PLM were tested under 1PLM (without taking into account the cut-scores) indicate that there are differences for these indices due to the increase in the number of items: (1) In the overall CA and overall CC rates, and FP rates and Kappa values calculated based on Rudner's method, (2) in the overall CA and overall CC rates and Kappa values calculated based on Guo's method, (3) in the Kappa values calculated based on Lee's method. While an increase was observed in overall CA and CC rates and Kappa values, a decrease was observed in FP rates. Considering the cut-scores, it is noteworthy that at each cut-score, the overall CA and overall CC rates and the Kappa values calculated based on each method increase due to the increase in the number of items. It was found that the change in FN and FP rates depending on the number of items differed according to the cut-score. This differentiation has changed between methods. When the effect of sample size is examined without taking into account the cut-scores, there is no remarkable difference due to the increase in sample size for the overall CA and CC rates, Kappa values, FP, and FN rates calculated based on Rudner's, Guo's and Lee's methods. When the cut-score was taken into account, there were differences according to the cut-scores in the changes that occurred due to the sample size. These differences changed depending on the number of items and the methods used to estimate these indices. Due to the increase in the number of items, there was a decrease in the absolute values of the bias regarding the overall CC rates and (regarding) the Kappa values calculated based on Rudner's and Guo's methods. In Lee's method, it was found that the absolute values of the bias calculated for the kappa values and FN rates were lower in 30-item simulation conditions. Due to the increase in sample size, a notable difference was observed only for the absolute value of the bias for the overall CA rate calculated based on Rudner's method. The absolute value of the bias for the overall CA rate calculated based on Rudner’s method was higher for simulation conditions where the sample was large (n =1000).

Table 2. Classification accuracy and consistency Indices and Kappa values for data generating IRT model.

Simulation condition	Cut-score	Rudner's method					Guo's method					Lee's method				
		CA	FP	FN	CC	κ	CA	FP	FN	CC	κ	CA	FP	FN	CC	κ
1	-0.75	0.901	0.474	0.051	0.858	0.580	0.855	0.019	0.126	0.824	0.595	0.848	0.046	0.106	0.788	0.464
1	0	0.859	0.073	0.067	0.799	0.599	0.855	0.081	0.064	0.796	0.592	0.818	0.081	0.101	0.753	0.451
1	0.75	0.885	0.086	0.030	0.842	0.519	0.807	0.186	0.007	0.813	0.578	0.901	0.690	0.030	0.859	0.321
2	-0.75	0.931	0.041	0.028	0.903	0.723	0.902	0.024	0.074	0.866	0.675	0.893	0.035	0.072	0.848	0.622
2	0	0.899	0.042	0.059	0.855	0.711	0.881	0.053	0.066	0.832	0.664	0.863	0.062	0.075	0.810	0.593
2	0.75	0.914	0.060	0.026	0.882	0.648	0.863	0.126	0.011	0.851	0.640	0.919	0.031	0.051	0.897	0.484
3	-0.75	0.895	0.045	0.060	0.851	0.561	0.840	0.019	0.140	0.814	0.576	0.837	0.041	0.122	0.780	0.457
3	0	0.864	0.077	0.060	0.806	0.612	0.857	0.086	0.057	0.799	0.599	0.829	0.078	0.094	0.766	0.475
3	0.75	0.890	0.083	0.028	0.850	0.545	0.817	0.176	0.006	0.825	0.599	0.904	0.064	0.031	0.864	0.352
4	-0.75	0.924	0.033	0.043	0.892	0.696	0.885	0.020	0.094	0.858	0.658	0.888	0.035	0.077	0.847	0.604
4	0	0.904	0.060	0.037	0.865	0.730	0.886	0.071	0.043	0.841	0.681	0.870	0.086	0.071	0.818	0.619
4	0.75	0.915	0.050	0.035	0.880	0.650	0.875	0.109	0.016	0.854	0.652	0.914	0.037	0.049	0.886	0.498
5	-0.75	0.904	0.034	0.062	0.857	0.607	0.868	0.020	0.112	0.831	0.599	0.865	0.043	0.092	0.808	0.503
5	0	0.837	0.067	0.096	0.771	0.539	0.855	0.083	0.063	0.800	0.601	0.756	0.041	0.203	0.742	0.338
5	0.75	0.859	0.081	0.061	0.813	0.405	0.798	0.193	0.010	0.816	0.601	0.872	0.064	0.064	0.842	0.194
6	-0.75	0.923	0.034	0.042	0.893	0.689	0.894	0.018	0.088	0.868	0.674	0.895	0.026	0.079	0.857	0.585
6	0	0.903	0.051	0.046	0.865	0.729	0.890	0.052	0.059	0.846	0.693	0.852	0.033	0.115	0.817	0.634
6	0.75	0.937	0.038	0.026	0.910	0.740	0.900	0.085	0.016	0.877	0.693	0.910	0.055	0.036	0.871	0.612
7	-0.75	0.905	0.029	0.066	0.861	0.609	0.870	0.017	0.113	0.841	0.615	0.863	0.044	0.094	0.808	0.513
7	0	0.836	0.065	0.099	0.769	0.536	0.857	0.081	0.062	0.803	0.605	0.746	0.039	0.215	0.742	0.305
7	0.75	0.854	0.081	0.065	0.807	0.389	0.796	0.193	0.111	0.811	0.591	0.879	0.061	0.060	0.854	0.164
8	-0.75	0.916	0.036	0.048	0.885	0.669	0.885	0.018	0.096	0.864	0.670	0.890	0.030	0.081	0.851	0.567
8	0	0.907	0.049	0.044	0.871	0.741	0.893	0.050	0.057	0.851	0.702	0.856	0.031	0.113	0.821	0.641
8	0.75	0.938	0.036	0.026	0.912	0.742	0.901	0.083	0.015	0.878	0.695	0.909	0.056	0.036	0.870	0.617
9	-0.75	0.870	0.509	0.079	0.822	0.409	0.773	0.009	0.218	0.781	0.527	0.832	0.016	0.153	0.782	0.296
9	0	0.819	0.099	0.082	0.747	0.485	0.832	0.049	0.119	0.795	0.589	0.775	0.071	0.154	0.710	0.416
9	0.75	0.863	0.079	0.058	0.804	0.445	0.869	0.115	0.017	0.851	0.649	0.832	0.107	0.061	0.768	0.397
10	-0.75	0.920	0.034	0.046	0.889	0.667	0.886	0.017	0.097	0.863	0.661	0.879	0.024	0.092	0.845	0.582
10	0	0.885	0.047	0.067	0.834	0.668	0.890	0.053	0.057	0.845	0.690	0.859	0.047	0.094	0.810	0.600
10	0.75	0.881	0.059	0.060	0.839	0.511	0.870	0.113	0.016	0.858	0.666	0.927	0.027	0.046	0.916	0.260
11	-0.75	0.847	0.049	0.104	0.796	0.347	0.738	0.009	0.253	0.772	0.518	0.801	0.014	0.185	0.751	0.269
11	0	0.798	0.122	0.080	0.726	0.442	0.838	0.056	0.106	0.786	0.572	0.769	0.082	0.149	0.705	0.409
11	0.75	0.858	0.096	0.046	0.792	0.475	0.869	0.105	0.026	0.832	0.600	0.867	0.092	0.041	0.811	0.463
12	-0.75	0.913	0.038	0.048	0.875	0.620	0.884	0.014	0.102	0.861	0.659	0.881	0.025	0.094	0.842	0.568
12	0	0.875	0.055	0.070	0.819	0.637	0.886	0.057	0.056	0.839	0.679	0.849	0.049	0.103	0.799	0.571
12	0.75	0.882	0.060	0.058	0.838	0.499	0.868	0.117	0.015	0.855	0.656	0.937	0.027	0.035	0.925	0.233

Note. CA: Classification Accuracy, FP: False Positive Rates, FN: False Negative Rates, CC: Classification Consistency, κ: Kappa

Considering the findings obtained when the data sets that were generated under 2PLM were tested under 2PLM (without taking into account the cut-scores), some remarkable differences for these indices were observed depending on the increase in the number of items: (1) In the overall CA and CC rates, FN rates and the Kappa values calculated based on Rudner's method, (2) in the overall CA and CC rates and the Kappa values calculated based on Guo's method, (3) in the overall CC rates and the Kappa values calculated based on Lee's method. An increase was observed in overall CA and CC rates and Kappa values, but a decrease was observed in FP rates. Taking into account cut-scores, at each cut-score, the overall CA and overall CC rates and kappa values calculated based on each method increased depending on the increase in the number of items. In contrast, a decrease was observed in the FP and FN rates calculated based on Lee's method. Also, there were differences according to the cut-scores in the changes that occurred due to the increase in the number of items in FN and FP rates calculated based on Rudner's and Guo's methods. These differences changed depending on the sample size. When examined in terms of the sample size without considering the cut-scores, no substantial difference was found depending on the increase in sample size for the CA, CC, FP, FN rates, and kappa values calculated based on all methods. When the cut-off score was considered, depending on the increase in the sample size, the overall CA, CC, FP, and FN rates calculated based on each method differed depending on the cut-scores. This differentiation was not systematic. Regarding the Kappa values, the differences were observed according to the cut-scores in the changes that occurred due to the sample size. These differences changed depending on the number of items and the methods used to estimate these indices. Depending on the increase in the number of items in all methods, a decrease was observed in the absolute values of the bias values regarding the overall CC rates and the Kappa values. The absolute values of the bias for FP rates calculated based on Rudner's method and the absolute bias values for the overall CA rates calculated based on Guo's method were found to decrease due to the increase in the number of items. Depending on the increase in the sample size, there was no significant difference in the absolute values of the bias regarding CA, CC, FP, FN rates, and kappa values (for any method).

Findings regarding 3PLM (without considering the cut-scores) indicated that overall CA and CC rates increased as the number of items increased in all methods. The kappa values based on both Rudner's method and Guo's method were found to be higher in 30-item simulation conditions in comparison to 15-item conditions. Besides this, due to the increase in the number of items, the FP rates calculated based on Rudner's method decreased. Considering the cut-scores, it was observed that at each cut-score, the overall CA rates calculated based on each method increased depending on the increase in the number of items. The changes in CC, FP, FN rate, and Kappa values depending on the number of items differed depending on the method and sample size. When the findings related to the effect of sample size were assessed without taking into account the cut-scores, it was understood that there was no substantial difference depending on the increase in sample size for the CA, CC, FP, FN rates, and kappa values (for any method). Considering the cut-scores (in all methods), the changes in CC, FP, FN rates, and Kappa values depending on the sample size differed depending on the increase in the number of items and the method. Depending on the increase in the number of items, it was observed that the absolute values of the bias regarding the CC, CA, FP rates, and Kappa values in Rudner's method decreased substantially. In Guo's method, the absolute values of the bias for CC rates and kappa values also decreased due to an increase in the number of items. However, in the Lee method, it was found that only the absolute value of the bias of the overall CC rate decreased. Due to the increase in sample size, no significant difference was found in the absolute values of the bias calculated based on any method. Then, the generated data sets were tested in case of model misspecification, and

the absolute values of the bias were also calculated (See Supplementary File, S-3, S-4). The absolute values of the bias were interpreted without considering the cut-scores due to the page limitation. Regardless of the IRT model used in data generation, it was found that in the case of model misspecification, the absolute values of the bias related to classification accuracy and consistency indices tended to decrease as the number of items increased. However, there was no significant difference in these calculated absolute values of the bias depending on the sample size. In cases of model misspecification, the highest absolute values of the bias were obtained when the data set generated under 3PLM was tested under 1PLM. The lowest absolute values of the bias were obtained when the data set generated under 1PLM was tested under 2PLM, and the data set generated under 2PLM was tested under 3PLM.

Discussion and Conclusion

The effectiveness of Rudner's, Guo's, and Lee's methods in assessing classification accuracy and classification consistency were comparatively examined in terms of different test lengths and sample sizes under 1PLM, 2PLM, and 3PLM. Findings indicated that test length substantially affected classification accuracy, classification consistency indices, and the absolute values of the bias. As the number of items increased, the values of the indices increased, and the absolute values of the bias decreased. However, there was no remarkable difference in the classification accuracy and classification consistency indices and the absolute values of the bias of these indices, depending only on the sample size. In the case of model misspecification, test length appeared to have a notable effect on the absolute values of the bias for classification accuracy and classification consistency indices. A decrease in absolute values of the bias was observed due to the increase in the number of items. It was concluded that the absolute values of the bias did not differ substantially depending on the sample size. Lathrop and Cheng (2013) reported similar results in their study. As the number of items increased, absolute values of the bias decreased, but these values were not affected by the sample size. However, researchers stated that the standard errors decreased as the sample size increased.

In general, FP and FN rates are calculated based on Guo's method, and the overall CC rates and kappa values calculated based on Lee's method have the highest absolute values of the bias. For the classification accuracy and classification consistency indices calculated based on Rudner's method, lower absolute values of the bias were obtained compared to other methods. These findings were supported by the findings of the studies conducted by Chau (2018) and Lathrop and Chen (2013), which indicated that Rudner's method performed better. When these findings are assessed together with the findings of Martineau's (2007) study, it is considered that Rudner's method will be more appropriate for classification decisions for large sample groups. Rudner's method may be preferred for examining the classification accuracy and classification consistency in national exams administered in Turkey, as it performs well when applied to large sample groups and has lower absolute bias values than other methods.

In the case of model misspecification, the absolute values of the bias for the indices appear to differ, but there is no systematically significant difference. The classification accuracy and consistency indices had the highest absolute value of the bias when the data set generated under 3PLM was tested under 1PLM. This finding implies that considering the probability of answering correctly by chance could affect the accuracy of classification decisions based on test scores. It seems necessary to assess whether the model is correctly specified in modeling the responses to the items in such tests and in ability estimations based on these responses, especially in high-stakes tests used for the selection and placement of individuals in various educational institutions. In the

case of model misspecification, kappa values calculated based on Lee's method had the highest absolute values of the bias in all simulation conditions. In the study conducted by Chau (2018), the values obtained in cases of model misspecification were similar to the values calculated under the correct model. Although these findings imply that these indices are not affected by model misspecification, Chau (2018) stated that in the case of model misspecification, the decisions made in practice and the evaluated decisions will not be the same as the ones being evaluated. In Chau's (2018) study, it was observed that the classification accuracy and consistency indices had high values when the location of the cut-scores had high test information. This study observed that the classification accuracy and consistency indices and the absolute values of the bias differed at different cut-off scores. However, there is no systematic differentiation. Additionally, when simulating data sets, ability parameters and item parameters drawn from specific distributions were used. Therefore, the findings can only be generalized to similar conditions.

As a result, national and international tests are used to determine the proficiency levels of individuals in a particular field. Accordingly, the accuracy of classification accuracy and classification consistency indices gain importance in such tests. In this study, only data sets based on dichotomously scored items are considered under simulation conditions, while it is of practical importance to investigate the accuracy of the classification accuracy and consistency indices for measures obtained from data sets based on multiple scored items.

Suggestions

Study findings indicated that sample size did not substantially affect the classification accuracy and consistency indices and the absolute bias values related to these indices. Although similar findings were obtained in the study of Lathrop and Cheng (2013), it was observed that the standard errors in that study decreased depending on the sample size. This means that the variability of the estimates of the classification accuracy decreases for larger sample groups. In this context, it is believed that it would be helpful to examine the effect of sample size on classification accuracy and consistency indices by studying with larger samples. While only dichotomous data sets have been considered in this study, it is of practical importance to investigate the accuracy of classification accuracy and consistency indices for measures obtained from polytomously scored items. In addition, in this study, ability parameters were drawn from the standard normal distribution for data simulation. Similarly, item parameters were drawn from the specific distributions, and data sets were generated based on these parameters. It is worth examining how different distributions that are used for data simulation can affect the accuracy of the classification accuracy and consistency indices. For example, a non-normal distribution for the ability parameter and distributions different from those used in this study for item parameters. Finally, in this study, model misspecification was considered the situation where the simulation data generated under one model was tested under another. However, model misspecification can be considered and examined differently in future research. For example, in future simulation studies, other situations that may lead to model misfit, such as multidimensionality of the data, can be examined, and model misspecification can be discussed in terms of different situations.

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References

Chalmers, P. (2020). *Package 'mirt'*. [Computer software]. https://cran.r-project.org/ web/ packages/mirt/mirt.pdf.

Chau, L. H. (2018). *Evaluating the correctness of IRT-based methods in computing classification consistency and accuracy indices in model misspecification.* [Doctoral dissertation, University of British Columbia]. http://hdl.handle.net/ 2429/66984

Chen, J., de la Torre, J., & Zhang, Z. (2013). Relative and absolute fit evaluation in cognitive diagnosis modeling. *Journal of Educational Measurement, 50*(2), 123-140. https://doi.org/10.1111/j.1745-3984.2012.00185.x

Cizek, G. J. & Bunch, M. B. (2007). *Standard setting: A guide to establishing and evaluating performance standards on tests*. Sage Publication.

Cohen, J. (1960). A coefficient of agreement for nominal scales. *Educational and Psychological Measurement, 20*(1), 37–46. https://doi.org/10.1177/001316446002000 10

Diao, H., & Sireci, S. G. (2018). Item response theory-based methods for estimating classification accuracy and consistency. *Journal of Applied Testing Technology, 19*(1), 20-25.

Guo, F. (2006). Expected classification accuracy using the latent distribution. *Practical Assessment, Research, and Evaluation, 11*(1), 6.https://doi.org/10.7275/bxba-7466

Hanson, B. A., & Brennan, R. L. (1990). An investigation of classification consistency indexes estimated under alternative strong true score models. *Journal of Educational Measurement, 27*(4), 345-359. https://doi.org/10.1111/j.1745-3984.1990.tb00753.x

Huynh, H. (1976). On the reliability of decisions in domain-referenced testing. *Journal of Educational Measurement, 13*(4), 253–264. https://doi.org/10.1111/j.1745-3984.1976.tb00016.x

Kingsbury, G. G., & Weiss, D. J. (1980). *A comparison of adaptive sequential, and conventional testing strategies for mastery decisions*. (ADA094478). https://apps.dtic.mil/sti/pdfs/ADA094478.pdf.

Lathrop, Q. N. (2020). *Package 'cacIRT'.* [Computer software]. https://cran.r-project.org /web/ packages/cacIRT/cacIRT.pdf.

Lathrop, Q. N., & Cheng, Y. (2013). Two approaches to the estimation of classification accuracy rate under item response theory. *Applied Psychological Measurement, 37*(3), 226-241. https://doi.org/10.1177/0146621612471888.

Lathrop, Q. N., & Cheng, Y. (2014). A nonparametric approach to estimate classification accuracy and consistency. *Journal of Educational Measurement, 51*(3), 318-334. https://doi.org/10.1111/jedm.12048

Lee, W. C. (2010). Classification consistency and accuracy for complex assessments using item response theory. *Journal of Educational Measurement, 47*(1), 1-17. https://doi.org/10.1111/j.1745-3984.2009.00096.x

Lee, W. C., Brennan, R. L., & Wan, L. (2009). Classification consistency and accuracy for complex assessments under the compound multinomial model. *Applied Psychological Measurement, 33*(5), 374-390. https://doi.org/10.1177/0146621608321759

Lee, W. C., Hanson, B. A., & Brennan, R. L. (2000). *Procedures for computing classification consistency and accuracy indices with multiple categories.* https://www.act.org/content/dam/act/unsecured/documents/ACT_ RR2000-10.pdf

Lee, W. C., Hanson, B. A., & Brennan, R. L. (2002). Estimating consistency and accuracy indices for multiple classifications. *Applied Psychological Measurement, 26*(4), 412-432. https://doi.org/10.1177/014662102237797

Livingston, S. A., & Lewis, C. (1995). Estimating the consistency and accuracy of classifications based on test scores. *Journal of Educational Measurement, 32*(2), 179-197. https://doi.org/10.1111/j.1745-3984.1995.tb00462.x

Martineau, J. A. (2007). An expansion and practical evaluation of expected classification accuracy. *Applied Psychological Measurement, 31*(3), 181-194. https://doi.org/10.1177/0146621606291557

Md Desa, Z. N. D. (2012). *Bi-factor multidimensional item response theory modeling for subscores estimation, reliability, and classification* [Doctoral dissertation, University of Kansas]. https://kuscholarworks.ku.edu/handle/1808/10126

Minchen, N., & de la Torre, J. (2018). A general cognitive diagnosis model for continuous-response data. *Measurement: Interdisciplinary Research and Perspectives, 16*(1), 30-44. https://doi.org/10.1080/15366367.2018.1436817

Partchev, I. (2017). *Package 'irtoys'*. [Computer software] .https://cran.r-project.org/ web/packages/irtoys/irtoys.pdf

Revelle, W. (2015). *Package 'psych'*. [Computer software]. https://cran.r-project.org/ web/ packages/psych/psych.pdf

Robitzsch, A. (2020). Package 'sirt'. [Computer software].https://cran.r-project.org/ web/ packages/sirt/sirt.pdf

Rudner, L. M. (2001). Computing the expected proportions of misclassified examinees. *Practical Assessment, 7*(14), 1-5. https://doi.org/10.7275/an9m-2035

Rudner, L. M. (2005). Expected classification accuracy. *Practical Assessment, 10*(13), 1-4. https://doi.org/10.7275/56a5-6b14

Sen, S., & Cohen, A. S. (2020). The impact of test and sample characteristics on model selection and classification accuracy in the multilevel mixture IRT model. *Frontiers in Psychology, 11*, 197. https://doi.org/10.3389/fpsyg.2020.00197

Subkoviak, M. J. (1976). Estimating reliability from a single administration of a criterion-referenced test. *Journal of Educational Measurement,* 265-276. https://doi.org/10.1111/j.1745-3984.1976.tb00017.x

Terzi, R., & De la Torre, J. (2018). An iterative method for empirically-based Q-matrix validation. *International Journal of Assessment Tools in Education, 5*(2), 248-262. https://doi.org/10.21449/ijate.407193

Thompson, N. A. (2009). Item selection in computerized classification testing. *Educational and Psychological Measurement, 69*(5), 778-793. https://doi.org/10.1177/0013164408324460

Wang, S., & Wang, T. (2001). Precision of Warm's weighted likelihood estimates for a polytomous model in computerized adaptive testing. *Applied Psychological Measurement, 25*(4), 317-331. https://doi.org/10.1177/01466210122032163

Wyse, A. E., & Hao, S. (2012). An evaluation of item response theory classification accuracy and consistency indices. *Applied Psychological Measurement, 36*(7), 602-624. https://doi.org/10.1177/0146621612451522

Yen, W. M. (1984). Effects of local item dependence on the fit and equating performance of the three-parameter logistic model. *Applied Psychological Measurement, 8*(2), 125-145. https://doi.org/10.1177/014662168400800201

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To Accept or to Ignore: School Leaders' Reactions to Errors

Gül Kurum Tiryakioğlu [1]

ABSTRACT

Errors are present in every organization, or structure involving people. They are inevitable in schools where school leaders, teachers, students, and parents maintain close contact. School leaders are key persons in managing errors effectively. By managing errors, they can turn them into positive consequences like learning, change at school. Error management is not about preventing errors, but about avoiding the negative consequences of errors and reducing their effects. In this regard, this study aims to reveal the views of school leaders regarding error management and strategies in schools through qualitative research administering semi-structured interviews with ten school leaders. Findings indicate that school leaders' dominant perspective on error is that it is accepted, though a few ignore or deny errors. There are individual (neglect, lack of knowledge and skill, state of well-being) and collective (lack of communication, unclear legislation, school culture) sources of errors. The findings of this study have revealed that error management strategies can be categorized before an error (detailed explanation, setting rules, sharing past errors), after an error (immediate intervention, ignorance, enforcing legislation, mediating, taking advice and warning), and in terms of both cases (communicating, tolerant school culture). The participants regard errors as learning, benefit, and change at school. The study concludes that errors can be managed easily when they are seen as a part of human nature.

Keywords: Error management, school leader, sources of errors, error prevention

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Introduction

Error management is an important and concrete element of a healthy organizational culture and is an element that can be included in the culture of organizations. It involves creating an environment where errors are acknowledged, analyzed, and used as opportunities for improvement rather than punished or ignored. In this sense, van Steenbergen et al. (2020) have suggested a framework that includes five key components: Let the group take ownership, engage employees/members, align structure and culture, refocus from person to system, and narrate the best examples. A strong error management culture is critical for organizational success, with key components including the tone, behaviours, and perspective of the management (van Steenbergen et al., 2020). This culture is related to improved employee performance (van Dyck et al., 2005), reduced turnover intentions (Guchait & Pasamehmetoglu, 2016), and increased innovativeness (Fischer et al., 2018). It is characterized by open communication about errors, quick detection and handling of errors, and a focus on system improvement rather than blaming individuals or ignoring errors.

Error management in organizations is a crucial aspect of organizational functioning and can be implemented through culture, which refers to the approach an organization takes towards handling errors within its operations. Seckler et al. (2018) emphasize the need to integrate various perspectives on error management, such as high-reliability organizations and psychological safety. Frese and Keith, (2015) highlighted the differences between error prevention and error management. While error prevention reduces the number of errors in the short term, error management enables long-term learning from errors. While errors decrease quantitatively in a short time in prevention within the scope of error consequences, people discover learning from their errors in the long term with error management. The authors emphasized added that the latter highlights implications for human resources management, job design, total quality management, and organizational culture development. While Frese and Keith (2015) distinguish between error prevention and management, Goodman, et al. (2011) consider the prevention phase as an error management approach. On the other hand, Zhou and Zhang (2024) has underscored the importance of error management in minimizing negative consequences and maximizing positive impacts such as learning and innovation.

Error management strategies encompass a range of approaches aimed at identifying, analyzing, and evaluating errors within an organization. These strategies include preventive, detective, corrective, learning, and cultural aspects. The first aspect focuses on reducing the likelihood of errors occurring in the first place through measures such as training, standard operating procedures, automation, and system redundancies (Reason, 2000). The detective strategies involve actively monitoring for errors through techniques such as peer review, audits, checklists, and incident reporting systems (Leape & Berwick, 2005). Corrective strategies address errors promptly and effectively once they are detected, including actions such as root cause analysis, feedback mechanisms, and process redesign (Carayon & Wood, 2010). The learning strategies emphasize learning from errors to improve future performance, including methods such as debriefing, simulation training, and sharing best practices (Edmondson, 2003). The cultural aspect takes the role of creating a supportive organizational culture that encourages error reporting, transparency, psychological safety, and continuous improvement (Vogus & Sutcliffe, 2007). These strategies are often implemented in combination to create a comprehensive approach to error management within organizations, tailored to their specific contexts and needs.

Organizations with effective error management culture tend to have higher levels of employee engagement, innovation, and resilience, as well as better overall performance. For this reason, making errors is considered a natural phase of progress. As seen, error management culture is an inevitable part of innovation, development, and learning in organizations. In this context, error management at school must be a culture that includes strategies encouraging stakeholders to learn from their errors and to carry the school community forward. In this regard, constructive and encouraging error management strategies like providing support and feedback can enhance a trusting and supportive learning culture at school (Soncini et al., 2022). Divsar and Dolat Pour (2018) also stated that positive error management behaviours contributed to creating a comforting atmosphere and encouraging self-confidence. Therefore, school leaders must provide guidance and support to colleagues by implementing effective error management strategies.

The literature indicates that studies on error management are generally carried out in organizations such as business, health and aviation. However, there is not enough research on error management culture in schools and error management strategies used by school leaders. The school is a dynamic learning environment, where individuals try and make errors. The errors are inevitable at school and must be managed effectively to support stakeholder engagement, innovation, learning, resilience, and better performance. Error management in schools is multifaceted process that falls under the responsibilities of school leaders. Although school leaders can be those who strive for effectiveness in rapidly changing educational contexts, principals no longer function as building managers, being responsible for adhering to rules, carrying out regulations and avoiding errors (Dimmock, 1996). They must be leaders in creating a hospitable climate to to ensure safety in education, a cooperative spirit and fruitful interaction, guiding educational stakeholders to assume their parts in realizing the school vision, learning to develop a team delivering effective instruction (Holland et al., 2013). Principals who are responsible for all these areas of duty are referred to as school leadersand in this study, school leader is preferred as a concept that meets principals. School leaders are regarded as key figures in managing errors at educational settings.

Error management culture is a serious issue that needs to be addressed in educational organizations "where the system directly involves human beings and informal relations are highly prevalent. Effective error management supports innovation, creativity, learning and taking initiative in schools, while ignoring or rejecting errors can cause teachers to withdraw, lose their motivation and reduce their commitment (Kurum Tiryakioglu, 2024). Nanto (2021) has also found that effective error management culture in schools positively affects teachers' organizational creativity and work engagement. School leaders' perspectives on errors play a crucial role in effective error management. Principals state that errors sometimes provide learning in schools, but mostly cause negative consequences such as a negative climate, decreased quality of education, loss of labour and time, and punishment (Akuzum & Ozmen, 2013). On the other hand, it is seen that errors in schools are mostly ignored and prevented before they cause a major crisis (Gokturk et al., 2017). Errors are inevitable in a school environment where formal and informal interaction is intense. For this reason, errors can be managed effectively in schools to enable the school community to learn from errors, avoid repetition, and take calculated risks. This study presents a perspective on the change, learning, and innovation understanding of school leaders by revealing the error management process in schools. As a part of error management, school leaders must be role models for teachers on how to take action on errors (Abay& Clores, 2022). Riani and Ain (2022) further underscore the principal’s role in improving education quality management, which includes error detection and correction. Hoque et al. (2011) highlight the impact of principals' roles

in school-based management on school improvement, suggesting that strategic planning and comprehensive roles are key in error management. Trail (2000) provides a comprehensive overview of the diverse roles of principals, underscoring their pivotal position in addressing errors and challenges within the school environment. In short, school leaders are key people in managing errors and creating an effective error management culture at school. Their perspective on errors can direct their error management strategies. Their priority should be to turn the errors into innovation, and new learning outcomes and make it sustainable as a school culture. In this context, this study aims to reveal the views of school leaders regarding error management and strategies in schools. The following research questions guide this study:

1. What is the perspective of school leaders on errors at school?
2. What are the sources of errors at school according to school leaders?
3. What strategies do school leaders use in error management?
4. What are the consequences of errors at school according to school leaders?

Method

This phenomenological study aims to uncover the views of school leaders on error management and strategies in schools. This design focuses on phenomena that are known but about which there is no detailed information (Creswell, 2015). Here, this study examines the meaning, structure, and essence of individuals' experiences with this phenomenon. In other words, it is an attempt to describe how people experience the relevant phenomena in a methodological, meticulous, and in-depth manner (Patton, 2014, 104). The phenomenon examined in depth in this research is accepted as the error management strategies of school leaders.

Study Group

The study group consisted of 10 school leaders identified with the criterion sampling method (Patton, 2014, 230-235). The criteria were sought for the participants to have worked as leaders in a public school for at least 5 years to internalize the school culture and know the school community and to study an educational administration graduate program. The study group was reached through voluntary participation. A total of 10 school leaders took part in this study. The personal information of the participants in this study is presented in Table 1.

Table 1. Study group

Participant Code	Gender	Seniority (Total)	Experience as a leader	Education Status	School Level
P1	Male	14 years	Deputy 11 years	Undergraduate	Lower Secondary
P 2	Male	21 years	Deputy 15 years	Undergraduate	Primary School
P 3	Male	26 years	Principal 11 years	Undergraduate	Primary School
P 4	Male	21 years	Principal 13 years	Undergraduate	Upper Secondary
P 5	Female	11 years	Deputy 10 years	Undergraduate	Upper Secondary
P 6	Male	22 years	Deputy 5 years	Undergraduate	Upper Secondary
P 7	Male	10 years	Deputy 9 years	Undergraduate	Upper Secondary
P 8	Female	29 years	Principal 8 years	Undergraduate	Lower Secondary
P 9	Male	23 years	Principal 12 years	Undergraduate	Lower Secondary
P 10	Male	24 years	Principal 16 years	Undergraduate	Lower Secondary

As seen from Table 1, half of the participants are working as principals and the other half are working as deputy principals. Principals and deputies have the role of administration at school. Their point of view on errors can direct the error management strategies at school. Therefore, it was sought to keep the number of principals and deputies as equal as possible. The participants

have administration experience of 11 years on average. Though all of the participants have bachelor's degrees, they are studying at a non-thesis master's degree program in educational administration.

Data Collection

In phenomenological studies, data is usually collected through semi-structured interviews (Biggerstaff & Thompson, 2008). A semi-structured interview form developed by the researcher was used to collect data. The interview form includes personal information, an introductory question, and nine main questions. The questions aim to determine error management strategies and the consequences of errors by revealing the perspective of school leaders on errors. The interviews were conducted via an online meeting platform (Zoom). A pilot interview was conducted to measure the clarity of the questions. The interviews lasted between 20 and 25 minutes. The data were collected between January 16 and February 24, 2022, and this process continued until the data were repeated and saturation was reached (Merriam& Tisdell, 2015). During the data collection phase, participants were given preliminary information about the subject before each interview. In addition, detailed explanations were made regarding ethics. First of all, it was pointed out that participation was voluntary. Participants were informed that personal data were kept confidential and that codes (e.g. P1, P2, etc.) were given to the participant during the analysis, and the interviews were recorded upon their permission.

Data Analysis

Interviews were conducted with school leaders to evaluate their perspectives on errors and error management strategies. The recorded interviews were transcribed, transferred to a computer, and loaded into the NVivo qualitative data analysis program. Since the interview questions were designed based on a review of the literaturereview on error management culture, content analysis was used. Content analysis systematically describes written, oral, or visual materials by organizing them into themes, categories, and patterns in a structured manner (Hanington& Martin, 2019). The themes, categories, and sub-categories created by the researcher were compared and discussed with colleagues until a consensus was reached. These themes and categories are shown in Figure 1.

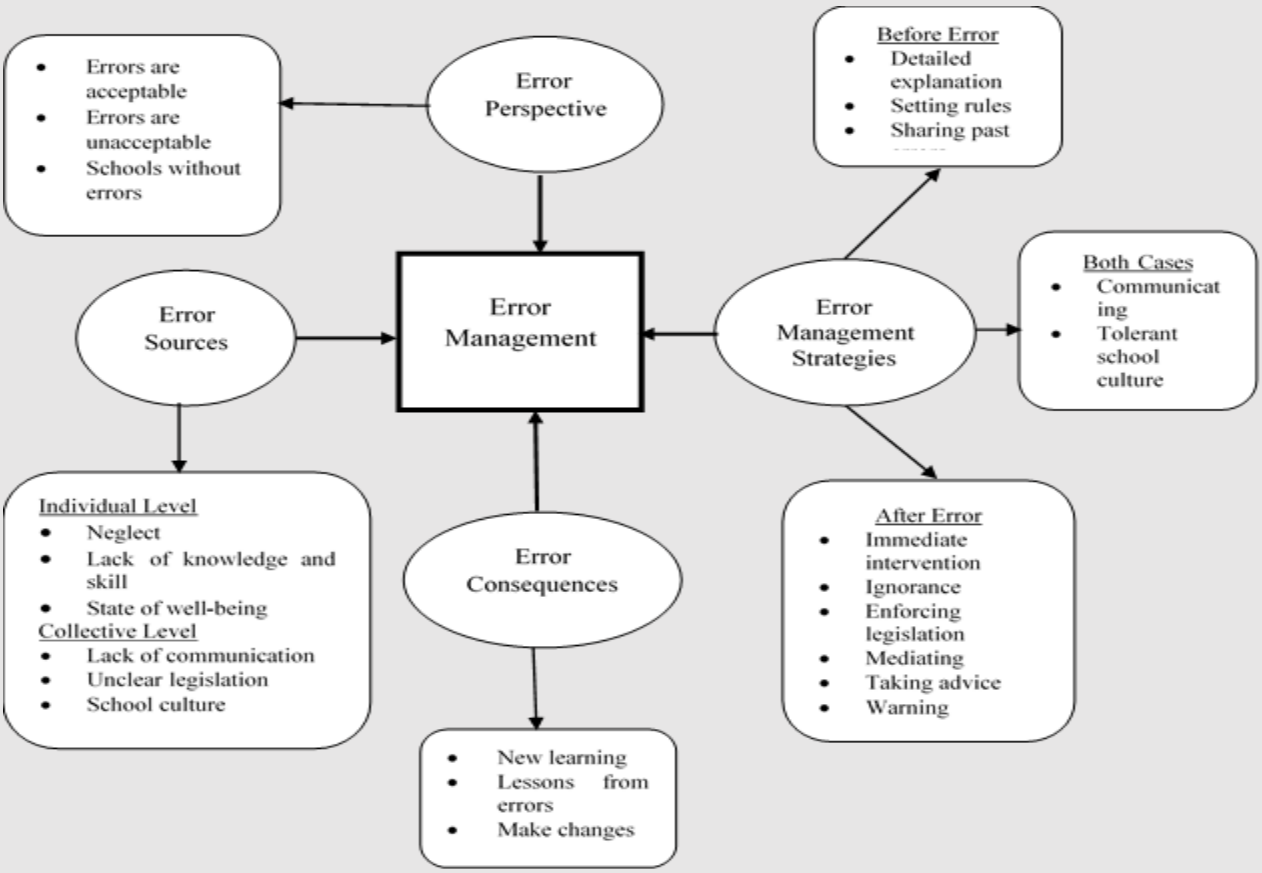

Figure 1. Themes and categories based on analysis

Figure 1 summarizes that there are four themes, 11 categories and 17 sub-categories based on the participants' views. They are interpreted in a descriptive narrative with direct quotations from participants. The quotations are given in italics and the participant's code is presented in parentheses.

Trustworthiness

Ensuring trustworthiness in qualitative research is crucial for credibility and reliability of the results. There are various methods like credibility, transferability, dependability, and confirmability to improve trustworthiness (Ahmed, 2024). Expert opinions were sought for the content validity of the interview form. Additionally, the study group, data collection, and analysis process were clearly explained under detailed subsection. The findings were also supported with direct quotes for the transferability of qualitative research, and the participants were determined using a purposive sampling method. Participants were informed that they could withdraw from the study without giving any reason, based on voluntary participation (Shenton, 2004). In addition, direct quotes from the participants were included while presenting the findings (Yildirim and Simsek, 2011). The data and findings were sent to a participant for review, and feedback was obtained on their accuracy and validity. Member checking (Creswell & Miller, 2000) was also used in the data analysis process to ensure the credibility of qualitative research. During the interview process, the researcher asked questions to the participants as part of the data collection process. To clarify the answers, the participants were occasionally asked to clarify their responses or give concrete examples.

Results

The findings are explained in parallel with the aims. Accordingly, at first participants are asked for their perspective on errors, since error management begins when the school leaders accept the errors. Secondly, the sources of errors are examined based on interviews. According to participants, the errors are resulted mostly from neglect and indifference at school. Thirdly, error management strategies used by school leaders are determined under three categories including before errors, after errors and both cases. Lastly, participants state that errors generally result in new learning for school community. These findings are presented under sub-titles in detail.

Error Perspective

The perspective of school leaders on errors is vital for the operation of the education system, it directly influences their error management strategies. In this context, the participants first responded to the question "*How they reacted to errors in schools*". Many participants consider that errors are acceptable in schools. In this regard, a school leader (P10) emphasized that "*errors are inevitable. Because here we have approximately 50 teachers working with us. We and our teachers can definitely make errors from time to time*". Similarly, other school leaders stated that they accepted errors by saying, "*In schools, there is no such thing as a person without errors, it happens everywhere* (P2)", and "*There are definitely errors where there are people* (P5)". From this perspective, participants stated that paperwork errors (P1-P4-P10) and system errors (P2-P10) are often made in schools. Teachers can also make errors when entering grades into e-school or school leaders can make errors in official correspondence. On the other hand, not every school leader can be tolerant of errors. Among the participants, there are school leaders who claim that errors are unacceptable or that there are no errors in schools. In this regard, a school leader defends himself with the view that "*errors are not wanted in schools* (P6)". Another school leader claims that there are no errors in the school with the statement "… *such errors do not come to the agenda. We have not encountered any errors* (P1)". In short, the participants exhibit three different perspectives towards errors: errors are accepted - errors are not accepted - and errors do not occur.

The Sources of Error

Errors can be made at school. These errors can take different forms such as actions, thoughts, or decisions. The process of managing errors also requires accepting errors and identifying the sources of errors. Participants indicate that errors arise from various factors at individual and collective levels.

Individual sources of error

School leaders believe that errors at school are mostly due to neglect and indifference. Errors are seen especially due to teachers not following the procedures they should do in the e-school system, delaying them and missing their time. Sometimes, neglect cases such as teachers being late for their shift duties or lessons can occur:

> P10- *"…it mostly happens in the grades. Teachers enter their exam grades into the e-school system. The system gives them a certain time. Even grades can be entered incorrectly, for example, instead of 100, 10 can be entered"*

The school leaders can also make errors due to disregard or neglect in terms of documents and systems. In this context, the errors made by the participants regarding e-registration, personnel, and extra course payments are as follows:

P2- "*As the school administration, we accidentally enrolled the 42-month-old student in primary school, which is not normally accepted by the system. The student enrolled in first grade. We also missed it. I had not looked at the student's date of birth"*

Teachers or school leaders make errors due to lack of information and skill or technical inadequacy, especially when using the electronic document system, in the e-school process:

P10- "*The Ministry of National Education released a document management system. When there is a new development, there can be technological inadequacies among teachers"*

The state of well-being can negatively affect a person's attention, interest, focus, and comprehension. The person's level of physical and psychological well-being can increase their potential to make errors. It is similar for teachers and school leaders as well:

P4- "*The individual, physical or psychological state of teachers. The same goes for the student. They may make errors because of a problem he is experiencing that day and his current mood*."

Collective sources of error

Communication is at the core of human relations. However, sometimes the lack of communication between the school leader-teacher-student-parent can cause errors. For this reason, communication problems within the school are seen as a serious source of error:

P10- "*We had printed the certificates of appreciation and achievement a few days before the report card day. At that time, the student was receiving a certificate of achievement in the system. On the report card day, the student came and said, teacher, you gave me a certificate of achievement, but it appeared in e-school that I should have received a certificate of appreciation. We looked at the e-school and asked the teacher. The student deserved to receive a certificate of appreciation. Then we understood that the teacher had entered the system with his password after we printed out the certificate and changed the student's score."*

Students directly tell their parents about the examples given by the teacher during the lesson, the way they call each other, or the problems they experience during the break, and parents come to school and ask the teachers to account for:

P1- "*The hall monitor cannot be everywhere at all times. He is on duty, but when he turns his back, for example, the student hits the friend in front of him. I see this situation from the camera. But the teacher does not see it. Later, the student tells the parents at home that my friend hit me in front of the hall monitor. This time, the parent comes and demands an explanation from us without understanding or listening*."

The most common source of collective errors can be resulted from unclear legislation. At this point, a participant, who claimed that subjective factors such as school culture, explains the situation as follows:

P4- "*There is only one regulation. The practices are the same for every school in Türkiye, but every school has its own culture. The implementation of the legislation may vary from school to school, depending on the potential of the student at school or the situation of the teachers.*"

School culture closely affects the practices and functioning of the school. Participants exemplify the errors that arise from differences in culture and context in the school as follows:

P9-"*… each school has its structure. There are schools in the centre where exams (LGS) and education are more of a priority. These schools have a success-oriented culture. But we also know that there is a student profile in these schools that does not match this at all. You understand that this student's psychology and the environment they come from do not match the institutional culture here. For example, in such cases, we cannot take the initiative. We have no authority.*"

Error Management Strategies

Error management does not mean eliminating errors, but rather addressing them and pursuing their consequences (Van Dyck et al., 2005). Error management is important for reducing negative consequences and mitigating their impact. In this context, Frese and Keith (2015) addressed the error management process in organizations in the context of the situation before and after the error. In this study, the strategies used in the error management process in schools were shaped within the framework of Frese and Keith's (2015) understanding of error management. In this context, the participants were asked about the strategies they adopted while managing errors. Error management takes place in two stages: before and after error. Error management strategies, identified through participants' perspectives, are categorized under the following subheadings.

Before Error

Strategies used before errors can be considered as preventing the errors. However, Goodman et al. (2011) consider the prevention phase as an error management approach. School leaders have stated that they use such error management strategies as detailed explanations, setting rules, and sharing past errors before errors. Errors may arise from uncertainty or ignorance. For this reason, providing detailed explanations to stakeholders at school ensures that the given task or responsibility is carried out correctly. The school leader (P4) emphasized the error-preventing feature of detailed explanations with the view that "*This is one of the issues I am most sensitive about. If I have requested something from my friends, I am careful to explain it in too much detail. In other words, I do not use a short sentence like bring this. I explain in more detail, it is much more important to be error-proof*." Similarly, another participant (P6) stated that official documents should be clearer with the view that "*The biggest source of errors is that the texts are not understood by the teachers. I see this as the biggest problem. I think that the margin of error will decrease if the texts are conveyed to the teachers more shortly and concisely.*"

Managing and reducing errors requires establishing clear rules and ensuring compliance with them (Goodman et al., 2011). School leaders also emphasized that they set clear and explicit school rules in the error management process. his category is exemplified by a school leader: "*The rules need to be clear and explicit. There is no confusion. …the rules should be clearly and explicitly shown to the teacher. When there is consensus and there are no dual practices, there is no problem* (P5)." Accepting errors and sharing them in meetings are also considered a preventive error management strategy and the participants use this strategy widely. An example from a school leader:

> P9- "*We talk about these errors to other friends as a positive example so that similar errors are not made. Our teachers also share their experiences in different schools in this sense. We try to ensure that our teachers learn from errors and be more careful*"

After Error

School leaders have used such strategies as immediate intervention, ignorance, enforcing legislation, mediating, taking advice, and warning after errors. When school leaders encountered errors they first determine the impact of the error. They then intervene and attempt to correct them. This category is explained as follows:

> P2- "*Error is not something that is done regularly and intentionally. Since it is something that every teacher can do, we try to solve it without offending. We correct the errors that come to us. Teachers, school administration, parents, students, and everyone who is affected by the error, all sit down*

and think together about how to fix it. Because our first goal is to fix this error as soon as possible with the least damage."

The implementation of legislation or rules is widely used in error management. This situation can be evaluated as an autocratic managerial style that prefers to use its legal power instead of taking initiative. School leaders have emphasized that they cannot go beyond the legislation in the centralized education system:

P2- "*So now we are here to realize the goals of national education. As you know, those regulations, laws, and rules are generally binding on us. This is also the case for errors made in this school*."

P9- "*There is already a regulation, legislation. This is something that teachers also know. Of course, we are in a certain position of authority here as school principals. We do not have the chance to act outside the legislation or individually take the issue to a different place*."

Ignorance is another error management strategy. Ignoring reflects the school leader's perspective on errors. Ignoring can also be considered an indicator that there are no errors in the school or that errors are not accepted. In this regard, one participant (P7) emphasized that school leaders do not take responsibility in error management stating that, "*I think school leaders ignore this issue too much. When our colleagues make errors, they do not go after them. In other words, they always pass the buck to someone else because they think they not to be the pioneer in this matter*" Another participant (P1) stated that they do not react to minor errors in school with the view that, "*It depends on the severity of the error that affects us. We can ignore errors that arise from misunderstandings or we do not face any sanctions.*" However, regardless of the size of the error, ignoring errors can increasethe negative consequences of the errors by ignoring them.

School leaders act as mediatorsbetween teachers, students, and parents while managing errors. In this regard, participants stated that when there is an error at school, they listen to the parties separately to understand the situation and mediate between the parties to correct the error. In this regard, a school leader (P1) explained teacher-parent mediation stating that "*We definitely do not confront the parent and the teacher. We first calm the parties down ourselves. We do not confront the parties (teacher-parent). Then we confront the teacher and listen. When I look at the video recordings of the situation, I see that there is nothing the teacher can do. We corrected the error by using communication channels between the parties.*" Another participant (P8) has also presented the error management strategy with the view that "*There may be raised voices due to a misunderstanding at school. In this case, I call the parties individually. I meet with the person individually. I try to find peace between the parties. I try to reveal the misunderstanding.*"

Error management can be considered as a comprehensive process. School leaders, as decision-makers, prefer to take advice from their colleagues while managing errors. In this way, they think that they can make more objective decisions regarding error management. In this regard, one participant (P7) stated that he consults with his colleagues regarding error management at school stating that "*When we, as school principals, look at errors, since there are 3-4 school principals, we generally try to act by consulting with each other in our school.*" Similarly, another school leader (P8) emphasized that he tries to be objective stating that "*We hold meetings with students together with the guidance teacher or vice principal as much as possible. We also criticize them. Then we criticize each other.*"

Warning is another commonly used strategy in error management. Warning can also be included in other error management strategies. When school leaders talk about errors in meetings or give detailed explanations about any task, they actually warn their stakeholders not to repeat these errors. A participant (P5) explained this situation as follows: "*The principal acted moderately and*

met the parent who made a complaint. The teacher was warned by the principal not to repeat it, and it did not happen again. The principal did not take this incident to a further level". The warning strategy may sometimes not be very successful in error management. People may continue despite all warnings, especially if they have made these wrong behaviours a habit. In addition, participants think that there is no deterrent sanction for repeated errors in the education system. A school leader explained this situation as follows:

> P7- "*If an error is made, we warn our colleagues or teachers about it. First, we warn our teachers verbally. After the verbal warning, we also warn them in writing. After we warn our teachers, when there is a problem, we convey this to the inspectors. They also give a penalty depending on the situation, but it is never such a high penalty. They are just warned and similar errors are repeated*."

Another participant has stated that people cannot know everything or may forget some information by nature. This school leader thinks that he can direct people to the right behaviour by warning them with appropriate language:

> P9- "*Humans can forget by nature. In other words, forgetting is one of the most basic characteristics of humans. People need to constantly refresh their knowledge. They need to remind them and they need to warn them with a method specific to the person.*"

Both Before and After Error

Error management is a process that covers both before and after errors. There may be common strategies used both before and after making errors. School leaders have stated that they use communication and tolerant school culture strategies both before and after errors. Interpersonal relationships, where errors are discussed openly, are important in the error management process. Because the error management process starts when errors are discussed. In this context, school leaders stated that they start the error management process by communicating with the parties. This strategy is expressed by a participant as follows:

> P6- "*There is no person without errors. Everyone makes errors. Teachers can also make errors, but what is important is to have a communication language. Since we are leaders, we must always be open to communication and approach errors in a solution-oriented way. We must allow the parties to express themselves so that we can find out what caused the error*."

Error management is implemented through culture at the organizational level, thus school culture is a prominent factor. The perspective of school leaders and teachers on errors and human relations in the school determines the error management culture. The oppressive and punitive attitude of autocratic leaders towards errors may cause stakeholders to hide their errors and repeat them. On the other hand, a tolerant school culture where errors are openly discussed provides new learning from errors. The school leader has summarized what can be done within the framework of the school culture as follows:

> P4- "*School culture and trust are very important to prevent errors and to carry out a healthy education process at school. Our school culture includes the idea that we have to meticulously carry out the task given to us by the school principal in the way he shows us. Because the school principal will be careful about this task and will follow us. Because he makes the necessary explanation and preliminary information before the task and then checks it.*"

Consequences of Errors

Error management aims to mitigate negative outcomes while providing new learning from errors. School leaders were asked what consequences they reached from errors made in school. Participants have generally stated that they learn from errors, benefit (lessons) from errors, and make some changes in the school within this scope. School leaders generally think that errors provide teachers with new learning. In this regard, one participant (K10) stated that new learning occurs by talking about errors at school with the following view "*We generally talk and discuss in meetings what can be done to avoid such errors. Our colleagues also gain a different perspective from the errors*". Similarly, another school leader (K6) stated that errors have positive results stating that "*We should not see errors as the source of the problem. We see errors as learning and improvement. This situation also leads to a positive result such as activating the learning processes in the school*". A participant (K9) who has stated that errors mobilize the school organization explains this situation as follows: "*In a sense, errors are things that teach and actually add dynamism to the school. Because it saves us from being mechanical. I also see that it contributes a lot from time to time because it supports new learning by making the other party see that they are deficient at certain points*."

Participants emphasized that errors are shared among teachers at school unless there is a very special situation. Thus, school leaders think that stakeholders learn lessons from errors as they are discussed at school. This also mitigates the negative consequences of errors. A participant (P9) has explained the situation at school as follows: "*Errors are shared with other friends at school to prevent similar errors from being made. In other words, let's say we all learn the necessary lesson from errors.*" Another school leader (P1) has emphasized that the necessary lesson is learned from errors shared among colleagues within the framework of confidentiality with the view that "*If this error happened to me, it somehow gets heard at school. Unless it is a very secret situation, errors made are generally heard in institutions. These errors definitely cause a lesson to be learned among colleagues*."

While errors provide new learning in school, they also bring positive changes when the school leaders accept and adapt to change. Otherwise, in an organization where there is no change, errors and their negative results may continue to increase. A school leader has exemplified this change in the shift system as follows:

> P3- "*As you know, shifts are made monthly. One of our teachers suggested turning monthly shifts into weekly shifts. Because the weather is very cold, especially in the winter months. When the same teachers keep watch in the garden for a month, they get cold and get sick. So, we organized the shifts weekly. In this case, we, as the school administration, accepted our error and immediately switched to weekly shift practice in the first week of December*."

Discussion and Conclusion

This study exploredthe views of school leaders on error management and error management strategies at school. First, it presents three different perspectives on errors: error is acceptable - error is not acceptable - error does not occur. The framework presented by the participants suggests that school leaders' error perspective determines the strategies they have used while managing errors at school. The process of error management begins when organizations accept that errors are inevitable. Next, the source of the error must be identified immediately, and errors must be openly discussed in the organization. After school leaders accept that errors occur in schools, they should investigate the sources of errors as stated by Frese and Keith (2015).

The findings of this study highlight that there are individual error sources, including neglect, lack of knowledge and skill, well-being, and collective sources of errors, including poor communication, the unclear legislation, and school culture. The individual and collective-level sources of error are supported by the literature. Lei et al. (2016) explain the sources of error in terms of individual characteristics. Openness to innovation, proactive behavior, and taking initiative significantly influence error occurrence. Similarly, Akuzum and Ozmen (2013) have revealed that errors in schools are mostly caused by such individual factors as inexperience, lack of knowledge, indifference to work, inattention, and personal attitude. The finding of lack of knowledge and skill is parallel with the study by Prümper et al. (1992), which pointed out that novice employees usually make errors because of limited knowledge and work experience. However, more experienced and expert individuals also make errors. As their work becomes routine, they behave automatically with limited attention. Additionally, the state of well-being is also an individual antecedent of making errors, which is similar to the study by Hunter et al. (2011). They have expressed that when people are physically or mentally fatigued, the possibility of making errors gets higher.

A prominent factor in arguments about errors at the collective level is the culture, particularly the error management culture. The current study builds on this by identifying similar sources of errors, such as lack of communication and school culture at the collective level, as found by Hunter et al. (2011) in school leaders. As Khan (2023) has stated communication in the organization has a key role in reaching organizational goals, otherwise poor communication results in confusion, which can direct people to make an error. Apart from these, the unclear legislation can cause errors at schools. Though there is school legislation strictly depending on the central authority in Türkiye, the vague statements outlined in the legislation can be implemented in different ways based on school characteristics. In addition to organizational culture, Akuzum and Ozmen (2013) have emphasized that errors in schools mostly arise from organizational structure including managerial attitudes, hierarchy, lack of planning, and inadequate infrastructure. These findings contribute to the literature by highlighting the prominent role of organizational culture and structure for error management.

Determining the error management culture in organizations requires examining the members' error perception, reaction, and handling methods (Cusin& Goujon-Belghit, 2019). Error management culture in organizations refers to organizational procedures, practices, and attitudes toward errors (Li, 2016). From the findings of this study, it has appeared that error management strategies can be categorized before error, after error, and in terms of both cases. This finding is similar to the study conducted by Frese and Keith (2015), which addressed the error management culture process before and after the error. According to the authors, the stage before the error covers the prevention stage, while the management stage begins after the error occurs, which aims

to turn the consequences of the error into positive. Lei et al. (2016) have also evaluated this process in terms of error management (adaptation, improvisation, flexibility) and prevention (routine, control, standardization) strategies. On the contrary, Goodman et al. (2011) have considered the prevention phase as an error management approach. In this study, the error management process is framed as before (prevention) and after (management) errors. Before errors, school leaders have used such error management strategies as making detailed explanations, setting rules, and sharing past errors. After errors, they immediately intervene to the case and warn them to minimize negative effects. At both cases, school leaders prefer being tolerant and communication. Consistent with this, Moraca et al. (2024) have emphasized direct relationship between leadership, tolerant climate and error management culture. In short, this study has pointed out that school leaders set clear rules and share professional experiences in meetings, provide detailed explanations with teachers about their duties or responsibilities because they think that errors in schools are mostly resulted from misunderstanding of official documents, uncertainty or inexperience.

During the error management process, positive or negative reactions can be given to errors. In this study, it is determined that school leaders first evaluate the error. Depending on the severity of the error, participants have stated that they use error management strategies such as immediate intervention, ignoring, enforcing legislation, mediating, and warning. Among these, warning is the most commonly used strategy. Because school leaders talk about past errors in meetings, ceremonies, or informal conversations and warn their stakeholders not to repeat them. When errors become widespread, school leaders are also warned by top management or subjected to legal sanctions (Ozdogru & Guclu, 2021). According to school leaders, errors are usually made regarding exam dates, grades, and official correspondence. At this point, participants emphasize that they correct errors by extending the dates related to the system or re-entering the grades. On the other hand, school leaders, who do not accept the error, prefer to ignore it or put the responsibility on someone else by enforcing the legislation. A similar understanding is also seen in the study conducted by Gokturk et al. (2017). In order not to cause conflict, school leaders often ignore errors and punish those responsible for errors by the legislation without talking about them. Similarly, Nanto (2021) has revealed that school leaders give harsh reactions such as blaming the teacher for the error and shouting. Errors in schools can be related not only to the school leader and teacher but also to the student and parent. Especially in errors caused by parents and teachers, school leaders take on the role of mediator. When school leaders get stuck in the error management process, they take advice from their colleagues. The finding of mediation and taking advice as an after error strategy is also supported by other studies (Akuzum & Ozmen, 2013; Nanto, 2023; Ozdogru& Guclu, 2021) in the literature. As can be seen, school leaders benefit from the experiences of their colleagues by establishing a network in error management, as in other issues.

This study has revealed that communication and a tolerant school culture are two important strategies used both before and after the error in schools. It has also been emphasized in different studies (Fischer et al., 2018; Klamar et al., 2022; Van der Byl& Vredenburg, 2023; Van Steenbergen et al., 2020) that communication and culture are indispensable elements in the error management process. Klamar et al. (2022) has drew attention to the fact that communication is a prerequisite for culture. For this reason, talking about errors is inevitable for an effective error management culture (Van Steenbergen et al., 2020). Similarly, Fischer et al. (2018) have emphasized that effective error management culture requires organizational practices such as talking about errors, sharing errors, and quickly detecting and addressing errors. Van der Byl and Vredenburg (2023) have also stated that a culture focused on correcting errors contributes to organizational development. Additionally, teachers' understanding of error management in the

classroom is affected by the error management culture in the school (Demirdag, 2015). All told, communication and organizational culture are seen as the cornerstone of the error management process in every context.

Whether school leaders accept it or not, errors are made in every setting where people are present. These errors have consequences that can lead to insignificant or catastrophic losses, the dissolution of organizations, the collapse of countries, and even the extinction of people (Guo & Liu, 2018, 1). At this point, effective error management comes into play in turning the consequences of errors into benefits for the organization. The findings of this study show that school leaders generally learn from errors, benefit (lessons) from errors, and make some changes in the school within this scope. This finding aligns with the research (Akgun et al. (2023; Ozdogru & Guclu, 2021; Zhao et al., 2024) in the literature, which points out that errors lead to creative solutions (Arenas et. al., 2023). Ozdogru and Guclu (2021) have also revealed that errors contribute to the professional development and learning of school leaders. Akgun et al. (2023) and Zhao et al. (2024) also have found a positive relationship between error management culture and organizational learning. Although errors provide learning, they sometimes cause negative consequences in the school such as a negative organizational climate, a decrease in the quality of education, and loss of labour and time (Akuzum & Ozmen, 2013).

As a conclusion, this study on school leaders' views about error management and error management strategies presents the fact that errors are inevitable at school, where multifaceted, complex, and informal relationships are intensely experienced, though some participants have refused errors. School leaders have faced individual or collective errors, which resulted mostly from neglect, lack of knowledge and skill, poor communication, and school culture. This study highlights the error management process can be conducted before or after errors at schools. It has been revealed that before the errors, school leaders mostly used prevention strategies such as sharing past errors, setting rules, and making detailed explanations for error management. After the mistake, it is seen that school leaders evaluate the impact of the error and sometimes ignore it, mediate, and sometimes apply sanctions in line with the legislation. However, the general stance of school leaders towards errors is constructive. They have adopted the basic principle of communicating and showing tolerance both before and after the error. In line with this understanding, it has been determined that errors in schools result in new learning, lessons from errors and making a change.

Suggestions and Limitations

As this study has mentioned, errors can be made at school because of individual or collective sources as given above. Thus under any circumstances, school leaders should accept errors instead of refusing or ignoring them since error management begins when the errors are accepted. This study is limited to school leaders' views on error management. The researchers can conduct studies with various stakeholders to determine the error management culture at the school. For this purpose, case studies with triangulation can be a good design to comprehend the school culture on errors. Apart from this, in centralized education systems like Türkiye, unclear legislation can cause systemic errors or school leaders can misinterpret the legislation. To mitigate this, school leaders can be given more initiative and autonomy. In addition, all stakeholders should be informed about their rights, duties, and responsibilities at the beginning of the term meetings. Setting clear schools also facilitates the error management process. Errors may be inevitable in school, but it is possible to direct them positively. Finally, for practitioners communicating errors, being tolerant,

and learning from errors are indispensable for creating an effective error management culture at school.

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Conflicts of Interest

The author conducted the study alone. There is no conflict of interest.

Ethics

The ethics application for the study was made on 30/07/2021 and the research was carried out with the approval of Trakya University Ethics Commission dated 08/09/2021 and numbered 07/07 (E-29563864-050.04.04-117952).

References

Abay, J. R., & Clores, M. A. (2022). Beliefs, attitudes, and practices of high school teachers in handling students' errors: Implications for error-tolerant mathematics classrooms. *International Journal on Emerging Mathematics Education, 6*, 101-118.

Ahmed, S. K. (2024). The pillars of trustworthiness in qualitative research. *Journal of Medicine, Surgery, and Public Health, 2*, 1-4. https://doi.org/10.1016/j.glmedi.2024.100051

Akgun, A. E., Keskin, H., Aksoy, Z., Samil Fidan, S., & Yigital, S. (2023). The mediating role of organizational learning capability and resilience in the error management culture-service innovation link and the contingent effect of error frequency. *The Service Industries Journal*, *43*(7-8), 525-554.

Akuzum, C., ve Ozmen, F. (2013). Okul yöneticilerinin okul ortamında yaşanan örgütsel hatalara yönelik tavır alışları [Attitudes of school administrators towards organizational errors in the school environment]. *Dicle Üniversitesi Ziya Gökalp Eğitim Fakültesi Dergisi*, 21, 332-351.

Arenas, A., Briones, E., & Tabernero, C. (2023). Error orientation in a decision-making simulation program: differences between promotion vs. prevention focus. *Frontiers in Psychology, 14*, 1057634.

Biggerstaff, D. L., & Thompson, A. R. (2008). Interpretative phenomenological analysis (IPA): A qualitative methodology of choice in healthcare research. Qualitative Research in Psychology, 5, 173-183.

Carayon, P., & Wood, K. E. (2010). Patient safety: The role of human factors and systems engineering. *Studies in Health Technology and Informatics*, 153, 23–46.

Creswell, J. W. (2015). *Nitel araştırma yöntemleri [Qualitative research methods]* (2. Baskı) (Çev. Edt. M. Bütün ve S. B. Demir). Siyasal Kitabevi.

Creswell, J. W., & Miller, D. L. (2000). Determining validity in qualitative inquiry. *Theory into practice*, 39(3), 124-130.

Cusin, J., & Goujon-Belghit, A. (2019). Error reframing: Studying the promotion of an error management culture. *European Journal of Work and Organizational Psychology*, *28*(4), 510–524. https://doi.org/10.1080/1359432X.2019.1623786

Demirdag, S. (2015). Management of errors in classrooms: student mistakes and teachers. *International Journal of Humanities and Social Science, 5*(7), 77-83.

Dimmock, C. (1996). Dilemmas for school leaders and administrators in restructuring. In *International Handbook of Educational Leadership and Administration: Part1–2* (pp. 135-170). Springer Netherlands.

Divsar, H., & Dolat Pour, E. (2018). Error management behaviors in EFL classrooms: teachers' responses to students' errors. *Iranian Journal of English for Academic Purposes, 6*(2), 86-99.

Edmondson, A. C. (2003). Speaking up in the operating room: How team leaders promote learning in interdisciplinary action teams. *Journal of Management Studies, 40*(6), 1419–1452.

Fischer, S., Frese, M., Mertins, J. C., & Hardt-Gawron, J. V. (2018). The role of error management culture for firm and individual innovativeness. *Applied Psychology, 67*(3), 428-453.

Frese, M., & Keith, N. (2015). Action errors, error management, and learning in organizations. *Annual review of psychology*, *66*, 661-687.

Gokturk, S., Bozoglu, O. & Guncavdi, G. (2017). Error management practices interact with national and organizational culture. *The Learning Organization*, 24(4), 245-256.

Goodman, P. S., Ramanujam, R., Carroll, J. S., Edmondson, A. C., Hofmann, D. A., & Sutcliffe, K. M. (2011). Organizational errors: Directions for future research. *Research in Organizational Behavior*, *31*, 151-176.

Guchait, P., Paşamehmetoğlu, A., & Madera, J. (2016). Error management culture: impact on cohesion, stress, and turnover intentions. *The Service Industries Journal*, *36*(3-4), 124-141.

Guo, K. ve Liu, S. (2018). *Fundamentals of error theory: Applications in decision-making*. Springer

Hanington, B., & Martin, B. (2019). *Universal methods of design expanded and revised: 125 Ways to research complex problems, develop innovative ideas, and design effective solutions*. Rockport publishers.

Holland, H., Ky, L., Hensley, D. Cummins, H.J., Bonti, S. (2013). The school principal as leader: Guiding schools to better teaching and learning. *Report on School Leadership*. Wallace Foundation Publication

Hoque, K. E., Alam, G. M., & Ghani, M. F. A. (2011). Principals' roles under school based management that influence school improvement. *New Educational Review*, *23*(1).

Hunter, S. T., Tate, B. W., Dzieweczynski, J. L., & Bedell-Avers, K. E. (2011). Leaders make mistakes: A multilevel consideration of why. *The Leadership Quarterly*, *22*(2), 239–258. https://doi.org/10.1016/j.leaqua.2011.02.001

Khan, H. (2023). Lack of communication in the workplace: causes and effects. https://www.simpplr.com/blog/2021/causes-effects-poor-communication-workplace/ (12.08.2024).

Klamar, A., Horvath, D., Keith, N., & Frese, M. (2022). Inducing error management culture–evidence from experimental team studies. *Frontiers in Psychology*, *12*, 716915.

Kurum Tiryakioglu, G. (2024). Error management culture in schools and its relationship with teachers' psychological withdrawal behaviors. *Journal of Pedagogical Research*, *8*(2), 113-128. https://doi.org/10.33902/JPR.202425804

Leape, L. L., & Berwick, D. M. (2005). Five years after To Err Is Human: What have we learned? *JAMA*, 293(19), 2384–2390. https://doi.org/10.1001/jama.293.19.2384

Lei, Z., Naveh, E., and Novikov, Z. (2016). Errors in organizations: An integrative review via level of analysis, temporal dynamism, and priority lenses. *Journal of Management*, 42, 1315–1343. doi: 10.1177/0149206316633745

Merriam, S. B., and Tisdell, E. J. (2015). *Qualitative research: A guide to design and implementation* (4th Ed.). John Wiley & Sons.

Moraca, E., Zaghini, F., Fiorini, J., & Sili, A. (2024). Nursing leadership style and error management culture: a scoping review. *Leadership in Health Services*, *37*(4), 526-547.

Nanto, Z. (2021). *The relationship between error management culture, work engagement, and organizational creativity.* [Doctoral dissertation,]. Fırat University, Elazığ, Türkiye.

Nanto, Z. (2023). Çocuk gelişimcilerinin hata yönetimi kültürüne yönelik görüşlerinin değerlendirilmesi [Evaluation of child development specialists' views on error management culture]. *Kesit Akademi*, *8*(32), 234-251.

Ozdogru, M., & Guclu, N. (2021). Okul yöneticilerinin yaptıkları yönetimsel hataların mesleki gelişim ve öğrenme bağlamında incelenmesi: hatalardan öğrenme [Examining administrative mistakes made by school principals in the context of professional development and learning: learning from mistakes]. *Eskişehir Osmangazi Üniversitesi Türk Dünyası Uygulama ve Araştırma Merkezi Eğitim Dergisi*, *6*(1), 46-62.

Patton, M. Q. (2014). *Nitel araştırma ve değerlendirme yöntemleri [Qualitative research and evaluation methods]*. (M. Bütün ve S. B. Demir, Çev. Edt.). Pegem Akademi.

Prümper, J., Zapf, D., Brodbeck, F. C., & Frese, M. (1992). Some surprising differences between novice and expert errors in computerized office work. *Behavior and Information Technology*, 11, 319-328.

Reason, J. (2000). Human error: Models and management. *BMJ: British Medical Journal, 320*(7237), 768–770. https://doi.org/10.1136/bmj.320.7237.768

Riani, S. S., & Ain, S. Q. (2022). The role of school principal in implementing education quality management. *Jurnal Ilmiah Sekolah Dasar*, *6*(2), 204-211.

Seckler, C., Fischer, S., & Rosing, K. (2021). Who adopts an error management orientation? Discovering the role of humility. *Academy of Management Discoveries, 7*(4), 461-481.

Shenton, A. K. (2004). Strategies for ensuring trustworthiness in qualitative research projects. *Education for Information, 22*(2), 63-75.

Soncini, A., Visintin, E. P., Matteucci, M. C., Tomasetto, C., & Butera, F. (2022). A positive error climate promotes learning outcomes through students' adaptive reactions toward errors. *Learning and Instruction*, *80*, 101627.

Trail, K. (2000). Taking the Lead: The Role of the Principal in School Reform. *CSRD Connections, 1*(4), 2-9.

Van der Byl, C. A., & Vredenburg, H. (2023). The interrelatedness of error prevention and error management. *Frontiers in Psychology*, *14*(1032472), 1-12. https://doi.org/10.3389/fpsyg.2023.1032472

Van Dyck, C., Frese, M., Baer, M., & Sonnentag, S. (2005). Organizational error management culture and its impact on performance: a two-study replication. *Journal of Applied Psychology*, *90*(6), 1228.

Van Steenbergen, E., Van Dijk, D., Christensen, C., Coffeng, T., & Ellemers, N. (2020). Learn to build an error management culture. *Journal of Financial Regulation and Compliance, 28*(1), 57-73.

Vogus, T. J., & Sutcliffe, K. M. (2007a). Organizational resilience: Towards a theory and research agenda. In *IEEE International Conference on Systems, Man and Cybernetics* (pp. 3418–3422). Montreal.

Yildirim, A. & Simsek, H. (2011). *Sosyal bilimlerde nitel araştırma yöntemleri* [*Qualitative research methods in social sciences*](8. Edition). Seçkin Yayıncılık.

Zhao, B., Lu, Y., Wang, X., & Pang, L. (2024). Challenge stressors and learning from failure: the moderating roles of emotional intelligence and error management culture. *Technology Analysis & Strategic Management*, *36*(2), 238-251.

Zhou, Q., & Zhang, H. (2024). Error management culture and college students' self-development: The serial mediating roles of grit and learning from failure. *Innovations in Education and Teaching International*, 1-14.

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Adaptation of Student-Educator Negotiated Critical Thinking Dispositions Scale into Turkish Educational Context

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ABSTRACT

The aim of this study was to adapt the Student-Educator Negotiated Critical Thinking Dispositions Scale (2020) developed by Quinn et al. (2020) to the Turkish educational context. After the language validity studies, the Turkish version was administered to 380 university students: 178 (46.8%) female and 202 (53.2%) male. Confirmatory factor analysis was applied to examine the construct validity of the scale. The obtained fit values were found to be within the acceptable range. In order to examine the reliability of the scale, Cronbach's alpha value and Spearman-Brown correlation value were analyzed to determine the split-half reliability level. Cronbach's alpha value for the whole scale was 0.85 and Spearman-Brown correlation value was calculated as r=0.78. The significance of the difference between the item scores of the lower and upper 27% groups determined according to the total score was determined by t-test. The results of the study indicate that the Student-Educator Deliberative Critical Thinking Dispositions Scale, a six-dimensional instrument, possesses adequate validity and reliability when administered to Turkish students.

Keywords: Critical thinking, critical thinking dispositions, scale adaptation

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Introduction

According to the World Economic Forum (WEF) Future of Jobs Report 2020, self-management skills such as critical thinking and analysis, problem solving and active learning, resilience, stress tolerance and flexibility are among the skills that will continue to increase in importance in the next five years. According to the report, the skills that will become indispensable in this new period are called 3C (Complex Problem Solving, Creativity, Critical Thinking). Critical thinking, which is the use of logic and reasoning to identify the strengths and weaknesses of alternative solutions, outcomes or approaches to problems, is especially important in the 21st century, where skills such as technology design and programming are prominent.

Critical thinking is a metacognitive process that involves conceptualising, applying, analysing, synthesising, and evaluating information derived or generated from observation, experience, reflection, reasoning, communication as a guide to belief and action (Dwyer et al., 2016). Critical thinking skill is an important educational outcome that is linked to general job performance (Baril et al., 1998), effective decision making (Park & Kim, 2009), academic achievement (Scott & Markert, 1994), knowledge transfer and problem solving (Garcia & Pintrich, 1992).

Critical thinking involves higher level thinking skills, while critical thinking disposition is the process of making decisions about these skills (Facione & Facione, 1996). Critical thinking disposition, which has a positive relationship with critical thinking skills, is defined by Facione et al. (1995) as a consistent intrinsic motivation that enables decision making and problem solving. A student with high critical thinking skill level; attempts to reach wings on a discourse, reaches the correct source of the information obtained, may be aware of prejudices, ask effective questions, can express themselves clearly and they are aware of their own metacognition (Kökdemir, 2000).

In addition, critical thinking is an important ability for individuals to analyze their thought processes in depth and to distinguish between right and wrong (Ennis, 2011; Ritchhart et al., 2020). Individuals who can think critically are highly intrinsically motivated, determined, careful and open-minded (Facione, 2020).

Individuals with high intrinsic motivation move towards their own goals in their learning and development processes without the need for external incentives. These individuals are driven by curiosity and enjoy discovering new information on their own (Deci & Ryan, 1985; Ryan & Deci, 2020). Critical thinking is the guide of this curiosity because the individual questions the information they encounter, investigates its accuracy and reaches a logical conclusion (Paul & Elder, 2014; Bailin & Battersby, 2016). Perseverance ensures the sustainability of critical thinking. Determined individuals continue to look for solutions without giving up despite the difficulties they face (Duckworth, 2016). This makes it possible not to be afraid of making mistakes in the critical thinking process and to reach better results by learning from mistakes. Being attentive is another indispensable component of critical thinking. Attentive individuals pay attention to details and can see the subtle connections between events and information. This enables more sound decisions to be made by making in-depth analysis instead of superficial approaches (Halpern, 2014; Heijltjes et al., 2019). Open-mindedness, on the other hand, refers to the individual's respect for different views and opinions and evaluating every idea without prejudice. Critical thinking requires understanding different perspectives and developing one's own thoughts. Open-minded individuals give a chance even to ideas that contradict their own views, which increases their intellectual development (Zhang, 2021).

It is known that an individual spends important developmental periods at school in the process of his/her life. Therefore, the role of the teacher in teaching critical thinking skills to students is undeniable (Ennis, 1991). “The main task of the teacher is to guide and facilitate learning. In order to teach effectively, he/she knows how students learn and develop. It organises activities and provides opportunities to support their intellectual, social, and personal development. It applies various teaching strategies to encourage the development of critical thinking, problem solving and performance skills” (MoNE, 2002:23, cited in Öztürk, 2004). As can be seen from this definition, communication between the teacher and the student is particularly important in teaching not only critical thinking but also thinking skills.

When scale development studies related to critical thinking in the literature are examined; the scale for the evaluation of critical thinking through philosophical questioning for 5–6-year-old children (Karadağ et al., 2017), California critical thinking tendency scale (Kökdemir, 2003), Pamukkale critical thinking skills scale (Duru et. al., 2022), critical thinking skills scale (Karabulut et. al., 2023), critical thinking questionnaire (Sarıgöz, 2014), achievement test for measuring critical thinking skills (Eğmir & Ocak, 2016), critical thinking tendency scale (Akbıyık, 2002; Akın et al, 2015; Semerci, 2016), critical thinking motivation scale (Dönmez & Kaya, 2016), critical thinking attitude scale (Yılmaz Özelçi, 2012), teacher behaviours inventory supporting critical thinking (Alkın-Şahin & Gözütok, 2013), critical thinking skills scale for science course (Gülen, 2019), critical thinking scale for nurses (Urhan, 2019), critical thinking tendency scale for primary school students (Akar, Uluçınar, 2020), critical thinking skills test for high school students (Orhan & Çeviker-Ay, 2022), Marmara critical thinking tendencies scale (Özgenel & Çetin, 2018), critical thinking standards scale for prospective teachers (Aybek et al. , 2015), the effect of teacher attitudes on students' critical thinking skills scale (Tokyürek, 2001), critical thinking tendency scale for secondary school students (Yıldırım-Döner & Demir, 2021), UF/EMI critical thinking tendency scale (Kılıç & Şen, 2014). A scale that includes student-teacher joint communication was not found. Therefore, this study aimed to adapt the ‘Student-Educator Negotiated Critical Thinking Dispositions Scale’ developed by Quinn et al. (2020) into Turkish. Considering the limited availability of scales related to critical thinking dispositions, the adaptation of SENCTDS into Turkish is thought to be useful for studies that will examine the determinants and outcomes of both skill-based and disposition-based aspects of critical thinking.

Method

Research Model

The purpose of this study is to conduct validity and reliability analyses to adapt the Student-Educator Negotiated Critical Thinking Dispositions Scale (SENCTDS), originally designed to assess students' critical thinking dispositions, for use within a Turkish educational context.

Study Group

This study was conducted with 380 university students studying in the departments of Turkish and English Language Teaching at a university in the Aegean region of the 2023-2024 academic year. Of these, 178 (46.8%) were female and 202 (53.2%) were male. According to Child (2006), the recommended sample size for performing the factor analysis technique should be five times the number of items, and Comrey and Lee (1992) state that a sample size of three hundred is "good." The 380 responses collected for the 21-item Student-Educator Deliberative Critical Thinking Dispositions Scale are deemed sufficient.

Original Measurement Tool

'Student-Educator Negotiated Critical Thinking Dispositions Scale' developed by Quinn, Hogan, Dwyer, Finn, and Fogarty (2020) consisting of twenty-one items and 6 sub-dimensions developed to measure students' critical thinking dispositions. It is a 7-point Likert scale (1=strongly disagree, 7=strongly agree). In addition, items numbered 4,5,6,7,8,9,10,11 in the scale are reverse items.

To ensure the construct validity of the original scale, exploratory and confirmatory factor analyses were conducted with two different samples. As a result of confirmatory factor analysis, $\chi 2$= 166.278, p > .05, GFI =.909; IFI: .995; CFI=.978; RMSEA=.017, [90% CI:.000-.042] values were obtained. In addition to construct validity, convergent and divergent validity studies were also included in the development stages of the original scale. In these studies, it was found that there was a positive relationship between the Need for Cognition Scale, Motivated Strategies for Learning Questionnaire, and Real-World Outcomes Scale, which measure similar constructs, and a negative relationship between the Generic Conspiracist Beliefs Questionnaire and the Revised Paranormal Beliefs Scale for divergent validity. In addition, within the scope of the reliability study of the original scale, Cronbach's alpha values of the general and sub-dimensions of the scale were calculated. These values ranged between 0.59 and 0.82 (Quinn, et al., 2020).

Table 1. Number of items in the sub-dimensions of the scale and Cronbach's Alpha values

Scale ve Sub-Dimensions	Number of items	Cronbach's Alpha
1. Reflection	3	0.59
2. Attentivenes	4	0.79
3. Open-mindedness	4	0.82
4. Organisation	3	0.68
5. Perseverance	3	0.78
6. Intrinsic goal motivation	4	0.73
Scale-Wide	21	0.77

Operations Performed in Data Analysis

To adapt the scale into Turkish, permission was obtained from co-author M. Hogan via email. The study followed the steps outlined by Şeker and Gençdoğan (2020):

Step 1: Translation into Turkish

Step 2: Analysing and comparing translations

Step 3: Reversal method

Step 4: Initialising the translation test

Step 5: Application of language validity

Step 6: Statistical analyses related to language validity

Step 7: Finalising the translated test

Step 8: Reliability and validity analyses of the Turkish test

In the first step, the scale was translated from English, the original language of the scale, into Turkish by six experts. In the second step, six different translations were analysed by the researcher and her supervisor and edited as a Turkish form. Turkish translations were corrected by two Turkish language experts. In the third step, the Turkish form was translated back into English by four experts. In the fourth step, the translations were compared and edited by the field expert. In addition, it was sent to the authors of the scale to check whether the interpretation of the Turkish words (i.e. translated back into English) had the same meaning as the original English version. In the fifth step, the Turkish and English versions of the scale were administered to 30 English language teaching students at separate times. In the sixth step, correlation values were calculated based on the responses of the students. In the seventh step, a focus group interview was conducted with five university students to determine the comprehensibility of the items in the Turkish version of the scale. Their opinions about each item were taken and adjustments were made. Finally, the final check of the linguistic appropriateness of the scale was conducted by different Turkish language experts. In the eighth step, since the final version of the scale translated into Turkish is more suitable for the Turkish structure, the validity and reliability studies were conducted with the data obtained by organizing and applying the scale as a 5-point Likert scale as Completely Agree (5), Agree (4), Somewhat Agree (3), Disagree (2), Strongly Disagree (1).

Data Analyses

To ensure the language validity, which is one of the process steps of the scale adaptation study, the Turkish and English versions of the scale were applied to the same group within two weeks and the Pearson Product Moment correlation coefficient was calculated to determine the relationship between the scores obtained since the data were normally distributed. To examine the validity of the scale, construct validity was examined. Confirmatory factor analysis (CFA) was performed for construct validity and fit indices were examined. To examine the reliability of the scale, the Cronbach's alpha value of the scale and the Spearman-Brown correlation value were examined to determine the two-half reliability level. The t-test was used to test whether there was a significant difference between the item scores of the lower and upper 27% groups determined according to the total score.

Results

Language Validity

To ensure the language validity of the scale, the English and Turkish forms of the scale were administered to thirty students studying in the department of English language teaching. Pearson Product Moment correlation coefficients calculated according to the scores obtained were 0.82, 0.92, 0.90, 0.90, 0.75, 0.89, 0.90 for the 6 sub-dimensions, respectively. Since the correlation value should be at least 0.70 (Seçer, 2018), the results obtained show that the English and Turkish forms are equivalent.

Confirmatory Factor Analysis (CFA) Results

CFA was conducted to verify the existing factor structure of the Turkish translated SENCTDS scale. The results of CFA examined with the help of LISREL 8.80 programme are shown in Table 2.

Table 2. CFA results of SENCTDS

fit indexes	perfect fit criteria	acceptable fit criteria	pre-modification compliance criteria	post-modification compliance criteria
$\chi 2$	p>0.05		969.926	750.16
$\chi 2$/sd	$0 \leq \chi 2/sd \leq 2$	$2 \leq \chi 2/sd \leq 5$	4.6	4.3
RMSEA	$0.00 \leq RMSEA \leq 0.05$	$0.05 < RMSEA \leq 0.08$	0.077	0.073
CFI	$0.95 \leq CFI \leq 1.00$	$0.90 \leq CFI < 0.95$	0.93	0.93
IFI	$0.95 \leq IFI \leq 1.00$	$0.90 \leq IFI < 0.95$	0.93	0.93
NNFI	$0.95 \leq NNFI \leq 1.00$	$0.90 \leq NNFI < 0.95$	0.91	0.92
NFI	$0.95 \leq NFI \leq 1.00$	$0.90 \leq NFI < 0.95$	0.91	0.91
PGFI	$0.95 \leq PGFI \leq 1.00$	$0.50 \leq PGFI < 0.95$	0.67	0.67
GFI	$0.95 \leq GFI \leq 1.00$	$0.90 \leq GFI < 0.95$	0.89	0.90

Source: Kline (2011)

The fit values obtained before and after the modification between item 9 and item 11 are shown in Table 2. It was determined that the X2/sd value changed from 4.6 to 4.3. According to Hooper et al. (2008), this value being less than 5 is an acceptable value. As a result of the modification, X^2/sd value and RMSEA and GFI values also changed, and it was determined that the fit indices obtained were within the acceptable value range. The t values obtained because of CFA were analysed, and it was seen that all items were significant at 0.01 level. In addition, Figure 1 shows that the item-standardized load values in the model are greater than 0.30 (Seçer, 2018).

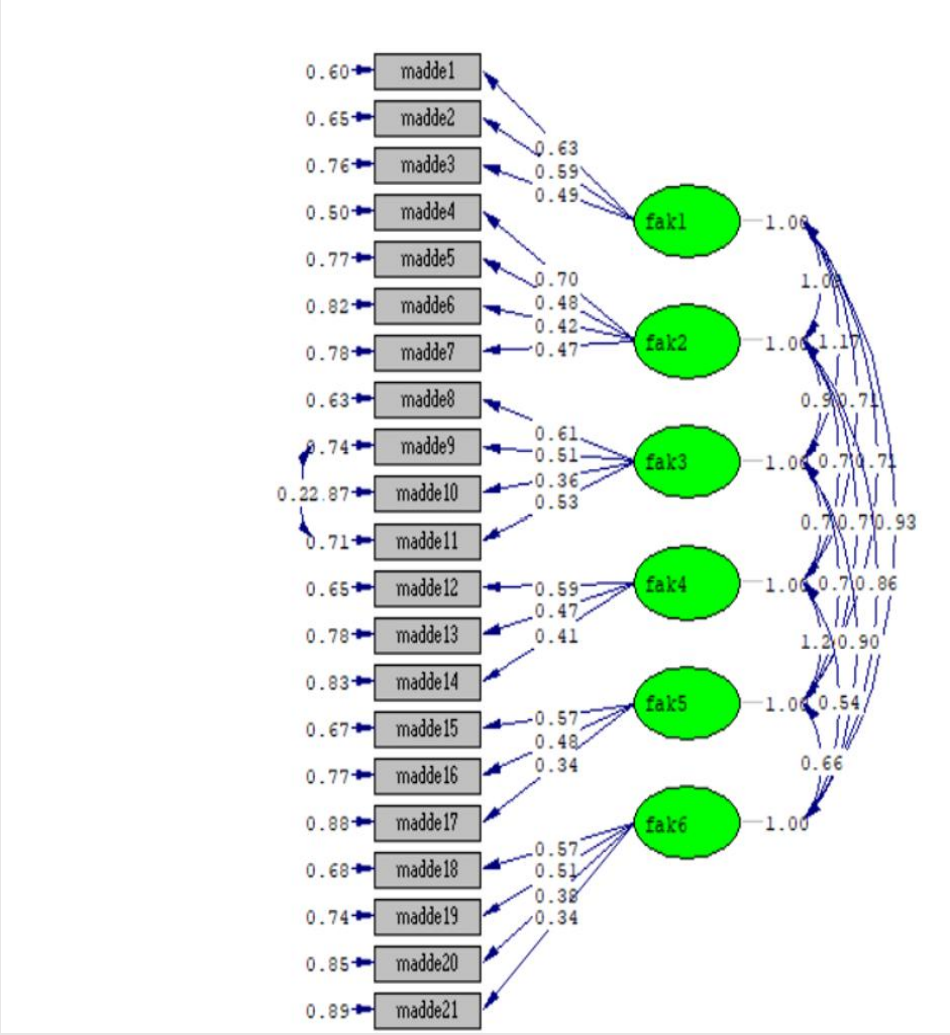

Figure 1. Standardised load values of SENCTDS

Reliability

Cronbach's alpha method was used to determine the reliability of the Student-Educator Negotiated Critical Thinking Dispositions Scale. Cronbach's alpha coefficient of the scale was calculated as 0.85. For the scale to be considered reliable, the reliability coefficient must be at least 0.70 (Büyüköztürk, 2020).

Table 3. Reliability coefficients of the total and sub-dimensions of the scale

Sub-Dimension	Original	Turkish
1. Reflection	0.59	0.65
2. Attentivenes	0.79	0.81
3. Open-mindedness	0.82	0.83
4. Organisation	0.68	0.69
5. Perseverance	0.78	0.79
6. Intrinsic goal motivation	0.73	0.73
TOTAL	**0.77**	**0.85**

In addition, the Spearman-Brown correlation value showed that the two-half reliability level of the scale was r=0.78. The Spearman-Brown correlation value of at least 0.70 in the scale development and adaptation process shows that the scale has sufficient reliability. Independent sample t-test was performed to determine whether there was a significant difference between the item mean scores of the lower 27% and upper 27% groups determined according to the SENCTDS scale scores.

Table 4. T-test results for the lower-upper group averages of the scale sub-dimensions

Sub-Dimension	Group	N	Mean	SS	sd	t	p
Reflection	Subgroup	103	13.9	1.34	204	-57.62	.000*
	Topgroup	103	24.81	0.38			
Attentiveness	Subgroup	103	19.07	1.81	204	-52.22	.000*
	Topgroup	103	28.64	0.47			
Open-mindedness	Subgroup	103	16.13	1.70	204	-52.83	.000*
	Topgroup	103	28.43	1.10			
Organization	Subgroup	103	10.37	1.47	204	-50.63	.000*
	Topgroup	103	21.56	1.08			
Perseverance	Subgroup	103	11.31	1.63	204	-48.44	.000*
	Topgroup	103	22.09	0.77			
Intrinsic goal motivation	Subgroup	103	22.56	1.77	204	-39.61	.000*
	Topgroup	103	32.30	0.65			

According to the t-test results in Table 4, it was determined that there was a significant difference between the lower and upper groups (*p<.05). According to the results obtained, the total scores of 6 sub-dimensions distinguish the individuals in the lower and upper groups. In Table 5, it was seen that there was a significant difference between the averages of the lower and upper 27% groups for each item in the scale, and it was concluded that each item was sufficient to distinguish individuals in terms of the feature it measured. In addition, item-total correlation values showing the relationship between the score obtained from each item and the total scale score were calculated. Item-total correlations ranged from 0.25 to 0.62, exceeding the 0.20 threshold (Büyüköztürk, 2020), indicating strong internal consistency.

Table 5. Item-total correlation and t-test results for lower-upper group means

Item no	t (Top%27- Sub%27)	Item-Total Correlation	Item no	t (Top%27- Sub%27)	Item-Total Correlation
Item 1	22.05*	0.62	Item 12	13.28*	0.40
Item 2	18.11*	0.53	Item 13	15.85*	0.46
Item 3	11.83*	0.42	Item 14	11.44*	0.34
Item 4	18.07*	0.61	Item 15	14.11*	0.41
Item 5	11.66*	0.46	Item 16	13.61*	0.41
Item 6	15.28*	0.40	Item 17	11.37*	0.37
Item 7	10.49*	0.39	Item 18	11.55*	0.43
Item 8	15.56*	0.56	Item 19	11.69*	0.40
Item 9	14.25*	0.44	Item 20	9.53*	0.32
Item 10	11.08*	0.33	Item 21	5.34*	0.25
Item 11	18.51*	0.52			

*p<.05

Discussion and Conclusion

In this study, the Student-Educator Negotiated Critical Thinking Dispositions Scale developed by Quinn et al. (2020) was adapted into Turkish. Language and field experts were assisted in ensuring language validity. The original 7-point Likert-type scale was organised as a 5-point Likert scale as Completely Agree (5), Agree (4), Somewhat Agree (3), Disagree (2), Strongly Disagree (1) because it is more suitable for Turkish structure. The original and Turkish forms of the scale were administered to thirty students studying in the English language teaching department at different times. The scale scores obtained from the two forms were calculated according to the sub-dimensions and Pearson Product Moment correlation coefficients were calculated as 0.82, 0.92, 0.90, 0.75, 0.89, 0.90, 0.75, 0.89, 0.90 for the 6 sub-dimensions respectively. In order to determine the comprehensibility of the items in the scale translated into Turkish, a focus group interview was conducted with university students and the final check of the linguistic appropriateness of the scale was carried out by a Turkish language expert.

The 6-factor structure of the Student-Educator Deliberative Critical Thinking Dispositions Scale was confirmed by CFA as in the original scale. The fit values obtained (X^2/sd =4.3, RMSEA=0.073, CFI=0.93, IFI=0.93, NNFI=0.92, NFI=0.91, PGFI=0.67, GFI=0.90) were within the acceptable range (Bentler, 1980; Çokluk et al., 2012). There is no definite criterion regarding which of the many fit values obtained because of CFA will be accepted as standard (Munro 2005, cited in Çapık, 2014). As a result of the fit values obtained, it can be said that the 6-dimensional structure of the scale is compatible and sufficient with the original structure.

For the reliability of the scale, Cronbach's alpha coefficients of the whole scale and its sub-dimensions were calculated. It was calculated as 0.85 for the whole scale, 0.65 for reflection sub-dimension, 0.81 for attention sub-dimension, 0.83 for open-mindedness sub-dimension, 0.69 for organisation sub-dimension, 0.79 for perseverance sub-dimension and 0.73 for intrinsic motivation sub-dimension. These values were found to be compatible with the Cronbach's alpha values in the original scale. In addition, the Spearman-Brown correlation value for the split-half reliability level of the Turkish translated scale was calculated as r=0.78.

In order to determine the discrimination of the scale, t-test results were examined between the scores of the lower and upper 27% groups. It was determined that there was a significant difference in the results obtained. This shows that the items in the scale are discriminative. In addition, item-total correlation values were calculated to determine the relationship between each item and the total scale score. Correlation values were found to vary between 0.25 and 0.62. When the item-total correlation values in Table 5 are analysed, it is seen that the correlation value of the first 20 items is higher than 0.30 and the 21st item has a value of 0.25. Positive and high item-total correlation values indicate that the items in the scale measure similar behaviours and have high internal consistency (Büyüköztürk, 2020).

The results confirm that the SENCTDS scale has 6 sub-dimensions as in the original scale, the internal consistency of these sub-dimensions is high and serves the targeted purpose. Thus, it can be said that the Student-Educator Negotiated Critical Thinking Dispositions Scale can be used to measure the critical thinking dispositions of students.

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Conflicts of Interest

This research was conducted by Emine CAN YURT under the supervision of Associate Professor. Dr. Beste DİNÇER. Both authors are half responsible for the transformation, control, editing and supervision of the article.

Ethics

With the decision number 2024/5-XXV dated 03.06.2024 of Adnan Menderes University Educational Research Ethics Committee, it was stated that the study was in accordance with the principles of the ethics committee.

References

Akar, C. & Uluçınar, U. (2020, 3-6 Eylül). *İlkokul öğrencileri için eleştirel düşünme eğilimi ölçeği geliştirme çalışması: geçerlilik ve güvenirlik analizi* [Bildiri sunumu]. 4. Uluslararası Sınırsız Eğitim ve Araştırma Sempozyumu, Ankara, Türkiye.

Akbıyık, C. (2002). *Eleştirel düşünme eğilimleri ve akademik başarı* (Yüksek lisans tezi). Hacettepe Üniversitesi Sosyal Bilimler Enstitüsü, Ankara

Akın, A., Hamedoğlu, M. A., Arslan, S., Akın, U., Çelik, E., Kaya, Ç., Arslan, N. (2015). The adaptation and validation of the Turkish version of the Critical Thinking Disposition Scale. *The International Journal of Educational Researchers, 6*(1), 31-35.

Alkın-Şahin, S. & Gözütok, F. D. (2013). Eleştirel düşünmeyi destekleyen öğretmen davranışları envanteri (EDDÖDE): geliştirilmesi ve uygulanması. *Eğitim Bilimleri Araştırmaları Dergisi, 3*(2), 223-254. http://dx.doi.org/10.12973/jesr.2013.3212a

Aybek, B., Aslan, S., Dinçer, S. & Coşkun-Arısoy, B. (2015). Öğretmen adaylarına yönelik eleştirel düşünme standartları ölçeği: geçerlik ve güvenirlik çalışması. *Kuram ve Uygulamada Eğitim Yönetimi Dergisi, 21*(1), 25-50. http://dx.doi.org/10.14527/kuey.2015.002

Bailin, S., & Battersby, M. (2016). *Reason in the balance: An inquiry approach to critical thinking*. Hackett Publishing Company.

Bentler, P. M. (1980). Multivariate analysis with latent variables: causal modeling. *Annual Review of Psychology, 31*, 419-456. https://doi.org/10.1146/annurev.ps.31.020180.002223

Büyüköztürk, Ş. (2020). *Sosyal bilimler için veri analizi el kitabı.* Pegem Yayıncılık.

Çapık, C. (2014). Geçerlik ve güvenirlik çalışmalarında doğrulayıcı faktör analizinin kullanımı. *Anadolu Hemşirelik ve Sağlık Bilimleri Dergisi,17*(3), 196-205.

Child, D. (2006). *The essentials of factor analysis (3th Edition).* Continuum.

Çokluk, Ö. S., Şekercioğlu, G. & Büyüköztürk, S. (2012). *Sosyal bilimler için çok değişkenli istatistik: SPSS ve LISREL uygulamaları.* Pegem Akademi Yayıncılık.

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

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. Springer Science & Business Media.

Dönmez, B. ve Kaya, F. (2016). Eleştirel düşünme motivasyonu ölçeği'nin Türkçe'ye uyarlanması. *Hasan Ali Yücel Eğitim Fakültesi Dergisi, 13*(25), 159-173.

Duckworth, A. L. (2016). *Grit: The power of passion and perseverance*. Scribner.

Duru, E., Özgüngör, S., Yıldırım, O., Duatepe-Paksu, A., & Duru, S. (2022). Pamukkale eleştirel düşünme becerisi ölçeği: Geçerlik ve güvenirlik çalışması. *International Journal, 9*(3), 741-771.

Eğmir, E., & Ocak, G. (2016). Eleştirel düşünme becerisini ölçmeye yönelik bir başarı testi geliştirme. *Electronic Turkish Studies, 11*(19), 337-360. http://dx.doi.org/10.7827/TurkishStudies.9961

Ennis, R. (1991). Critical thinking: A streamlined conception. *Teaching Philosophy, 14*, 15-24. http://dx.doi.org/10.5840/teachphil19911412

Ennis, R. (2011). Critical thinking: Reflection and perspective—Part I. *Inquiry: Critical Thinking Across the Disciplines, 26*(1), 4-18.

Facione, N. C., & Facione, P. A. (1996). Externalizing the critical thinking in knowledge development and clinical judgment. *Nursing Outlook, 44*(3), 129-136.

Facione, P. A. (2020). *Critical thinking: What it is and why it counts*. Insight Assessment.

Facione, P. A., Sanchez, C. A., Facione, N. C., & Gainen, J. (1995). The disposition toward critical thinking. *The Journal of General Education, 44*(1), 1-25.

Garcia, T. & Pintrich, R. (1992). *Critical thinking and its relationship to motivation, learning strategies, and classroom experience,* Paper presented at the Annual Meeting of the American Psycho. Association, Seattle, W.A.

Gülen, S. (2019). Development of Critical thinking skills scale for science lesson. *European Journal of Education Studies, 6*(4), 161-178. http://dx.doi.org/10.5281/zenodo.3335835

Halpern, D. F. (2014). *Thought and knowledge: An introduction to critical thinking*. Psychology Press.

Heijltjes, A., van Gog, T., & Paas, F. (2019). Improving critical thinking: Effects of dispositions and instructional interventions. *Learning and Instruction, 63*, 101210.

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.

Karabulut, H., Gökçe, H., & Kariper, A. (2023). Eeştirel düşünme becerisi ölçeğinin geliştirilmesi (ortaokul örneklemi). *Kırıkkale Üniversitesi Sosyal Bilimler Dergisi*, *13*(2), 443-461.

Karadağ, F., Demirtaş, Y. V., & Yıldız, T. (2017). 5-6 Yaş çocuklar için felsefi sorgulama yoluyla eleştirel düşünmenin değerlendirilmesi ölçeğinin geliştirilmesi. *International Online Journal of Educational Sciences, 9*(4), 1025-1037.

Kılıç, H. E., & Şen, A. İ. (2014). UF/EMI Eleştirel düşünme eğilimi ölçeğini türkçeye uyarlama çalışması. *Eğitim ve Bilim, 39*(176), 1-12. http://dx.doi.org/10.15390/EB.2014.3632

Kline, R. B. (2011). *Yapısal eşitlik modellemesinin ilkeleri ve uygulaması (Çev. Şen, S.)* Nobel Akademi Yayıncılık.

Kökdemir, D. (2000). *Deniz yıldızlarını kurtarmaya çalışanların öyküsü. eleştirel ve yaratıcı düşünme.* XI. Ulusal Psikoloji Kongresi.19-22 Eylül, Ege Üniversitesi, İzmir.

Kökdemir, D. (2003). *Belirsizlik durumlarında karar verme ve problem çözme.* (Doktora Tezi). Ankara Üniversitesi, Eğitim Bilimleri Enstitüsü, Ankara.

Orhan, A. & Çeviker-Ay, Ş. (2022). Developing the critical thinking skill test for high school students: A validity and reliability study. *International Journal of Psychology and Educational Studies, 9*(1), 132-144. https://dx.doi.org/10.52380/ijpes.2022.9.1.561

Özgenel, M. & Çetin, M. (2018). Development of the Marmara critical thinking dispositions scale: validity and reliability analysis. *International Journal of Eurasia Social Sciences, 9*(32), 991-1015.

Öztürk, Ç. (2004). Ortaöğretim coğrafya öğretmenlerinin öğretim yöntem ve teknikleri kullanabilme yeterlilikleri. *Gazi Üniversitesi Kırşehir Eğitim Fakültesi, 5*(2), 75-83.

Paul, R., & Elder, L. (2014). *Critical thinking: Tools for taking charge of your learning and your life*. Pearson.

Quinn, S., Hogan, M., Dwyer, C., Finn, P., & Fogarty, E. (2020). Development and validation of the student-educator negotiated critical thinking dispositions scale (SENCTDS). *Thinking Skills and Creativity*, *38*, 1-17. https://doi.org/10.1016/j.tsc.2020.100710

Rayn, M., & Deci, E. L. (2020). Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemporary Educational Psychology*, *25*(1), 54-67.

Ritchhart, R., Church, M., & Morrison, K. (2020). *The power of making thinking visible: Practices to engage and empower all learners*. Jossey-Bass.

Sarıgöz, O. (2014). Öğretmen adaylarının eleştirel düşünme becerileri hakkındaki görüşlerinin değerlendirilmesi. *Akademik Bakış Uluslararası Hakemli Sosyal Bilimler Dergisi, 41*(Mart-Nisan), 1-15.

Seçer, İ. (2018). *Psikolojik test geliştirme ve uyarlama süreci: SPSS ve LISREL uygulamaları (2. Ed.).* Anı Yayıncılık

Şeker, H. ve Gençdoğan, B. (2020). *Psikolojide ve eğitimde ölçme aracı geliştirme*. Nobel Yayınları.

Semerci, N. (2016). Eleştirel düşünme eğilimi ölçeğinin geliştirilmesi: geçerlik ve güvenirlik revize çalışması. *Electronic Turkish Studies, 11*(9), 725-740. https://dx.doi.org/10.7827/TurkishStudies.9573

Tokyürek, T. (2001). *Öğretmen tutumlarının öğrencilerin eleştirel düşünme becerilerine etkisi* (Yüksek lisans tezi). Sakarya Üniversitesi Sosyal Bilimler Enstitüsü, Sakarya.

Urhan, E. (2019). *Kamu hastanelerinde çalışan hemşirelerin eleştirel düşünme düzeylerinin belirlenmesi* (Yüksek lisans tezi). Okan Üniversitesi Sağlık Bilimler Enstitüsü, İstanbul.

WEF (2020). The Future of Jobs Report 2020. Retrieved from: https://www3.weforum.org/docs/WEF_Future_of_Jobs_2020.pdf on 01.05.2024.

Yıldırım-Döner, S. & Demir, S. (2021). Ortaokul öğrencileri için eleştirel düşünme eğilimi ölçeğinin geliştirilmesi: geçerlik ve güvenirlik çalışması. *Pamukkale Üniversitesi Eğitim Fakültesi Dergisi, 54*, 99-129. https://dx.doi.org/10.9779.pauefd.823427

Yılmaz Özelçi, S. (2012). *Eleştirel düşünme tutumuna etki eden faktörler: Sınıf öğretmeni adayları üzerine bir çalışma* (Doktora tezi). Adnan Menderes Üniversitesi Sosyal Bilimler Enstitüsü, Aydın.

Zhang, L. (2021). *Open-mindedness and cognitive flexibility: A pathway to critical thinking development*. Cambridge University Press.

Annex 1. Turkish version of “Critical Thinking Dispositions Scale with Student-Educator Discussion”

Madde No		Tamamen katılıyorum	Katılıyorum	Biraz Katılıyorum	Katılmıyorum	Hiç Katılmıyorum
1	Bana bir teori, yorum veya sonuç sunulduğunda, iyi bir destekleyici kanıtı olup olmadığına karar vermeye çalışırım.					
2	Karar vermem gerektiğinde konu ile ilgili mümkün olduğunca çok bilgi toplarım.					
3	Bir konu hakkında sonuca varmadan önce o konu hakkında mümkün olduğunca çok bilgi toplamaya çalışırım.					
4	Bir iş hakkında düşünürken dikkatimin kolayca dağıldığını fark ederim.					
5	Bir problem hakkında düşünürken, konsantre olmakta zorlanırım.					
6	Başka şeyleri düşünmem nedeniyle, önemli bilgileri sıklıkla kaçırırım.					
7	Yeni bir konu öğrenirken sık sık hayal kurarım.					
8	Düşünmek 'esnek olmakla’ ilgili değil, 'haklı olmakla' ilgilidir.					
9	Farklı dünya görüşleri hakkında açık fikirli olmak, insanların düşündüğü kadar önemli değildir.					
10	Karmaşık sorunları çözmeye uğraşırken, çözüme ulaşamıyorsam çabuk pes ederim.					
11	İnandığım ve bilgisine sahip olduğum bir konu hakkında çok fazla düşünmenin bir anlamı yoktur.					
12	Yapmam gereken şeylerin ve düşüncelerimin listesini oluşturmayı severim.					
13	Düşüncelerimi düzenleyebilmek için notlar tutarım.					
14	Çok miktarda bilgiyi düzenlememe yardımcı olması için basit çizelgeler, diyagramlar ya da tablolar yaparım.					
15	Bir görev çok zor olduğunda dahi sabrederim.					
16	Hayal kırıklığı, yapmam gereken şeyleri yapmama engel değildir.					
17	Bazen zor olsa bile o zor işe devam etmeyi arzu ederim.					
18	Düşünmem için beni zorlayan bilgilerden hoşlanırım.					
19	Zorlu şeyleri öğrenmek için can atarım.					
20	Zor görevleri tamamlamak benim için eğlencelidir.					
21	Anlaşılması güç olsa dahi merakımı uyandıran bilgilerle uğraşmaktan zevk alırım.					

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The Mediating Role of Problem-solving Skills in the Relationship Between Emotional Intelligence Level and Classroom Management Skills: The Status of Being or Not Being a Social Studies Teacher

Günışık Öktem Berksan[1]

ABSTRACT

In the present study, the mediation role of problem-solving skills in the relationship between teachers' emotional intelligence levels and classroom management skills was examined based on the status of being social studies teachers or not. In this regard, situational effect analysis was examined. In the quantitative study, relational survey design was employed and data were collected through three different scales. The data of the study were obtained from 217 teachers. The analysis of the data was carried out with model 14 from Hayes modelling. Tests were carried out by taking Bootstrap 5000 samples with a 95% confidence interval. According to the results of the study, the indirect effect of problem-solving on classroom management strengthens once the teacher is a social studies teacher. Moreover, this effect is stronger on planned and programmed activities and teacher-student relationships, which are sub-dimensions of classroom management although no significant change was observed in the third sub-dimension, classroom interaction and behaviour.

Keywords: Social studies teachers, classroom management, emotional intelligence, problem-solving skills

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Introduction

Education is recognised as one of the cornerstones of the development of societies; however the role of teachers in this process is not limited to the transfer of knowledge. It also contributes greatly to the emotional and social development of students. Today's educational settings demand more skills and competences from teachers along with divergent student profiles and dynamic classroom structures. In this regard, teachers' emotional intelligence levels and classroom management skills are increasingly coming to the forefront in terms of their impact on students' academic achievement and overall learning experience.

The teaching profession is a challenging process that requires not only field knowledge but pedagogical skills, time management, crisis management and strong social-communication skills as well. Both teachers and students bring their own prejudices, experiences and emotions to the classroom. With regards to this complex social context, the fundamental task of teachers is to build a positive classroom climate and provide a good learning environment (Packard, 2021). Social studies teachers, notably, incur more responsibility for enhancing students' social sensitivity. Therefore, it is of importantance for them to have a higher level of emotional intelligence in order to support students' social and emotional development as well as course content.

In recent years, numerous benefits of teachers' emotional intelligence have been revealed in terms of their professional performance, teaching-learning processes, students' school achievement, job satisfaction, stress and burnout (Valente et al., 2020). Emotional intelligence is a crucial instrument that aids individuals cope with daily life, reduce stress, and harmonise thoughts and actions (Packard, 2021). In this respect, social studies teachers are expected to communicate effectively with students, show empathy in classroom management, and resolve emotional conflicts. Teachers' emotional intelligence levels enable them to establish healthier communication with students and generate a positive learning climate (Brackett & Katulak, 2013). Moreover, inasmuch as teachers are successful in addressing stress, they can exhibit a calmer and more effective leadership in the classroom (Jennings & Greenberg, 2009).

Teachers with enhanced emotional intelligence skills show awareness to students' individual needs in classroom interactions, thus fostering student engagement and eliminating negative behaviours in the classroom (Corcoran & Tormey, 2012; Sutton & Wheatley, 2003). This creates a more positive learning setting and reinforces the teacher's effectiveness in terms of classroom management. Effective classroom management relies on teachers' ability to resolve complicated problems in a rapid and appropriate manner. Teachers who minimise conflicts and disruptions in the classroom provide a more organised learning environment. Notably in social studies courses, understanding the individual needs of students and providing them with appropriate solutions is critical for the development of social sensitivity (Emmer & Stough, 2001; Hindman & Stronge, 2004).

The development of an effective learning environment entails technical skills to control events in the classroom and meet student needs simulteneously. One of these skills is classroom management; it is unlikely to provide an effective learning environment without classroom management (Şevgin & Eranıl, 2023). Furthermore, classroom management contributes to students' developing socially accepted positive behaviours and supporting their learning processes (Nanyele et al., 2018). Therefore, the success of social studies teachers in classroom management

should not only increase academic achievement but also contribute to the development of students' social skills.

Emotional intelligence and problem solving ability of teachers in the educational process are significant determinants on classroom management. Emotional intelligence enables teachers to understand the individual needs of students, show empathy and manage negative situations in the classroom effectively. In addition, problem solving skills allow them to produce quick and accurate solutions to complex problems encountered in classroom management. Both competencies contribute to the effective fulfilment of teachers' professional roles and the achievement of students' educational goals.

Under the light of the preceding information above, this study aims to examine the mediating role of problem solving skills in the relationship between emotional intelligence levels and classroom management skills of social studies teachers and other primary school teachers. Emotional intelligence and problem solving skills are competences that support and complement one other in the teaching profession.

Based on the body of the related literature, it is seen that classroom management skills are examined within the framework of many variables. Although there are more studies on the role of emotional intelligence in teachers' effective classroom management (Brackett & Katulak, 2013 ; Corcoran & Tormey, 2012; Di, Lun, & Zhang, 2024; Dzafic & Ilic, 2024; Jennings & Greenberg, 2009; Kumar et al., 2022; Rao, 2022; Packard, 2021; Sutton & Wheatley, 2003; Valente et al, 2020), the number of studies on the effect of teachers' problem solving skills on classroom management, student-teacher relationships and the quality of the learning environment (Emmer & Stough, 2001; Hindman & Stronge, 2004; Rahimi & Asadollahi, 2012) is relatively limited. Moreover, research on the relationship between teachers' emotional intelligence and problem solving skills (Akyol & Akdemir, 2019; Ciarrochi, Forgas, & Mayer, 2006; Deniz, 2013; Kuntari & Asmarany, 2024) has also been limited. However, a study (Karagözoğlu, 2016) investigating the relationship between social studies teachers' emotional intelligence competencies and their levels of utilizing it in their profession and classroom management models has been encountered.

As can be understood from the abovementioned statements, no specific study elaboration the effect of social studies teachers' emotional state on problem solving skills in classroom management has been found. This situation offers an important research area for social studies teachers due to their sensitivity to social issues and their role in supporting students' social development. It has been thought that social studies teachers require more social interaction and emotion management skills compared to other branch teachers. Therefore, providing an insight into the relationship between emotional intelligence and problem solving skills of social studies teachers is critical for improving the quality of education and developing students' social sensitivity.

Conceptual Framework

Classroom Management

Classroom management is the process through which teachers support students' learning processes by organising the elements, time and materials within the classroom. Effective classroom management aims to maximise students' potential and enable them to develop appropriate models of behaviour. It also includes dealing with unexpected situations, controlling student behaviour and creating a sustainable learning environment. The teacher's organisation of the setting, determination of rules and consistent implementation are the fundemantal parts of classroom management (Sieberer-Nagler, 2016).

Classroom management is the sum of the methods and strategies employed by educators to build an appropriate classroom environment that nourish students' success and learning. Despite the fact that there are many pedagogical approaches in this field, the common outlet is that all of them includes the application of methods aimed at making students feel that they are in an environment where they can be successful, as well as creating a safe and effective learning environment (Hans & Hans, 2017). When the definitions of classroom management are examined, it is seen that teachers' strategies to create and maintain the most appropriate learning conditions by providing effective and efficient learning experiences for their students are at the forefront (Khansir & Mirzaei 2024; Nurdin, 2024). An effective teaching that attracts students' attention and arouses excitement in them is also deemed as a powerful way to reduce the impact of uncontrollable factors and prevent negative behaviours (Levin & Nolan, 2023, p.13). Classroom management plays a critical role in creating an effective teaching environment and is directly related to teachers' competences and skills (Sieberer-Nagler, 2016).

The positive contributions of effective classroom management to instructional quality can not be ignored, as effective classroom management promotes a positive learning environment which is essential for student engagement and achievement (Habsy et al., 2023). The teacher not only ensures order but also promotes the active participation of students by improving the quality of teaching. This process requires the teacher to use preventive and interventionist strategies along with a democratic and humane leadership approach. Discipline should encourage both obedience and self-control and responsibility. The teacher creates a learning atmosphere that makes success possible by arranging the classroom environment, organising the lesson in a logical flow, using time efficiently and motivating students (Savage & Savage, 2009).

Teacher-student relationships should not be left to coincidence or the personalities of individuals; instead, they should be deliberately constructed through strategies evidenced by research. Effective classroom management requires teachers to be sensitive towards student needs through a balanced use of dominance and co-operation. Strong teacher-student interactions are the key to high student achievement by creating positive classroom dynamics (Marzano & Marzano, 2003). As an effective classroom manager, the teacher is required to have the skills to plan and prepare the educational process, know how to organise teaching and how to guide the class. In addition, an effective teacher needs to create a positive classroom climate and develop work discipline. The teacher should also have the ability to evaluate students' progress and include his/her own work in this evaluation process (Delceva-Dizdarevik, 2014).

Strategies such as starting and ending the lesson on time, maintaining a good student-teacher relationship, ensuring positive interaction between students, using clear language and

communication skills, selecting appropriate teaching materials, giving immediate reinforcement and feedback, developing the lesson with appropriate lesson approach and sequence, and providing a good physical arrangement depending on the teaching-learning situation are among the significant elements of effective classroom management (Chathurika, 2017). Teachers' effective classroom management positively affects students' academic achievement; in this context, strong classroom management skills such as modelling ideal behaviours, encouraging assuming responsibility, developing positive relationships and making the course content interesting support the learning process by decreasing unwanted behaviours in the classroom environment (Özen & Yıldırım, 2020).

Effective teaching entails important skills in managing the tasks and situations occuring in the classroom every day. Classroom management includes a variety of skills and techniques that teachers can use to keep students organised, active, attentive and productive in the classroom. When classroom management strategies are implemented effectively, teachers minimise behaviours that interfere with learning for both individuals and groups of students. Effective teachers tend to exhibit strong classroom management skills; the hallmark of an inexperienced or less effective teacher is a less organised classroom environment in which students are less attentive and engaged (Dustova & Cotton, 2015). The fundamental factor in educational success is the level of the teacher's classroom management skills since success in classroom management depends mainly on the effective use of the teacher's leadership and management skills. Processes such as planning, organisation, communication and rewarding constitute the basic elements of classroom management and directly influences the academic success of teachers and students (Ergin, 2019).

Once a teacher loves teaching, he/she reflects this feeling to his/her students and the students become eager to learn as well. Effective teachers exhibit a high level of enthusiasm that reflects their professional competence and confidence. Classroom climate has a critical importance in increasing students' commitment to school (Sieberer-Nagler, 2016).

Emotional Intelligence

Emotional intelligence is a key concept that refers to the capacity of individuals to recognise, understand and manage their own and others' emotions (Singh et al., 2022). This ability also includes the capacity to solve one's internal problems and evaluate the emotional states of others (Zafar & Akhtar, 2023). To cite an example, recognising frustration in a student's behaviour and helping him/her cope with this emotion is essential for an effective intervention (Packard, 2021, p.25). The process of perceiving, understanding and managing emotions entails systematic introspection.

Emotional intelligence in education significantly improves the emotional competencies of teachers and students, leading to increased self-regulation, motivation, empathy, learning motivation and academic performance (Dzafic & Ilic, 2024). Correspondingly, it offers coping strategies that positively affect classroom dynamics by improving interactions between teachers and students (D'Ambrosio, 2002; Rao, 2022; Kumar et al. 2022). Teachers use emotional intelligence in classroom management by understanding their students' emotions, which helps to build relationships and overcome crises. Self-control and emotionality are key factors that enable teachers to manage unexpected situations in the classroom effectively (Packard, 2021). It is quite difficult to achieve emotional understanding of others, especially when dealing with immature and insensitive students, which complicates the task of teachers. The teacher needs to take careful steps

to know the causes and consequences of the behaviour, as any negative behaviour of the teacher may make the student feel guilty and hesitate to share his/her problem or feelings with the teacher next time (Iram, 2022).

Teachers have a significant impact on students' emotions and the subjects they teach play a decisive role on students' positive and negative emotions (Ariapooran & Etemadi, 2020). According to Valente et al. (2020), teachers with high levels of emotional intelligence exhibit a more integrative and conciliatory approach in conflict management. In this perspective, there is a significant relationship between emotional intelligence and problem solving (Deniz, 2013; Di, Lun, and Zhang, 2024). Institutions and individuals can benefit from the development and use of behaviours attributed to emotional intelligence. The practice of emotional intelligence skills may contribute to solving complicated management problems at individual and group level (Hess & Bacigalupo, 2014). Teachers' emotional intelligence skills positively affect teacher efficacy and teachers who are prone to perceive and manage emotions are beneficial for the personal development of students as well as for the constructing a positive and self-regulated learning setting. In addition, teachers' emotional intelligence skills play a decisive role in the performance of their work (Valente et al., 2020).

The effectiveness of classroom management is greatly influenced by emotional intelligence; besides, it positively influences classroom management skills such as organizing activities and maintaining order (Di, Lun, & Zhang, 2024). It helps teachers regulate their behaviour in the classroom, sustain discipline, and develop a positive learning environment (Jeyapriya & Jayachithra, 2024). The presence of teachers with high emotional intelligence in the classroom shows that the different characteristics of teachers' emotional intelligence are a dynamic factor in terms of successful education (Valente & Lourenço, 2020). Within the school or classroom, teachers notice and interact with a range of students' emotions (such as disappointment, hope, anger, joy, sadness, expectation, appreciation, passion, humor, love, loneliness, and compassion). In this regard, teachers should recognize and interpret these emotions to guide students towards learning (Packard, 2021). When teachers believe they have the ability to understand and regulate emotions, they will be able to exhibit higher emotional intelligence (Kanesan & Fauzan, 2019).

The emotional intelligence levels of teachers play an important role in the academic success of students. Research shows that emotional intelligence reduces teachers' burnout levels in the classroom, increases their engagement with their work, and thereby enhancing students' achievement. Additionally, it has been determined that teachers' perception of self-efficacy strengthens the relationship between job commitment and academic success. This situation emphasizes that emotional intelligence training should be part of the curriculum for both teacher candidates and current teachers (Wang, 2022). The emotional intelligence of teachers has a strong and significant impact on the school climate (Iram, 2022). Emotional intelligence refers to individuals' capacity to recognize, understand, and manage their own emotions, while classroom management skills encompass teachers' abilities to organize the classroom setting effectively, ensure student participation, and prevent negative behaviours. In the literature, there are findings that teachers with high emotional intelligence may build a more positive learning environment in the classroom and communicate with students more effectively.

Problem-solving skill

Problem-solving is a fundamental characteristic of human life, and individuals develop this skill by adapting to changing conditions and goals. Rapidly changing social dynamics require individuals to be effective problem solvers with the ability to cope with challenges; today, this skill stands out as the key to scientific and societal progress. Problem-solving also involves the interaction between a person's experience and the demands of the task (Martinez, 1998). The role of the teacher in education extends beyond conveying curriculum objectives to students; teachers must provide students with the necessary instruments to experience social and academic achievement both inside and outside the classroom. In this context, teachers need to empower students with the tools to critically analyse the world around them so that they can become critical independent thinkers. Moreover, empowering students with the ability to define, analyse, and evaluate the vast amount of information available in our rapidly changing digital world entails the use of skills associated with higher levels of thinking (Franklin & Harrington, 2019). Problem-solving also refers to students' capacity to cope with complicated and unexpected situations. This allows students to analyze real-life problems and develop effective and applicable solutions (Devi, 2016). Thus, problem-solving skills are gaining importance as a critical factor that optimizes learning processes at both individual and group levels.

Problem-solving skills are defined as an important component of emotional intelligence and enable teachers to support students' academic and social success. These skills aim to create creative and collaborative learning environments in the classroom, enhance students' motivation, and positively impact the overall atmosphere within the classroom (Rahimi & Asadollahi, 2012; Durlak et al., 2011). For teachers, problem-solving skills may seem simple at first glance, yet they actually involve a complex process; as even situations that appear simple may require the individual to use both cognitive and perceptual abilities simultaneously. Therefore, problem-solving processes often require more effort and depth than one might think (Roesler, 2017).

Student behaviours affect teachers' stress levels and student-teacher relationships (Schaubman et al., 2011). This requires problem-solving skills to enable teachers to effectively manage the challenges they face in the classroom, propose innovative solutions, and construct a positive learning setting. These skills help teachers quickly identify problems and generate solutions, improve student outcomes, and adapt to different learning needs. Problem-solving strategies enable teachers to manage classroom dynamics, engage students, and address individual learning deficiencies, thereby increasing teaching effectiveness and the efficiency of classroom operations (Jeyapriya & Jayachithra, 2024). Consequently, problem-solving skills stand out as an important competency that supports teachers in dealing with various classroom challenges they encounter.

Theoretical Background

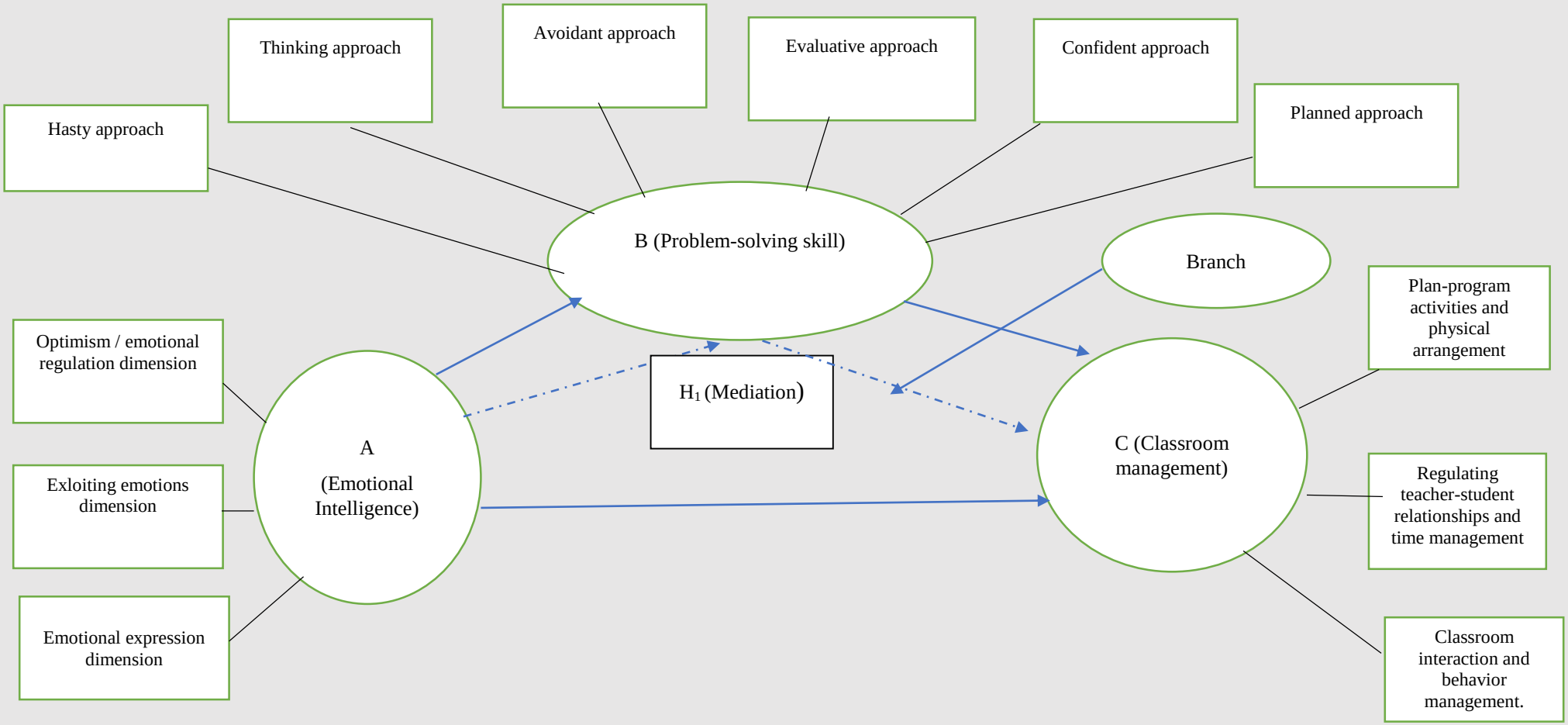


Figure1. Conceptual model

Research Hypotheses

H_1: The indirect effect of teachers' problem-solving skills on the relationship between their emotional intelligence levels and classroom management levels is moderated by being a social studies teacher.

H_2: The indirect effect of teachers' problem-solving skills on the relationship between their emotional intelligence levels and the planning-programming activities and physical arrangement dimensions of classroom management is moderated by being a social studies teacher.

H_3: The indirect effect of teachers' problem-solving skills on the relationship between their emotional intelligence levels and the teacher-student relationships and time management dimensions of classroom management is moderated by being a social studies teacher.

H_4: The indirect effect of teachers' problem-solving skills on the relationship between their emotional intelligence levels and the classroom interaction and behavior regulation dimensions of classroom management is moderated by being a social studies teacher.

Method

Research Model

The present study is quantitative research designed in a relational survey pattern. The survey method is an approach aimed at describing a situation as it exists in the past or present (Karasar, 2009). The relational survey design, on the other hand, aims to analyse the interactions and possible relationships between two or more variables by determining the correlation values between them (Büyüköztürk et al., 2009, p. 16). In this study, the mediating role of problem-solving skills in the relationship between teachers' emotional intelligence level was examined.

Sample

The sample of the research consists of social studies teachers and other middle school teachers working in Turkish state schools affiliated with the Ministry of National Education in the 2024-2025 academic year. A total of 217 teachers participated in the study. Of all participants, 126 of the participants are women and 91 are men. While 89 teachers specialize in social studies, 128 teachers are not social studies teachers. The age range varies between 24 and 60. Their professional seniority ranges from 1 year to 34 years. Based on their education levels, 162 teachers hold a bachelor's degree, 48 teachers a master's degree, and 7 teachers a doctorate. In terms of marital status, 132 are married and 85 are single.

Instruments

In the study, data were collected using three different scales. Additionally, a section consisting of seven questions was added to the data collection form to determine the participants' demographic information (such as gender, age, and professional seniority). Information regarding the scales administered in the study is presented below in order:

Classroom Management Scale

In this study, the version of the "Classroom Management Skills Scale" developed by Delson (1982) and adapted into Turkish by Yalçınkaya and Tonbul (2002) was used. The scale has a 5-point Likert-type structure and consists of a total of 15 items. The items of the scale are rated as "very good", "good", "average", "poor" and "very poor". The scale consists of three sub-

factors: “Physical Arrangement Plan Program Activities”, “Regulation of Teacher-Student Relationships” and “Time Management and Classroom Interaction and Behavior Regulations”. As for the findings regarding the validity and reliability of the scale, the value for construct validity (KMO) was found to be .96, and the Bartlett’s test results were 1909.176 ($p<0.00$). In addition, it was observed that the factor structure of the scale explained 58.42% of the total variance. It has been concluded that the Cronbach alpha coefficient value is $\alpha = 0.92$.

Emotional Intelligence

The “Emotional Intelligence Scale”, developed by Schutte et al. (1998) and revised by Austin et al. (2004), was administered. The adaptation of the scale into Turkish was carried out by Göçet (2006). The scale consists of a total of 37 items in a 5-point Likert type. The items of the scale are rated with “strongly agree”, “agree”, “neutral”, “disagree”, “strongly disagree”. The first sub-dimension of the Emotional Intelligence Scale, which is the optimism/mood regulation dimension, consists of a total of 17 items. The second sub-dimension of the Emotional Intelligence Scale, the dimension of utilizing emotions, consists of a total of 6 items. The last sub-dimension of the Emotional Intelligence Scale, the expression of emotions dimension, consists of a total of 14 items. When examining the findings related to the scale's validity and reliability, the (KMO) value for construct validity was found to be .85, and the Bartlett’s results were 3893.603 ($p<0.00$). Additionally, it was observed that the factor structure of the scale explained 62.35% of the total variance. It was concluded that the Cronbach alpha coefficient value is $\alpha = 0.89$.

Problem-solving skill

The "Problem Solving Inventory" was developed by Heppner and Petersen (1982) and the Turkish version adapted by Şahin, Şahin, and Heppner (1993) was used. The scale consists of a total of 35 items in a 6-point Likert type. The items of the scale are rated with "I always behave like this," "I mostly behave like this," "I often behave like this," "I sometimes behave like this," "I rarely behave like this," "I never behave like this." Concerning the findings regarding the validity and reliability of the scale, the value for construct validity (KMO) was found to be .90, and the Bartlett's test results were 5825.501 ($p<0.00$). Additionally, it was observed that the factor structure of the scale explained 68.46% of the total variance. It has been concluded that the Cronbach alpha coefficient value is $\alpha = 0.98$. The fit index values for all three scales are presented below in Table 1.

Table 1. Fit index and reference intervals

Indices	Good fit	Acceptable fit	Problem-solving Skill	Emotional Intelligence	Classroom Management
$\chi 2/Sd$	$0 \leq \chi^2/Sd < 2$	$2 < \chi^2/Sd \leq 5$	3,31	2,96	3,98
RMSEA	$0 \leq$ RMSEA $\leq .08$	$.08 <$ RMSEA ≤ 1.00	.104	.095	.118
CFI	$.95 \leq$ CFI ≤ 1.0	$.90 \leq$ CFI $< .95$	.80	.64	.86
GFI	$.95 \leq$ GFI ≤ 1.0	$.90 \leq$ GFI < 95	.69-	.67	.81
AGFI	$.90 \leq$ AGFI ≤ 1.0	$.85 \leq$ AGFI $< .90$	.63-	.63	.74
RMR	$0 \leq$ RMR $\leq .08$	$.08 <$ RMR ≤ 1.00	.14	.10	.03

Source: (Kline, 2005; Tabachnick and Fidell, 2012)

According to Table 1, the Confirmatory Factor Analyses of the research were also tested with participants consisting of 217 individuals. The fit indices of the three scales have been presented in order. In this context, especially when examining $\chi 2/Sd$, it is revealed that the scales exhibit good fit.

Data Analysis

In the data analysis process, five values were initially excluded to form three values, ensuring data integrity and reducing potential noise in the analysis (Tabachnick & Fidell, 2019). The final dataset included 217 participants, providing a sufficiently large sample for mediation, moderation, and conditional effect analyses. These analyses were conducted using Hayes' PROCESS macro in SPSS, a widely recognized tool for examining complex relationships in social sciences (Hayes, 2022). The study employed Model 14 from Hayes' models, which accounts for moderated mediation effects, allowing for an interaction term to influence both the mediator and the outcome variable (Hayes, 2018). Given its robustness, Model 14 is appropriate for exploring the extent to which a mediator transmits the effect of an independent variable to a dependent variable while simultaneously being influenced by a moderator. This model provides a comprehensive understanding of the interaction between mediation and moderation effects. A 95% confidence interval was used with a Bootstrap sample of 5000, which enhances the accuracy and reliability of indirect effect estimates (Preacher & Hayes, 2008). The LLCI (Lower Confidence Interval) and ULCI (Upper Confidence Interval) were reported to assess the precision of the estimates, and unstandardized beta coefficients (b) were used to interpret effect sizes. The significance threshold was set at $p < .05$, aligning with conventional statistical standards (Cohen, 1988). Furthermore, AMOS was utilized to assess model fit indices, ensuring that the proposed structural relationships were supported by empirical data. Key fit indices such as RMSEA, CFI, TLI, and SRMR were examined, with values being interpreted based on widely accepted benchmarks (Hu & Bentler, 1999; Kline, 2015).

Ethic

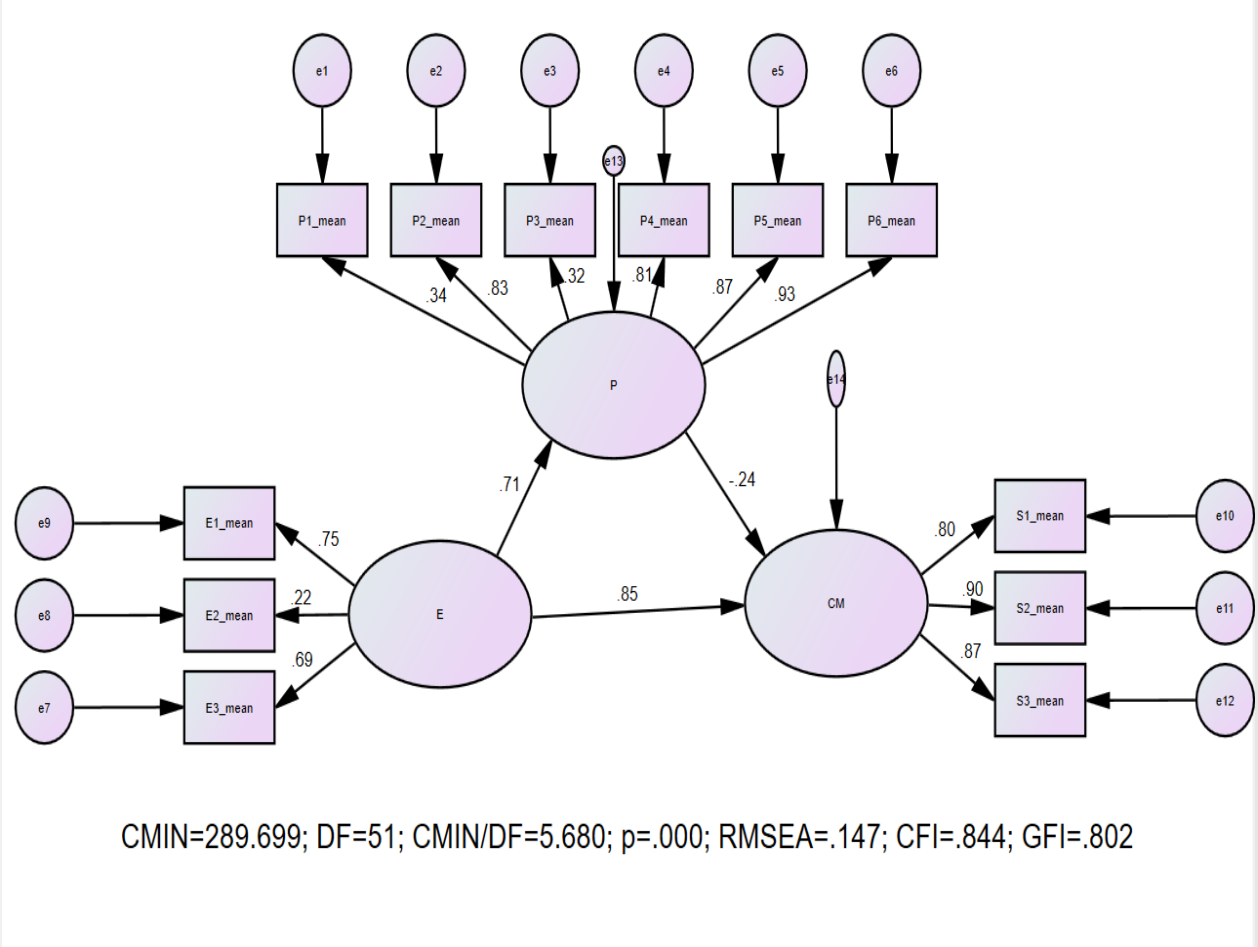
The ethics application for the study was made on 04/11/2024 and the research was carried out with the approval of Sinop University Human Research Ethics Commission dated 06/12/2024 and numbered 2024/351.

Results

In this section, the conceptual framework of the research was first examined using structural equation modelling. Then, the hypotheses of the research were tested.

Structural Equation Modelling

Below, in Figure 2, the basic model version of the conceptual model without covariance is presented.



E=Emotional intelligence P= Problem solving skills CM= Classroom management

Figure 2. Basic model

According to Figure 2, it is understood that the fit indices of the basic model are good. Moreover, the improved version of the model was also tested by creating covariance connections. Below, in Figure 3, the model with added covariance is presented.

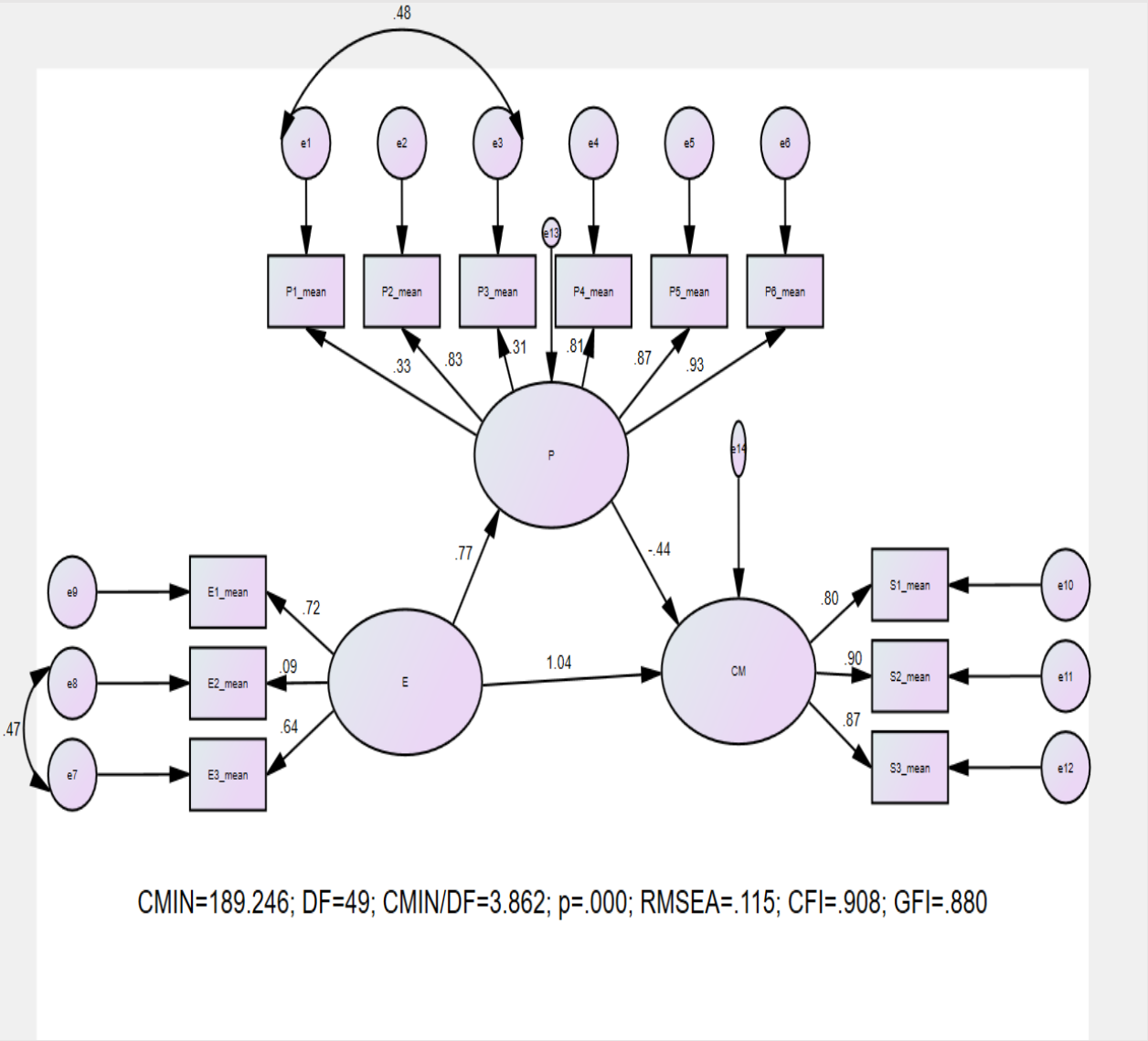


Figure 3. Covariance-adjusted model

When Figures 3 and 2 are evaluated together, it can be stated that the data is consistent with the theoretical model created based on the results of the confirmatory factor analysis of the model.

When the models with and without covariance in Figure 2 and 3 were evaluated together, two different Structural Equation Models (SEM) were compared. These are the model without covariance and the model with covariance. Common fit indices such as CMIN/DF, RMSEA, CFI and GFI were taken as reference when evaluating model fit (Kline, 2015; Hu & Bentler, 1999).

CMIN/DF value was found as 5.680 in the model without covariance and 3.862 in the model with covariance. In the related literature, values ≤ 3 are accepted as good fit, 3-5 as moderate fit, and > 5 as poor fit (Kline, 2015). It has been found that the model without covariance shows poor fit, but it improves to moderate level with the addition of covariance. RMSEA is an significant fit criterion representing the error level of the model. It was calculated as 0.147 in the model without covariance and 0.115 in the model with covariance. RMSEA $\leq$ 0.05 is considered as

perfect fit, ≤ 0.08 as acceptable fit and > 0.10 as poor fit (Browne & Cudeck, 1993). CFI is required to be ≥ 0.95 for a perfect fit and ≥ 0.90 for an acceptable fit (Bentler, 1990; Hu & Bentler, 1999). It was calculated as 0.844 in the model without covariance and 0.908 in the model with covariance. GFI ≥ 0.90 indicates that the model shows good fit (Jöreskog & Sörbom, 1993). It was calculated as 0.802 in the model without covariance and 0.880 in the model with covariance. The covariance-added model showed improvement in all fit indices.

H_1: The indirect effect of teachers' problem-solving skills on the relationship between their emotional intelligence levels and classroom management levels is moderated by being a social studies teacher. (Hayes Model 14)

Table 2. The ındirect effect of problem-solving skills on classroom management bootstrap regression analysis results (N= 217)

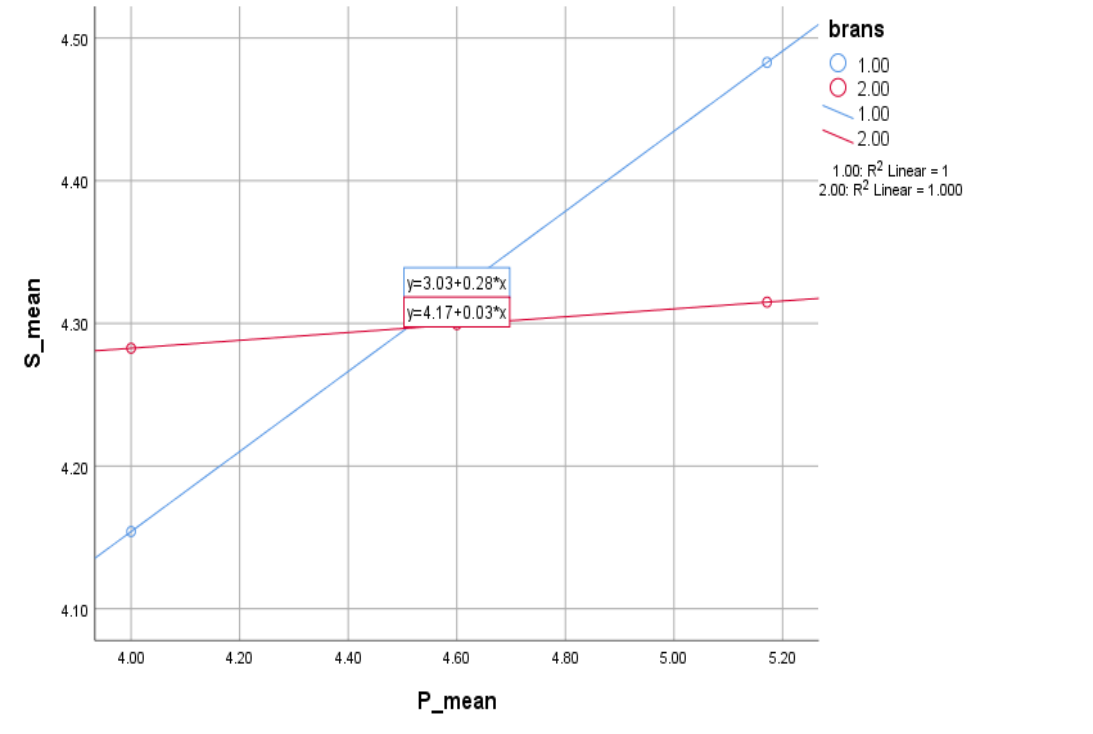
Variables	***Problem-solving Skill***			***Classroom Management***		
	b	LLCI	ULCI	*b*	LLCI	ULCI
Emotional Intelligence (X)	-	-	-	.4867*	.3115	.6618
Problem-solving skill (M)	-	-	-	.5338*	.1786	.8890
Social Studies Teacher (W)	-	-	-	1.1411*	.1935	2.0886
M*W (Interaction)	-	-	-	-.2531*	-.4575	-.0487
R^2					.304	
Indirect Affect	*b*	LLCI	ULCI	-	-	-
Social Studies Teacher	.2407	.0741	.4806	-	-	-
Other Branch Teachers	.0236	-.1085	.1573	-	-	-
Situational mediation index	-.2171*	-.4505	-.0356	-	-	-

Note: * p<.05; LLCI= Lower confidence interval; ULCI= Upper confidence interval. Bootstrap resampling = 5000 Unstandardized beta coefficients (b) are reported.

The results of the regression analysis, which tested H_1 of the study by considering whether the teachers are social studies teachers as a situational moderator (moderated mediation), are given in Table 2. It is observed that all the predictor variables included in the regression analysis explain approximately 30% of the variance in classroom management skills (R^2 = .304).

Initially, the effects of being a social studies teacher on the impact of problem-solving skills on classroom management skills were investigated. When looking at the confidence interval values obtained using the bootstrap technique, it is observed that the effect of problem-solving skills on classroom management is significant for those who are social studies teachers (b= .2407, 95% CI [.0741, .4806]), yet the effect of problem-solving skills on classroom management is not significant for those who are not social studies teachers (b= .0236, 95% CI [-.1085, .1573]).

Then, the dependence of the indirect effect of emotional intelligence (X) on classroom management skills (Y) through the mediating variable (problem-solving skills, M) on whether or not one is a social studies teacher (situational mediation role) was tested. The slope analysis conducted with the results in the table and the situational mediation effect are presented graphically in Figure 1.



1=Social Studies Teacher 2= Other Branch Teachers

Graphic 1. Situational mediation effect (Emotional Intelligence→Problem-solving Skill→Classroom Management)

According to Graph 1, the value of the index of moderated mediation (b= -.2171, 95% CI [-.4505, -.0356]) is found to be significant. It has been determined that the condition of being or not being a social studies teacher acts as a moderating variable in the indirect effect of teachers' emotional intelligence levels on classroom management skills through problem-solving skills. In other words, the indirect effect of problem-solving on classroom management is strengthened when the teacher is a social studies teacher. According to the bootstrap results, the *H_1 hypothesis was accepted* as the situational mediation index was significant.

H_2: The indirect effect of teachers' problem-solving skills on the relationship between their emotional intelligence levels and the planning-programming activities and physical arrangement dimensions of classroom management is moderated by being a social studies teacher. (Hayes Model 14)

Table 3. The ındirect effect of problem-solving skills on planned and programmed activities bootstrap regression analysis results (N= 217)

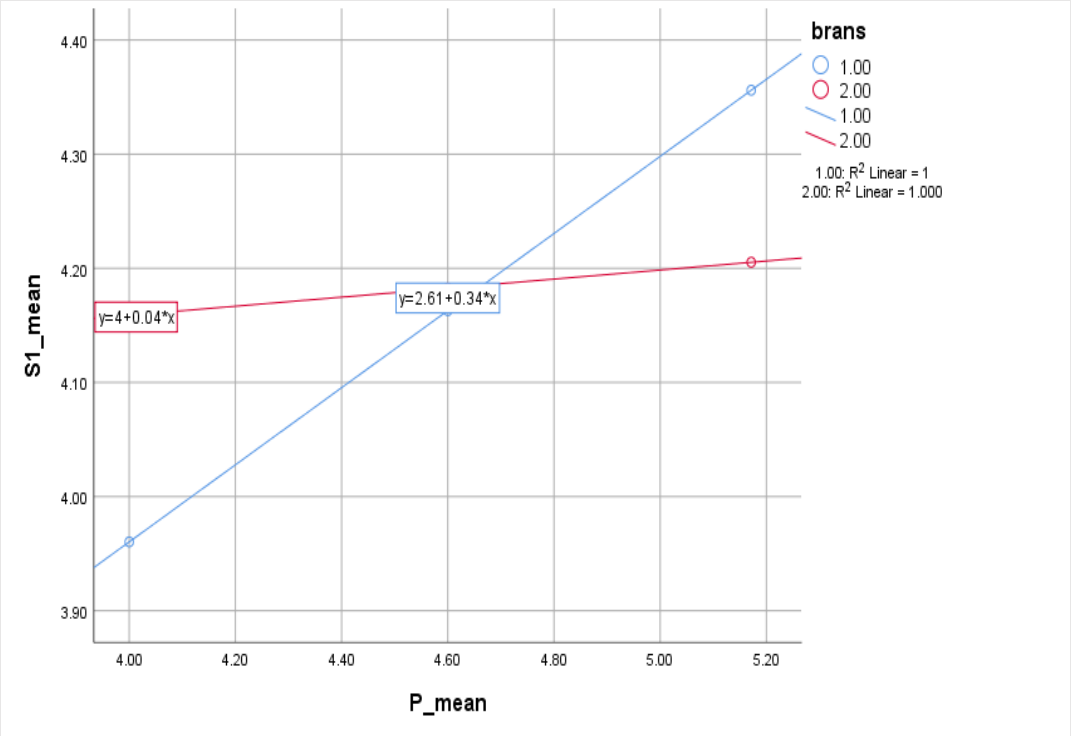
Variables	***Problem-solving Skill***			***Planned- Programmed Activities***		
	b	LLCI	ULCI	*b*	LLCI	ULCI
Emotional Intelligence (X)	-	-	-	.4317*	.2441	.6193
Problem-solving Skill (M)	-	-	-	.6359*	.2554	1.0164
Social Studies Teacher (W)	-	-	-	1.3911*	.3761	2.4061
M*W (Interaction)	-	-	-	-.2981*	-.5171	-.0792
R^2					.268	
Indirect affect	*b*	LLCI	ULCI	-	-	-
Social Studies Teacher	.2897	.0960	.5486	-	-	-
Other Branch Teachers	.0340	-.1091	.1727	-	-	-
Situational Mediation Index	-.2557*	-.5113	-.0582	-	-	-

Note: *p<.05; LLCI= Lower confidence interval; ULCI= Upper confidence interval. Bootstrap resampling = 5000 Unstandardized beta coefficients (b) are reported.

The results of the regression analysis, which served as a situational moderator (moderated mediation) to test H_2 of the research regarding whether the teachers are social studies teachers or not, are given in Table 3. It is observed that all the predictor variables included in the regression analysis explain approximately 27% of the variance in planned and programmed activities, which is a sub-dimension of classroom management skills (R2 = .268).

First, the effects of being a social studies teacher on the impact of problem-solving skills on planned and programmed activities were examined. Regarding the confidence interval values obtained using the bootstrap technique, it is observed that the effect of problem-solving skills on planned and programmed activities is significant for those who are social studies teachers (b= .2897, 95% CI [.0960, .5486]), while the effect of problem-solving skills on planned and programmed activities is not significant for those who are not social studies teachers (b= .0340, 95% CI [-.1091, .1727]).

The dependence of the indirect effect of emotional intelligence (X) on planned and programmed activities (Y) through the mediating variable (problem-solving skills, M) on whether one is a social studies teacher (whether there is a situational mediation role) was tested. The slope analysis conducted with the results presented in the table shows the situational mediation effect graphically in Graphic 2.



Graphic 2. Situational mediation effect (Emotional Intelligence→Problem-solving Skill→ Planned-Programmed Activities)

According to Graph 2, the value of the index of moderated mediation (b= -.2557, 95% CI [-.5113, -.0582]) is found to be significant. It has been determined that the condition of being or not being a social studies teacher acts as a moderating variable in the indirect effect of teachers' emotional intelligence levels on the planned and programmed activities skill, which is a sub-dimension of classroom management, through problem-solving skills. In other words, the indirect effect of problem-solving on the planned and programmed activities dimension of classroom management is strengthened when the teacher is a social studies teacher. According to the bootstrap results, the *H_2 hypothesis was accepted* on the grounds that the situational mediation index was significant.

H_3: The indirect effect of teachers' problem-solving skills on the relationship between their emotional intelligence levels and the teacher-student relationships and time management dimensions of classroom management is moderated by being a social studies teacher. (Hayes Model 14)

Table 4. The ındirect effect of problem-solving skills on teacher-student relationships bootstrap regression analysis results (N= 217)

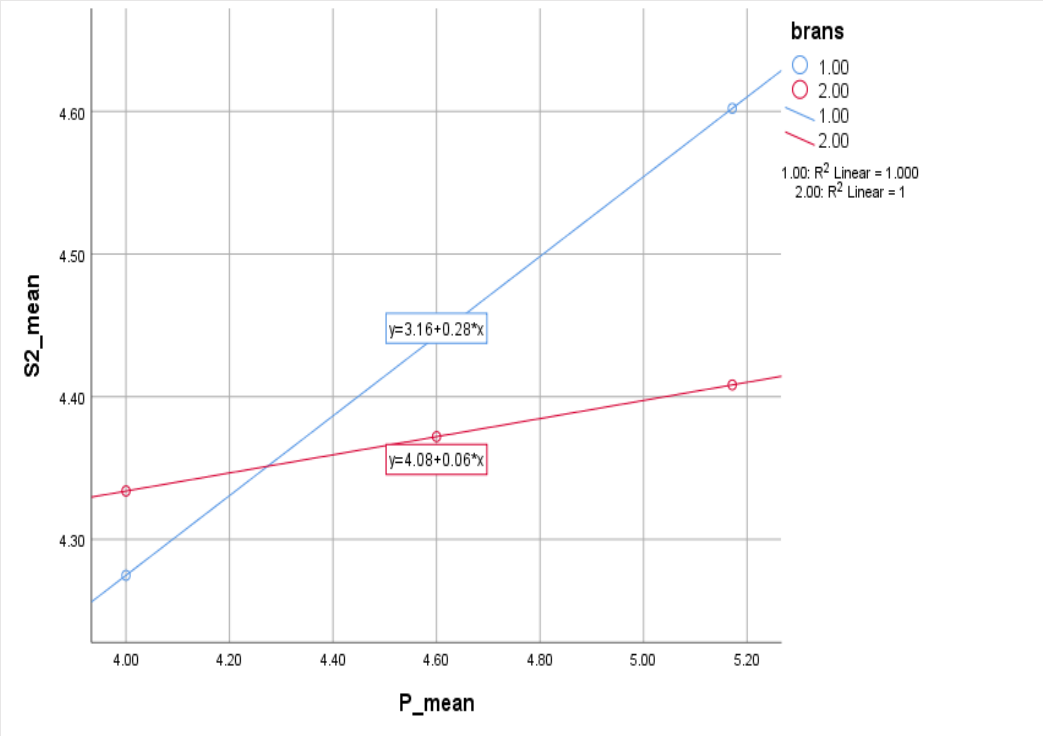
Variables	***Problem-solving Skill***			***Teacher-Student Relationship***		
	b	LLCI	ULCI	*b*	LLCI	ULCI
Emotional Intelligence (X)	-	-	-	.4810*	.2861	.6760
Problem-solving Skill (M)	-	-	-	.4953*	.0999	.8906
Social Studies Teacher (W)	-	-	-	.9226	-.1321	1.9773
M*W (Interaction)	-	-	-	-.2159	-.4434	.0116
R^2					.270	
Indirect Effect	*b*	LLCI	ULCI	-	-	-
Social Studies Teacher	.2396	.0530	.5141	-	-	-
Other Branch Teachers	.0545	-.0926	.2246	-	-	-
Situational Mediation Index	-.1852*	-.4535	-.0309	-	-	-

Note: *p<.05; LLCI= Lower confidence interval; ULCI= Upper confidence interval. Bootstrap resampling = 5000 Unstandardized beta coefficients (b) are reported.

With the purpose of testing H_3 of the study, the results of the regression analysis in which whether teachers are social studies teachers or not is a moderated mediator are presented in Table 4. It is seen that all predictor variables included in the regression analysis explained approximately 27% (R2 = .270) of the variation on teacher-student relationships, which is the sub-dimension of classroom management skills.

In the initial phase, the effects of being a social studies teacher or not on the effect of problem-solving skills on teacher-student relationships were examined. When the confidence intervals obtained with the bootstrap technique are considered, it has been found that the effect of problem-solving skills of social studies teachers on teacher-student relationships is significant (b= .2396, 95% CI [.0530, .5141), yet the effect of problem-solving skills of those who are not social studies teachers on teacher-student relationships is not significant (b= .0545, 95% CI [-.0926, .2244]).

Then, it was tested whether the indirect effect of emotional intelligence (X) on teacher-student relationships (Y) through the mediating variable (problem solving skill, M) has a moderated mediating role in terms of the status of being a social studies teacher or not. The results in the table and the slope analysis and the moderated mediation effect are given in Graphic 3.



Graphic 3. Moderated mediation effect (Emotional Intelligence→Problem-solving Skill→ Teacher-Student Relationships)

Based on Graph 3, it is concluded that the Index of moderated mediation value is significant (b= -.1852, 95% CI [-.4535, -.0309]). The status of being or not being a social studies teacher was found to be a moderating variable in the indirect effect of teachers' emotional intelligence levels on teacher-student relationships, which is a sub-dimension of classroom management, through problem solving skills. Namely, the indirect effect of problem solving on teacher-student relationships of classroom management is stronger in the case that the teacher is a social studies teacher. According to the bootstrap results, H_3 *was accepted* since the moderated mediation index was significant.

H_4: The indirect effect of teachers' problem-solving skills on the relationship between their emotional intelligence levels and the classroom interaction and behavior regulation dimensions of classroom management is moderated by being a social studies teacher. (Hayes Model 14)

Table 5. The bootstrap regression analysis results of the ındirect effect of problem-solving skills on classroom ınteraction and behaviour (N= 217)

Variables	***Problem-solving Skill***			***Classroom Interaction and Behaviour***		
	b	LLCI	ULCI	*b*	LLCI	ULCI
Emotional Intelligence (X)	-	-	-	.5761*	.3500	.8022
Problem-solving Skill (M)	-	-	-	.4288	-.0297	.8873
Social Studies Teacher (W)	-	-	-	1.0391	-.1840	2.2622
M*W (Interaction)	-	-	-	-.2321*	.4960	.0317
R^2					.213	
Indirect Effect	*b*	LLCI	ULCI	-	-	-
Social Studies Teacher	.1687	-.0030	.4282	-	-	-
Other Branch Teachers	-.0304	-.1907	.1332	-	-	-
Moderated Mediation Effect	-.1991	-.4761	.0278	-	-	-

Note: * p<.05; LLCI= Lower confidence interval; ULCI= Upper confidence interval. Bootstrap resampling=5000 Unstandardised beta coefficients (b) are reported.

In order to test H_4 of the current study, the results of the regression analysis regarding to the fact that teachers are social studies teachers or not is a moderated mediator are given in Table 5. It has been revealed that all prediction variables included in the regression analysis explain approximately 21% (R2 = .213) of the change in classroom interaction and behaviour, which is the sub-dimension of classroom management skills.

In the first phase, the effects of being a social studies teacher or not on the effect of problem solving skills on classroom interaction and behaviour skills were examined. Considering the confidence intervals obtained with the bootstrap technique, it has been demonstrated that the effect of problem-solving skills of social studies teachers on classroom interaction and behaviour is not significant (b= .1687, 95% CI [.0030, .4282). Likewise, the effect of problem-solving skills of non-social studies teachers on classroom interaction and behaviour was found insignificant (b= -.0304, 95% CI [-.1907, .1332]). In addition, it was investigated whether the indirect effect of emotional intelligence (X) on classroom interaction and behaviour (Y) through the mediating variable (problem-solving skill, M) has a moderated mediation role on being a social studies teacher or not. It is understood that the index of moderated mediation value is not significant (b= -.1991, 95% CI [-.4761, .0278]). It was unveiled that being or not being a social studies teacher was not a moderating variable in the indirect effect of teachers' emotional intelligence levels on classroom interaction and behaviour, which are the sub-dimensions of classroom management through problem-solving skills. According to the bootstrap results, since the situational mediation index was not significant, *H_4 was rejected.*

Acceptance and Rejection Status of Hypotheses

Table 6. Acceptance and rejection status of hypotheses

Hypotheses	Status
H_1: The indirect effect of teachers' problem-solving skills on the relationship between their emotional intelligence levels and classroom management levels is moderated by being a social studies teacher.	Accepted
H_2: The indirect effect of teachers' problem-solving skills on the relationship between their emotional intelligence levels and the planning-programming activities and physical arrangement dimensions of classroom management is moderated by being a social studies teacher.	Accepted
H_3: The indirect effect of teachers' problem-solving skills on the relationship between their emotional intelligence levels and the teacher-student relationships and time management dimensions of classroom management is moderated by being a social studies teacher.	Accepted
H_4: The indirect effect of teachers' problem-solving skills on the relationship between their emotional intelligence levels and the classroom interaction and behavior regulation dimensions of classroom management is moderated by being a social studies teacher.	Rejected

As seen in Table 6, 3 out of the 4 hypotheses included in the study have been accepted.

Discussion and Conclusion

Depending on the research findings, it has been observed that all the predictor variables included in the regression analysis explain approximately 30% (R^2 = .304) of the variation in classroom management skills. In other words, the indirect effect of problem-solving on classroom management is strengthened when the teacher is a social studies teacher.

It has been seen that the indirect effect of problem-solving on the sub-dimensions of classroom management skills, such as planned and programmed activities, teacher-student relationships, and classroom interaction and behaviour, increases in the presence of a social studies teacher. It was found that all the predictor variables included in the regression analysis explained approximately 27% (R^2 = .268) of the variation in planned and programmed activities in classroom management. Thus, the indirect effect of problem-solving on the planned activities of classroom management is strengthened when the teacher is a social studies teacher.

The findings of this research are consistent with the existing literature on the relationships between emotional intelligence, problem-solving skills, and classroom management (Agbaria, 2021; Karagözoğlu, 2016; Kelley, 2018; Saeedi & Pahlavani, 2018; Valente et al.., 2019). Specifically, it has been found that teachers with high levels of emotional intelligence are more successful in classroom discipline management (Hamidi & Khatip, 2016; Valente et al., 2019) and student relationships, and they also positively affect the classroom environment (Agbaria, 2021; Kazi & Laskar, 2024; Kelley, 2018; Saeedi & Pahlavani, 2018).

In the study, it was found that the relationships between social studies teachers' emotional intelligence and problem-solving skills and classroom management were stronger. This finding aligns with Karagözoğlu's (2016) study on social studies teachers.

In Koutrouba's (2020) study, it is stated that effective classroom management reflects the multifaceted abilities of teachers and has positive effects on student achievement. Sabetra and Aziz (2021) highlight the importance of lesson planning in classroom management and report that well-prepared lesson plans allow teachers to manage the classroom more effectively. In this regard, it is noted that teachers are required to develop an approach to planning in classroom management strategies and at the same time, problem solving skills should be used functionally. Besides, teachers are to anticipate potential problems and generate solutions while managing classroom dynamics and student behaviours. The integration of both classroom management and problem-solving skills at the planning stage has emerged as an important theme in both studies. Therefore, it can be said that there is a strong relationship between both studies.

In a similar vein, an indirect effect of problem-solving has been found in the teacher-student relationships sub-dimension of classroom management skills. It is observed that all the predictor variables included in the regression analysis explain approximately 27% (R^2 = .270) of the variation in teacher-student relationships. In other words, the indirect effect of problem-solving on classroom management's impact on teacher-student relationships is stronger when the teacher is a social studies teacher. Social studies teachers' mindfulness levels strongly correlate with their problem solving skills. As mindfulness increases, teachers' classroom management and problem solving competences improve and they are able to produce more creative and effective solutions. This enables teachers to be more focused, flexible and sensitive to student needs (Al-Refai, 2021; Güleç, 2020). These findings show that teachers adopt a conscious method in problem solving processes.

The results of the related literature have also been seen to coincide with the research results. To cite an example, the finding in Chamizo-Nieto et al. (2021) study that emotional intelligence and problem-solving skills nourish each other and have the potential to foster students' academic achievement underlines the teacher-student relationship as an important factor as a tool that supports these processes. Therefore, both analyses provide similar conclusions on how emotional intelligence and problem-solving skills play vital roles to enhance academic achievement. Strong and supportive relationships between teachers and students play a pivotal role in enhancing students' motivation towards learning by affecting their academic achievement in a positive way. A strong teacher-student relationship in classroom management contributes to increasing students' academic achievement; in addition, mutual respect, supportive communication and trust are critical factors in this process (Fan, 2012; Ifesinachi et al., 2024; Shermukhamedovna, 2024).

At the end of the research, the change in classroom interaction and behaviour explains approximately 21% of the variance in the predictor variables (R^2 = .213). It has been found that being or not being a social studies teacher is not a moderating variable in the indirect effect of teachers' emotional intelligence levels on classroom management sub-dimensions, specifically classroom interaction and behavior, through problem-solving skills.

Given all these results along with the body of related literature, it is indicated that emotional intelligence is an effective variable on classroom management. Furthermore, the effect of problem-solving on classroom management is also significant. When the results of the literature are examined, it is supported by Deniz's (2013) findings that emotional intelligence levels of pre-service teachers contribute to their adoption of more effective problem-solving strategies. In addition, Rawian (2018) stated that teachers' ability to manage emotional needs is an important factor in reducing classroom behaviour problems and supporting the learning process. In the

present study, this relationship was observed particularly in the sub-dimensions of planned programmed activities and teacher-student relationships. Asiyai (2011); Valente et al. (2020) revealed that teachers with the skills of perceiving, expressing and managing emotions exhibit more effective classroom management and teaching competence. The findings of this study support the positive relationship between emotional intelligence and effective classroom management and teaching. In the study, it was observed that teachers with high levels of emotional intelligence were more effective in classroom management and had a stronger bond with students. Jeyapriya and Jayachithra (2024) emphasized that problem-solving skills is fundamental in dealing with complex situations in the classroom and creating a positive learning setting. The indirect effect of problem- solving skills on different sub-dimensions of classroom management aligns with this view. The improvement of problem-solving skills may increase teachers‘ effectiveness in classroom management and have positive effects on students' learning outcomes and academic achievement. This result corresponds with the finding revealed by Mustafa et al. (2024) that the evaluation of emotional intelligence and problem-solving skills together leads to positive results in classroom management.

Based on the research findings, the following recommendations can be made:

- Teachers' awareness towards students' feelings in classroom management can enable them to make more conscious and effective decisions in solving the problems that might be encountered.
- Teachers can be encouraged to participate in professional development programmes to foster their emotional awareness and strengthen their self-regulation skills.
- Applied workshops can be organised where they can practice in-class conflict management and coping with stress.
- The regulatory role of being a social studies teacher can be tested for different subjects to achieve more comprehensive results.
- To more clearly demonstrate the impact of problem-solving skills on emotional intelligence and classroom management, experimental or quasi-experimental research can be conducted. The development of these skills can contribute to the determination of strategies that can be integrated into teacher training processes in accordance with the findings obtained by observing their reflections in the classroom environment.
- The effects of demographic variables such as gender, age, and professional seniority on problem-solving skills, emotional intelligence, and classroom management skills can be examined in depth.

Limitations

The research has been limited to teachers working in state schools affiliated with the Ministry of National Education in Türkiye.

Declaration of Conflicting Interests

There is no conflict of interest for the study. The author conducted the study alone.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sector.

Ethic

The ethics application for the study was made on 04/11/2024 and the research was carried out with the approval of Sinop University Human Research Ethics Commission dated 06/12/2024 and numbered 2024/351.

References

Agbaria, Q. (2021). Classroom Management Skills among Kindergarten Teachers as Related to Emotional Intelligence and Self-Efficacy. *International Journal of Instruction, 14*(1), 1019-1034. https://doi.org/10.29333/iji.2021.14160a

Akyol, M. A., & Akdemir, E. (2019). Comparison of Emotional Intelligence Levels and Problem Solving Skills of Prospective Teachers According to Different Variables. *World Journal of Education, 9*(3), 131-141. https://doi.org/10.5430/wje.v9n3p131

Al-Refai, A. (2021). Mindfulness of Social Studies' Teachers and Its Relationship to Their Skills of Solving Classroom Problems. *Jordan Journal of Educational Sciences, 17*(3), 475-491. https://doi.org/10.47015/17.3.10

Ariapooran, S., & Etemadi, H. (2020). Relationship between Classroom Management through the Social and Emotional Learning and Teacher-Student Interaction with Emotional Literacy in Elementary Students. *Research in Teaching, 8*(1), 79-59.

Asiyai, R. I. (2011). Effective classroom management techniques for secondary schools. *African Research Review, 5*(1). https://doi.org/10.4314/afrrev.v5i1.64526

Austin, E. J., Saklofske, D. H., Huang, S. H. S., & McKenney, D. (2004). Measurement of trait emotional intelligence: Testing and cross-validating a modified version of Schutte et al.'s (1998) measure. *Personality and Individual Differences, 36*(3), 555-562. https://doi.org/10.1016/S0191-8869(03)00114-4

Bentler, P. M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin, 107*(2), 238.

Brackett, M. A., & Katulak, N. A. (2013). Emotional intelligence in the classroom: Skill-based training for teachers and students. In *Applying emotional intelligence* (pp. 1-27). Psychology Press. https://doi.org/10.1093/obo/9780199828340-0047

Browne, M. W., & Cudeck, R. (1993). Alternative ways of assessing model fit. *Sage Focus Editions*, 154, 136-162.

Büyüköztürk, Ş., Çakmak, E., K., Akgün, Ö. E., Karadeniz, Ş., & Demirel, F. (2009). Bilimsel araştırma yöntemleri. Ankara: Pegem Akademi.

Chamizo-Nieto, M. T., Arrivillaga, C., Rey, L., & Extremera, N. (2021). The role of emotional intelligence, the teacher-student relationship, and flourishing on academic performance in adolescents: a moderated mediation study. *Frontiers in psychology*, *12*, 695067. https://doi.org/10.3389/fpsyg.2021.695067

Chathurika, P., (2017). Effective teaching practices of teaching environment related activities in primary level in Sri Lanka, *International Journal of Management and Applied Science*, 3 (9), 12-18.

Ciarrochi, J., Forgas, J. P., & Mayer, J. D. (Eds.). (2006). *Emotional intelligence in everyday life*. Psychology press.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Routledge.

Corcoran, R. P., & Tormey, R. (2012). How emotionally intelligent are pre-service teachers? Teaching and Teacher Education, 28(5), 750–759. https://doi.org/10.1016/j.tate.2012.02.007

D'Ambrosio, M. (2002). Emotional intelligence in the classroom. *Academic Exchange Quarterly*, *6*(2), 46-52.

Delceva–Dizdarevik, J. (2014). Classroom management. *International Journal of Cognitive Research in Science, Engineering and Education*, *2*(1), 51.

Deniz, S. (2013). The relationship between emotional intelligence and problem solving skills in prospective teachers. *Educational Research and Reviews*, *8*(24), 2339.

Devi, K. R. P. (2016). Role of problem solving ability on enhancing students' achievement. *Indian J. Res*, *5*, 238-240.

Di, H., Lun, Y., & Zhang, B. (2024). The relationship between kindergarten teachers' emotional intelligence and classroom management ability: An investigative study with latent profile analysis. https://doi.org/10.21203/rs.3.rs-4016900/v1

Durlak, J. A., Weissberg, R. P., Dymnicki, A. B., Taylor, R. D., & Schellinger, K. B. (2011). The impact of enhancing students' social and emotional learning: A meta-analysis of school-based universal interventions. Child Development, 82(1), 405–432. https://doi.org/10.1111/j.1467-8624.2010.01564.x

Dustova, G., & Cotton, S. (2015). Classroom management strategies. *The CTE Journal*, *3*(2), 32.

Dzafic, M., & Ilic, M. (2024). Emotional intelligence in teaching and learning. *Research in Pedagogy*, *14*(1), 62-73. https://doi.org/10.5937/IstrPed2401062D

Emmer, E. T., & Stough, L. M. (2001). Classroom management: A critical part of educational psychology, with implications for teacher education. *Educational Psychologist*, 36(2), 103–112. https://doi.org/10.1207/S15326985EP3602_5

Ergin, D. Y. (2019). Developing the Scale of Classroom Management Skills. *Journal of Education and Training Studies*, *7*(4), 250-258. https://doi.org/10.11114/jets.v7i4.4024

Fan, F. A. (2012). Teacher: students' interpersonal relationships and students' academic achievements in social studies. *Teachers and teaching*, *18*(4), 483-490. https://doi.org/10.1080/13540602.2012.696048

Field, A. (2009). *Discovering statistics using Spss*(3rd.ed.). London: Sage publications.

Franklin, H., & Harrington, I. (2019). A review into effective classroom management and strategies for student engagement: Teacher and student roles in today's classrooms. *Journal of Education and Training Studies*. https://doi.org/10.11114/jets.v7i12.4491

George, D. &Mallery, P. (2010). *SPSS for windows step by step: A simple guide and reference, 17.0 update*. Boston: Allyn & Bacon.

Göçet, E. (2006). *Üniversite öğrencilerinin duygusal zeka düzeyleri ile stresle başaçıkma tutumları arasındaki ilişki* [Yayımlanmamış Yüksek Lisans Tezi,]. Sakarya Üniversitesi.

Güleç, S. (2020). Problem solving skills in social studies education and problem solving skills of social studies teachers. *Journal of Education and Training Studies, 8*(3), 48. https://doi.org/10.11114/jets.v8i3.4686

Habsy, B. A., Azizah, N. H., Viola, N. P., & Mahendra, W. (2023). Peran guru dalam menciptakan lingkungan pembelajaran yang efektif dengan cara pengelolaan kelas yang menarik. *TSAQOFAH, 4*(2), 545-566. https://doi.org/10.58578/tsaqofah.v4i2.2305

Hamidi, H., & Khatib, M. (2016). The interplay among emotional intelligence, classroom management, and language proficiency of Iranian EFL teachers. *BRAIN. Broad Research in Artificial Intelligence and Neuroscience, 7*(2), 49-58.

Hans, A., & Hans, M. E. (2017). Classroom management is prerequisite for effective teaching. *International Journal of English and Education*, *6*(2), 273-283.

Hayes, A. F. (2018). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach* (2nd ed.). Guilford Press.

Hayes, A. F. (2022). *The PROCESS macro for SPSS, SAS, and R: A primer on mediation, moderation, and conditional process analysis* (3rd ed.). Guilford Press.

Heppner, P.P. & Petersen, C.H. (1982). The development and implications of a personal problem solving inventory. *Journal of Conselling Psychology*, 29, 66- 75. https://doi.org/10.1037/0022-0167.29.1.66

Hess, J. D., & Bacigalupo, A. C. (2014). Enhancing management problem-solving processes through the application of emotional intelligence skills. *Journal of Management Policies and Practices, 2*(3), 1-17. https://doi.org/10.15640/jmpp.v2n3a1

Hindman, J. L., & Stronge, J. H. (2004). What effective teachers do: Professional characteristics and practices. *Teacher Education Quarterly*, 31(1), 101–113.

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.

Ifesinachi, E. J., Dadzie, J., & Ocheni, A. C. (2024). Enhancing students'academic achievement in basic science: the role of assessment for learning, classroom management, and teacher-student relationships. *European Journal of Education Studies, 11*(5). https://doi.org/10.46827/ejes.v11i5.5298

Iram, N. (2022). Effect of Teachers' Emotional Intelligence on School Climate at Secondary School Level. *Bulletin of Education and Research*, *44*(3), 18-36.

Jennings, P. A., & Greenberg, M. T. (2009). The prosocial classroom: Teacher social and emotional competence in relation to student and classroom outcomes. Review of Educational Research, 79(1), 491–525. https://doi.org/10.3102/0034654308325693

Jeyapriya, A. L., & Jayachithra, J. (2024). Life skills pertaining to teaching performance with special emphasis on problem-solving. *International Journal of Emerging Knowledge Studies*, 3 (7), 357-361.

Jöreskog, K. G., & Sörbom, D. (1993). *LISREL 8: Structural equation modeling with the SIMPLIS command language.* Scientific Software International.

Kanesan, P., & Fauzan, N. (2019). Models of emotional intelligence: A review. *e-BANGI Journal*, *16*(7).

Karagözoğlu, N. (2016). Sosyal bilgiler öğretmenlerinin duygusal zeka yeterliklerini mesleğinde kullanma düzeyleri ile benimsedikleri sınıf yönetimi modelleri arasındaki ilişki. *The Journal of Academic Social Science*, *29*(29), 269-287. https://doi.org/10.16992/ASOS.1240

Karasar, N. (2009). Bilimsel araştırma yöntemi. 20. Baskı. Ankara: Nobel.

Kazi, S., & Laskar, J. H. (2024). Integrating Emotional Intelligence and Professional Ethics in Classroom Problem-Solving Among Upper Primary Teachers, *An Online Peer Reviewed / Refereed Journal, 2 (8),* ISSN: 2583-973X (Online)

Kelley, J. E. (2018). Teacher emotional intelligence and best practices for classroom management. *Dissertations*.

Khansir, A. A., & Mirzaei, M. (2024). The Classroom Management in English Language Teaching. *Indian Journal of Language and Linguistics*, *5*(2), 44–52. https://doi.org/10.54392/ijll2424

Kline, P. (2005). *Psychometrics and psychology: A primer*. Routledge.

Kline, R. B. (2015). *Principles and practice of structural equation modeling* (4th ed.). Guilford Press.

Koutrouba, K. (2020). Classroom Management and Teacher Effectiveness. *Oxford Research Encyclopedia of Education.*

Kumar, N., Tandon, R., & Misra, N. (2022). Emotional Intelligence as Intangible Class Content for Effective Communication in Managing University Classes: A Bibliometrics Analysis. *J. Content Community Commun*, *16*, 26-36. https://doi.org/10.31620/JCCC.12.22/03

Kuntari, R. D., & Asmarany, A. I. (2024). The Relationship Between Emotional Intelligence and Problem Solving in SLB Teachers. *The Relationship Between Emotional Intelligence and Problem Solving in SLB Teachers*, *142*(1), 6-6. https://doi.org/10.47119/IJRP1001421220246051

Levin, J., & Nolan, J. F. (2023). *Sınıf yönetimi ilkeleri: Bir profesyonel karar verme modeli* (Cemaloğlu, N. & İhtiyaroğlu, N, Çev. Ed.). Palme Yayıncılık.

Martinez, M. E. (1998). What Is Problem Solving? *The Phi Delta Kappan*, *79*(8), 605–609. http://www.jstor.org/stable/20439287

Marzano, R. J., & Marzano, J. S. (2003). The key to classroom management. *Educational leadership*, *61*(1), 6-13.

Mustafa, M. N., Hermandra, H., & Zulhafizh, Z. (2024). Classroom management through problem solving: teachers' strategies in realizing quality learning. In *Proceeding of The International Conference of Inovation, Science, Technology, Education, Children, and Health* (Vol. 4, No. 1, pp. 116-131).

Nanyele, S., Kuranchie, A., & Owusu-Addo, A. (2018). Classroom management practices and student disruptive behavior. *Integrity Journal of Education and Training, 2*(2), 6-14. https://doi.org/10.31248/IJET2018.021

Nurdin, S. (2024). Pengelolaan Kelas Dalam Pembelajaran Tematik di SD/MI. *Jurnal Arjuna: Publikasi Ilmu Pendidikan, Bahasa dan Matematika, 2*(3), 295-310. https://doi.org/10.61132/arjuna.v2i3.985

Özen, H., & Yıldırım, R. (2020). Teacher Perspectives on Classroom Management. *International Journal of Contemporary Educational Research,* 7(1), 99-113. https://doi.org/10.33200/ijcer.645818

Packard, A. B. (2021). *Managing Emotions: Teachers Use of Emotional Intelligence* (Doctoral dissertation, Northeastern University). https://doi.org/10.17760/D20412901

Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods, 40*(3), 879-891.

Rahimi, M., & Asadollahi, F. (2012). EFL teachers' classroom management orientations: Investigating the role of individual differences and contextual variables. *Procedia - Social and Behavioral Sciences*, 31, 43–50. https://doi.org/10.1016/j.sbspro.2011.12.013

Rao, D. V. T. (2022). Role of emotional intelligence in classroom to improve teaching methods of teachers.

Rawian, R. M. (2018). Emotional Intelligence in Classrooms. *SALTeL Journal (Southeast Asia Language Teaching and Learning), 1*(2), 21-26. https://doi.org/10.35307/saltel.v1i2.11

Roesler, R. A. (2017). Independence Pending: Teacher Behaviors Preceding Learner Problem Solving. *Journal of Research in Music Education, 64*(4), 454–473. https://doi.org/10.1177/0022429416672858

Sabetra, F., & Aziz, I. (2021). The Component Of Lesson Plan On Classroom Management. *International Journal of Humanities Education and Social Sciences, 1*(3). https://doi.org/10.55227/ijhess.v1i3.72

Saeedi, F., & Pahlavani, P. (2018). The Difference between predictability of Iranian EFL teachers' emotional intelligence and sense of plausibility with their sense of classroom management. *Journal of Modern Research in English Language Studies, 5*(1), 73-94.

Savage, T. V., & Savage, M. K. (2009). *Successful classroom management and discipline: Teaching self-control and responsibility*. Sage.

Schaubman, A., Stetson, E., & Plog, A. (2011). Reducing teacher stress by implementing collaborative problem solving in a school setting. *School Social Work Journal, 35*(2), 72-93.

Schutte, N. S., Malouff, J. M., Hall, L. E., Haggerty, D. J., Cooper, J. T., Golden, C. J., & Dornheim, L. (1998). Development and validation of a measure of emotional intelligence. *Personality and Individual Differences, 25*(2), 167-177. https://doi.org/10.1016/S0191-8869(98)00001-4

Shermukhamedovna, P. S. (2024). The Importance of Emotional Intelligence in Education: Nurturing Social and Emotional Learning in Students. *Pedagogical Cluster-Journal of Pedagogical Developments*, *2*(2), 22-27.

Sieberer-Nagler, K. (2016). Effective classroom-management & positive teaching. *English language teaching*, *9*(1), 163-172. https://doi.org/10.5539/elt.v9n1p163

Singh, A., Prabhakar, R., & Kiran, J. S. (2022). Emotional intelligence: A literature review of its Concept, models, and measures. *Journal of Positive School Psychology*, *6*(10), 2254-2275.

Sutton, R. E., & Wheatley, K. F. (2003). Teachers' emotions and teaching: A review of the literature and directions for future research. Educational Psychology Review, 15(4), 327–358. https://doi.org/10.1023/A:1026131715856

Şahin, N., Şahin, N. H., & Heppner, P. P. (1993). Psychometric properties of the problem solving inventory in a group of Turkish university students. *Cognitive Therapy and Research*, *17*, 379-396. https://doi.org/10.1007/BF01177661

Şevgin, H., & Eranıl, A. K. (2023). Investigaiıon of teachers'classroom management and classroom measurement and evaluatıon competencies. *International Journal of Eurasian Education & Culture*, *8*(23), 2319-2341. https://doi.org/10.35826/ijoecc.791

Tabachnick, B. G., & Fidell, L. S. (2012). *Using multivariate statistics* (6th ed.). Pearson.

Tabachnick, B. G., & Fidell, L. S. (2019). *Using multivariate statistics* (7th ed.). Pearson.

Valente, S., & Lourenço, A. A. (2020). Conflict in the classroom: How teachers' emotional intelligence influences conflict management. In *Frontiers in education* (Vol. 5, p. 5). Frontiers Media SA. https://doi.org/10.3389/feduc.2020.00005

Valente, S., Lourenço, A. A., Alves, P., & Dominguez-Lara, S. (2020). The role of the teacher's emotional intelligence for efficacy and classroom management. *CES Psicología*, *13*(2), 18-31. https://doi.org/10.21615/cesp.13.2.2

Valente, S., Monteiro, A. P., & Lourenço, A. A. (2019). The relationship between teachers' emotional intelligence and classroom discipline management. *Psychology in the Schools*, *56*(5), 741-750. https://doi.org/10.1002/pits.22218

Valente, S., Veiga-Branco, A., Rebelo, H., Lourenço, A. A., & Cristóvão, A. M. (2020). The relationship between emotional intelligence ability and teacher efficacy. https://doi.org/10.13189/ujer.2020.080324

Wang, L. (2022). Exploring the relationship among teacher emotional intelligence, work engagement, teacher self-efficacy, and student academic achievement: A moderated mediation model. *Frontiers in psychology*, *12*, 810559. https://doi.org/10.3389/fpsyg.2021.810559

Yalçınkaya, M., & Tonbul, Y. (2002). İlköğretim okulu sınıf öğretmenlerinin sınıf yönetimi becerilerine ilişkin algı ve gözlemler. *Ege Eğitim Dergisi*, *1*(2), 1-10.

Zafar, J. M., & Akhtar, M. S. (2023). Emotional Intelligence and Anxiety Handling in Secondary Grade Students by Classroom Managerial Style. *Academy of Education and Social Sciences Review*, *3*(1), 22–31. https://doi.org/10.48112/aessr.v3i1.399

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The Mediating Role of Religion-Based Beliefs in the Relationship Between Microaggressions and Ethnocultural Empathy

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ABSTRACT

This study examines the mediating role of individuals' religious worldview in the relationship between microaggressions toward mental illness and ethnocultural empathy. Microaggression is generally associated with low empathy and unconscious biased attitudes, referring to individuals making discriminatory or demeaning statements without being aware of it. The study explores how individuals' religious worldviews shape the impact of microaggressions and their relationship with ethnocultural empathy levels. The research was conducted with 312 participants aged 18 and older, and data were collected using the Religious Worldview Scale, the Ethnocultural Empathy Scale, and the Microaggressions Toward Mental Illness Scale. The analyses revealed that microaggressions do not have a direct significant effect on ethnocultural empathy; however, religious worldview plays a mediating role, indirectly influencing this relationship. The study's main hypothesis suggests that religious worldview mediates the relationship between microaggressions toward mental illness and ethnocultural empathy, significantly shaping the effect of microaggressions on empathy. In this context, the findings are expected to provide valuable contributions to promoting social cohesion, fostering acceptance of cultural differences, and developing strategies to reduce the impact of microaggressions.

Keywords: Religious worldview, microaggressions, ethnocultural empa-thy, social interaction, prejudice

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Introduction

Living in a society with different cultures requires social adaptation. Thus, being able to empathize between groups becomes important (Shunchao, 2023). These societies are called multicultural societies. Multicultural societies can be defined as social structures that include various races, religious beliefs, languages, and social lives (Islam & Bozdağ, 2021). While this diversity causes positive effects such as cultural richness in many areas of society, it can also cause prejudices and negative thoughts towards these differences by society (Hutabarat, 2023). Microaggressions, which represent these negative thoughts and prejudices, can cause psychological pressure and difficulties towards individuals with differences (Mensitieri et al., 2025). Although overt discrimination is the subject of many studies, microaggressions are a difficult situation to detect, affecting individuals' well-being, interpersonal relationships, and social skills (Mohammad Vali Samani, 2024). Microaggression includes words and behaviors that are made towards individuals from different cultures, who are in the minority, and that negatively affect them, whether intentionally or unintentionally (Güleç & Özden, 2019; Schraub, 2023; Webster, 2018). Similarly, Torino et al. (2018) and Adedeji et al. (2023) describe microaggression as “demeaning insults or belittling behaviors directed at members of an oppressed group.” If microaggressions are not taken seriously by society, issues such as interpersonal skills and the sense of belonging among individuals in society can be negatively affected, while problems such as alienation from oneself can arise (Williams et al., 2021). Although microaggressions are often perceived as demeaning, they differ from overt and intentional acts of racism. Since they are done unconsciously, their individual and psychological effects can sometimes be ignored (Campbell & Manning, 2014). Over time, these unnoticed effects can combine and cause many negative feelings such as worthlessness, exclusion, and lack of belonging, which seriously harm the psychological health of the individual (Idle et al., 2025). In addition, negative effects such as loss of self-confidence, anxiety, depression and alienation from social life are seen in individuals in minority communities (Starling, 2024). Microaggressions can also cause chronic stress that harms the psychological integrity of the person (Sue, 2005). Such situations can affect areas such as the person's social and academic life and cause the functionality in their life to deteriorate (Adenusi et al., 2025). These negative effects do not only harm the individual, but can also disrupt the peace and structure of society (Farber, 2021).

In combating microaggression, empathy is one of the most powerful keys to awareness and change (Jana & Baran, 2023). Defined as "feeling what another person feels," empathy has been a subject of debate in philosophy for centuries regarding its role in social and moral development and has also become a key concept in contemporary psychology (Eisenberg & Strayer, 1990). The concept of empathy is sometimes used to refer to a cognitive process similar to perspective-taking (Deutsch & Madie, 1975) and at other times to an affective process that also includes cognitive elements (Eisenberg & Strayer, 1990). Goldstein and Michaels (1985) viewed empathy as a process that serves a communicative function of gathering information. Empathy is crucial for human relationships and serves as a fundamental component of all psychological phenomena (Duan & Hill, 1996). According to Dyche and Zayas (2001), empathy is one of the foundations of prosocial behavior and a sense of justice.

While empathy is an effort to understand the emotional state of the other person without losing one's objectivity (Watson et al. 2022); ethno-cultural empathy is the ability to understand individuals from different languages, races and beliefs by using empathy in relationships (Valieva & Fazlitdinova, 2023). In other words, ethno-cultural empathy is the effort of the concept of

empathy to understand individuals who experience cultural diversity. While the basic concept of empathy tries to understand the emotional processes of individuals, ethno-cultural empathy deepens this understanding and offers the opportunity to understand the individual who has differences (Fernández-Corbacho et al., 2024). To describe the concept of intercultural empathy, various terms have been used interchangeably, such as ethnocultural empathy (Ridley & Lingle, 1996), multicultural empathic awareness (Scott & Borodovsky, 1990), and ethnic perspective-taking (Quintana et al., 2000 ; Wang et al., 2003). In this context, it can be thought that ethno-cultural empathy will have an important effect in combating microaggressions. Ethno-cultural empathy is an important concept that helps understand the thoughts, feelings, and experiences of individuals from different identities (Kapıkıran, 2023). Individuals with this skill know how words and behaviors will affect individuals with different identities and pay attention to this in interpersonal communication (Moffit et al., 2022). With the increase of this empathic skill, people not only contribute to eliminating the negative effects of microaggressions, but also support individuals who are exposed to microaggressions (Singleton-Gonzalez, 2025). Ethnocultural empathy is a tool that can help reduce individual prejudices and promote equality and inclusivity in society. In particular, fostering mutual understanding among individuals from different ethnic and religious groups can help mitigate the impact of microaggressions and contribute to building a more inclusive society (Cundiff & Komarraju, 2008). Therefore, developing ethno-cultural empathy is a fundamental step toward establishing more inclusive, respectful, and healthy social relationships in multicultural societies.

Empathy or ethno-cultural empathy alone may not be enough to deal with microaggressions. This situation is especially evident in societies with different cultures and deeply held beliefs. When these beliefs are shaped by religious views, perceptions of darkness are affected by these thoughts (Cuevas & Dawson, 2021). Religious views provide a framework that guides people in making sense of life and are an important phenomenon that directs interpersonal relationships by determining the individual's moral and ethical choices (Suryani & Muslim, 2024).A religious worldview influences not only how individuals perceive themselves and the world but also shapes their expectations, goals, motivations, and emotions through various psychological processes (Goplen & Plant, 2015). As a result, individuals with a strong religious worldview may adopt different strategies to maintain their beliefs when encountering other groups. This can sometimes lead to biased and discriminatory reactions (Greenberg et al., 1997; Major et al., 2007) and, in some cases, even acts of aggression toward other groups with the intention of suppressing or eliminating alternative worldviews (Goplen & Plant, 2015).

The influence of religious beliefs on social behavior and cultural norms that shape society is well-known (Sele et al., 2024). In many societies, religion serves as a fundamental reference point in defining right and wrong, the distinction between “us” and “them,” and the value of others. These religious frameworks can play a mediating role in shaping how individuals relate to microaggressions and ethnocultural empathy. On the one hand, religious teachings can reduce the incidence of microaggressions by promoting tolerance, compassion, and understanding (Hall, 2023). Conversely, some religious teachings can be said to be effective in the development and maintenance of negative thoughts and behaviors towards minority groups, albeit unconsciously (Gupta, 2024). In this context, religious beliefs have the potential to reduce or increase both the occurrence and impact of microaggressions.

The mediating role of religion-based beliefs in the relationship between microaggressions and ethnocultural empathy is a complex and multifaceted issue. Religion can influence both the expression of microaggressions and the development of empathy, depending on the specific religious values, interpretations, and practices individuals adhere to (Pentaris, 2018). For example, in some religious traditions, there is a strong emphasis on charity, kindness, and respect for others, which may encourage individuals to practice empathy and avoid behaviors that could be perceived as discriminatory or harmful. In contrast, other religious beliefs might reinforce an "in-group" mentality, where individuals are more likely to dehumanize those outside their religious community, making microaggressions more likely to occur.

The aim of this study is to examine the mediating role of individuals' religious worldview in the relationship between microaggressions toward mental illness and ethnocultural empathy. The main hypothesis of the study suggests that religious worldview mediates the relationship between the level of microaggressions toward mental illness and ethnocultural empathy and that this mediation significantly influences the effect of microaggressions on empathy. In this context, the findings are expected to provide significant contributions to social cohesion, the acceptance of cultural differences, and the development of strategies to reduce the impact of microaggressions.

Method

Research Model

The primary aim of this study is to examine the mediating role of religious worldview in the relationship between microaggressions toward mental illness and ethno-cultural empathy. In this context, the research was conducted within the framework of the predictive correlational model, which is one of the descriptive research methods (Şata, 2020). Predictive correlational research is defined as a research model that aims to determine the interaction between multiple independent variables and the level of relationships among these variables (Karasar, 2014).

Population and Sample

The population of this study consists of individuals over the age of 18 who do not have any disabilities. The sample was selected using the convenience sampling method, a type of non-probability sampling technique that involves selecting participants based on their accessibility and proximity to the researcher. This method is often preferred in exploratory research or when random sampling is not feasible due to time, cost, or logistical constraints (Ahmed, 2024).

Initially, the sample included a total of 350 participants. During the data cleaning and examination process following data collection, 18 individuals with missing values were excluded from the study. Subsequently, an outlier analysis was conducted, identifying 20 individuals with extreme values, who were also excluded from the study. As a result, the study was conducted with a total of 312 individuals. The study sample consisted of 312 participants. In terms of gender, 66.7% were male and 33.3% were female. Regarding age distribution, 18.6% were aged 22 and under, 30.8% were between 23 and 25, 21.4% were between 26 and 28, and 29.2% were aged 29 and over. Concerning education levels, 7.1% had completed primary or secondary school, 16.3% had a high school education, 64.1% held an associate or bachelor’s degree, and 12.5% had completed postgraduate studies. In terms of marital status, 24.7% were married, 62.5% were single, and 12.8% were in a relationship. When it came to perceived income status, 31.4% reported their income as being less than their expenses, 53.8% stated it was equal to their expenses, and 14.8% reported earning more than their expenses. Regarding parental education levels, 45.8% of

mothers were illiterate, 34.6% had completed primary school, 8.0% had a middle school education, 7.4% had finished high school, and 4.2% had a university degree. For fathers, 15.4% were illiterate, 40.1% had completed primary school, 21.8% had a middle school education, 12.2% had finished high school, and 10.5% held a university degree. The socio-demographic information of the participants is presented in Table 1.

Table 1. Descriptive statistics on participants' socio-demographic information

Variables		Frequency	Percentage
Gender	Male	208	66.7
	Female	104	33.3
Age group	22 years and under	58	18.6
	23-25 age	96	30.8
	26-28 age	67	21.4
	29 age and over	91	29.2
Education level	Primary/Secondary school	22	7.1
	High school	51	16.3
	Associate/Bachelor's degree	200	64.1
	Postgraduate	39	12.5
Marital status	Married	77	24.7
	Single	195	62.5
	In a relationship	40	12.8
Percieved income	Income < Expenses	98	31.4
	Income = Expenses	168	53.8
	Income > Expenses	46	14.8
Mother's education	lIlliterate	143	45.8
	Literate/Primary School	108	34.6
	Middle School	25	8.0
	High School	23	7.4
	University	13	4.2
Father's education	lIlliterate	48	15.4
	Literate/Primary School	125	40.1
	Middle School	68	21.8
	High School	38	12.2
	University	33	10.5
	Total	312	100.0

When Table 1 is examined, it is observed that the majority of participants are male and fall within the age range of 23-28. Regarding educational levels, most participants have an associate or bachelor's degree, while the least common education level is primary or secondary school. In terms of marital status, the majority of participants are single. When examining perceived income, it is found that most participants have a moderate income that is equal to their expenses. Regarding maternal education levels, the majority of mothers are illiterate, whereas most fathers are literate.

Data Collection Instruments

Religious Worldview Scale :The Religious Worldview Scale, developed by Goplen and Plant (2015), consists of 19 items and is administered using a 5-point Likert scale (1: strongly disagree, 2: disagree, 3: neither agree nor disagree, 4: agree, 5: strongly agree). In the original study, the internal consistency coefficient of the scale was calculated as $\alpha = .97$. For validity analysis, Confirmatory Factor Analysis (CFA) was conducted, and fit indices such as RMSEA, CFI, and TLI were examined. The factor loadings demonstrated high correlations, ranging between .60 and .85. In the reliability analysis, the Cronbach's Alpha coefficient was found to be .95, and

the test-retest reliability was .92 (Goplen & Plant, 2015). The validity and reliability studies of the scale in Turkey were conducted by Kuşat and Bulut (2016). The scale consists of 19 items and two factors, namely meaning-making of the afterlife and this world. The Cronbach's Alpha internal consistency coefficient of the scale was determined to be .88, and the split-half reliability coefficient was .86.

Ethno-Cultural Empathy Scale: Originally developed as a 31-item, 6-point Likert scale, the Ethno-Cultural Empathy Scale was adapted into Turkish by Özdikmenli and Demir (2014) and revised to a 5-point Likert format. As a result of item analysis, item 16 was removed due to low item-total correlation. For validity analysis, Exploratory Factor Analysis (EFA) was conducted, revealing a three-factor structure, which includes: Empathic Feeling and Expression, Empathic Perspective-Taking, and Acceptance of Cultural Differences with Empathic Awareness. The CFA results indicated that the scale had fit indices of RMSEA = .06, CFI = .95, TLI = .94, demonstrating a good fit. In the reliability analysis, the Cronbach's Alpha coefficient was .91 for the total scale, while it ranged between .78 and .87 for the sub-dimensions (Özdikmenli & Demir, 2014).

Microaggressions Toward Mental Illness Scale: The Microaggressions Toward Mental Illness Scale, developed by Gonzales et al. (2015), consists of 17 items and four sub-dimensions. The scale follows a 4-point Likert format, with higher scores indicating higher levels of microaggression. Validity analyses were conducted using CFA, confirming that the four-factor structure was appropriate. The fit indices were found to be RMSEA = .07, CFI = .94, and TLI = .93, indicating an acceptable fit. In the reliability analysis, the Cronbach's Alpha coefficient was .89 for the total scale, while it ranged between .75 and .86 for the sub-dimensions. The test-retest reliability was calculated as .88 (Gonzales et al., 2015).

Normality and Reliability Analysis of Data Collection Instruments

To determine the distribution characteristics of the data obtained from the measurement instruments used in the study, skewness and kurtosis coefficients were examined. Additionally, descriptive statistics were calculated to present the general characteristics of the data. To assess the reliability of the measurement instruments, Cronbach's Alpha coefficient was calculated, and reliability analyses were conducted. The descriptive statistics and reliability values obtained from the measurement instruments are presented in Table 2.

Table 2. Skewness and Kurtosis Statistics and Reliability Values of the Measurements Obtained from the Instruments

Variables	Min.	Max.	$\bar{X}$	SD	Skewness	Kurtosis	Cronbach α
Religious Worldview	23.00	87.00	63.95	9.57	-0.65	1.56	.91
Ethnocultural Empathy	65.00	117.00	93.51	7.35	-0.62	1.97	.89
Microaggression	17.00	64.00	42.38	6.94	-0.53	1.99	.85

When Table 2 is examined, it is observed that the skewness values of the measurement instruments used in the study fall within the ±3.00 range, while the kurtosis values remain within the ±10.00 range. This result indicates that the data follow a normal distribution (Kline, 2015). Accordingly, the measurement instruments were accepted as having the characteristic of normal distribution.

Additionally, the obtained reliability coefficients were found to range between .85 and .91. In the literature, reliability coefficients of .70 and above are considered to indicate high reliability levels (Salvucci et al., 1997), while values between .60 and .70 are considered acceptable reliability levels (Griethuijsen et al., 2014). In this context, it can be concluded that the reliability values obtained from the measurement instruments used in this study generally indicate a high level of reliability.

Data Analysis

The data analysis in this study was designed in accordance with the research objective. First, descriptive statistics were calculated, and skewness and kurtosis values were examined to assess the distribution of the data. To determine the reliability of the measurement instruments, Cronbach's Alpha coefficient was calculated. To analyze the mediation effects, which form the core of the study, a mediation model was applied. While evaluating the model, the 95% confidence interval of indirect effects was taken into consideration (Preacher & Hayes, 2004). To test the significance of the indirect effects, the bootstrapping method was applied using 10,000 bootstrap samples. The data analysis process was conducted using SPSS (Version 25) and Jamovi (Version 2.6.13) software.

Ethic

The research was carried out with the approval of Van Yüzüncü Yıl University Social and Humanities Sciences Ethics Commission dated 07/02/2025 and numbered 2025/03-20.

Findings

As part of the study, the relationships between variables were first examined, and the findings are presented in Table 3.

Table 3. Correlations between variables

Variables	Religious Worldview	Ethnocultural Empathy
Religious Worldview	--	
Ethnocultural Empathy	.23**	--
Microaggression	.44**	.11*

***p < .001; *p < .05.*

When Table 3 is examined, it is observed that the variables within the scope of the study have statistically significant relationships. The relationship between ethnocultural empathy and microaggressions is positive and low ($r = .11$, $p < .05$), while its relationship with religious worldview is also positive and low ($r = .23$, $p < .05$). The relationship between microaggressions and religious worldview is positive and at a moderate level ($r = .44$, $p < .05$).

After examining the relationships between variables, the mediating effect of religious worldview in the relationship between microaggression levels toward mental illness and ethnocultural empathy was tested. The findings are presented in Table 4.

Table 4. Mediation analysis

Path	Effect	b	%95 Confidence Interval Lower	Upper	β	p-value
Indirect	MA ⇒ RW ⇒ ECE	0.10	0.04	0.17	0.10	<.001
	MA ⇒ RW	0.61	0.47	0.75	0.44	<.001
	RW ⇒ ECE	0.17	0.08	0.26	0.22	<.001
Direct	MA ⇒ ECE	0.02	-0.11	0.14	0.01	0.816
Total	MA ⇒ ECE	0.12	0.00	0.24	0.11	0.045

Note: MA = Microaggression, RW = Religious Worldview, ECE = Ethnocultural Empathy

Upon examining Table 4, it was found that the direct effect of individuals' levels of microaggression toward mental illnesses on their level of ethnocultural empathy is statistically significant (total effect, $\beta = .11$, $p < .05$). The level of microaggression toward mental illnesses is also a positive predictor of the level of religious worldview (direct effect, $\beta = .44$, $p < .001$). When the effect of the level of religious worldview on the level of ethnocultural empathy was examined, it was determined that religious worldview is a positive predictor of ethnocultural empathy (direct effect, $\beta = .22$, $p < .01$). When the mediating variable (religious worldview) was included in the model, the level of microaggression toward mental illnesses was found to have no statistically significant direct effect on the level of ethnocultural empathy (direct effect, $\beta = .01$, $p > .05$). Accordingly, it was found that the level of microaggression toward mental illnesses has an indirect effect on ethnocultural empathy through the mediation of religious worldview (indirect effect, $\beta = .10$, $p < .01$). A graphical representation of the tested model is provided in Figure 1.

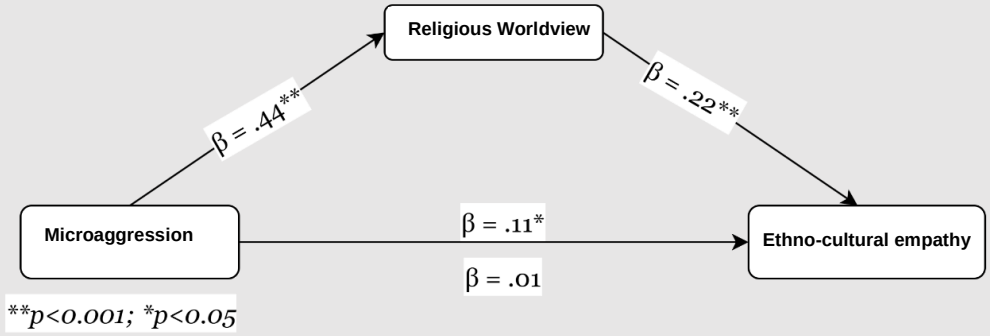

Figure 1. Tested mediation model

Discussion and Conclusion

Microaggressions generally involve discriminatory and exclusionary behaviors and verbal attitudes that are unknowingly made towards individuals in minority groups. This can cause an increase in psychological distance in all individuals and weaken empathy skills (Sue et al., 2019). For some individuals, being exposed to these behaviors can cause them to be more sensitive to social equality and increase awareness on this issue, thus providing an opportunity to develop ethnocultural skills by developing empathy skills towards others (Chao et al., 2024). This suggests that self-awareness and sociocultural sensitivity can enable negative experiences to become opportunities for empathy development. As a result, whether microaggressions hinder or enhance ethnocultural empathy may vary depending on how individuals process these experiences and the support systems or belief frameworks they have. In this context, religiously based beliefs may play an important role in both microaggression experiences and the acquisition of ethnocultural skills. Individuals with strong religious beliefs, especially those emphasizing compassion, justice, and the inherent dignity of all people, may tend to evaluate microaggressions within the framework of understanding rather than hostility (Moss, 2020). Such attitudes can reduce the negative effects of microaggressions and foster a deeper understanding and relationship towards different identities.

Firstly, according to the results of the analyses, it was revealed that microaggressions do not have a significant relationship on ethnocultural empathy. It was concluded that microaggressions alone cannot be sufficient to affect empathic skills towards differences (Peifer & Taasoobshirazi, 2022; Williams, 2019). The fact that there was no significant relationship between microaggressions and the dependent variable ethnocultural empathy provided insight into the fact that different intergroup variables and emotional understanding skills can be affected by very different dynamics (Hess & Philippot, 2007; Mackie & Smith, 2015). Although microaggressions are often associated with negative outcomes such as stress, alienation, and decreased psychological well-being (Choi et al., 2022), the lack of a direct effect of these on ethnocultural empathy suggests that the development of empathy towards different cultural groups is shaped by deeper and more complex mechanisms. The existence of possible mediating or moderating variables that determine how individuals respond to such experiences is important in this context. Rather than directly increasing or decreasing empathy, microaggressions may act through more complex psychological or social processes, such as religious beliefs, coping mechanisms, or cultural identity; these processes may either moderate or strengthen the impact of microaggressions (Anderson, 2022).

The findings reveal a nuanced role of religious worldview in the context of microaggressions and ethnocultural empathy. The moderate positive relationship between religious worldview and microaggressions suggests that individuals with stronger religious convictions may, at times, engage in or justify microaggressive behaviors—possibly as a result of rigid interpretations of religious doctrine, in-group favoritism, or a moral framework that inadvertently marginalizes those who differ from their beliefs (Greenberg et al., 1997). This finding of the study revealed that although there are situations where religion can direct prosocial values, sometimes when religion is treated in an exclusionary manner, prejudices and stereotypes towards minorities can develop (Kiper, 2023). The significant positive relationship between religious worldview and ethnocultural empathy shows that individuals with a religious worldview can have compassion, respect for their differences and empathic understanding towards individuals who are different from themselves. It can be stated that while religion can both strengthen microaggressions and also develop understanding and empathic skills towards social differences, it reveals the complex nature of religion (Day, 2009; Hall, 2023; Roszak, 2021). In addition,

religious worldview can be considered as an important factor in individuals being more sensitive to differences socially and culturally (Taiba et al., 2023). These results refer to the value of how individuals interpret religious worldview and how they transform it into behavior.

Implications

Practitioners, educators, and community leaders can plan to incorporate religious terminology such as human dignity, compassion, interdependence, and understanding of human value into various educational programs to build social empathy with minority group members. Faith-based perspectives can play an important role in promoting social peace by focusing on tolerance and respect for differences among minority group members based on their human nature. It is thought that it would be important to implement intervention programs that are sensitive to individual differences by emphasizing the importance of individuals' belief systems in social empathy. Psychologists and clients working with individuals who are victims of microaggression can investigate the functionality of religion in increasing psychological resilience and apply technical and theoretical knowledge in this direction. The development of psychoeducation programs that investigate the functionality of religion in increasing the psychological well-being of individuals is also considered very important. Longitudinal and in-depth studies with multiple variables can reveal in more detail how these variables relate to each other and how religion interacts with microaggressions over time and in different socio-political contexts.

Declaration of Conflicting Interests

There is no conflict of interest for the study. The author conducted the study alone.

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Ethic

The research was carried out with the approval of Van Yüzüncü Yıl University Social and Humanities Sciences Ethics Commission dated 07/02/2025 and numbered 2025/03-20.

References

Adedeji, A., Olonisakin, T. T., Metzner, F., Buchcik, J., Tsabedze, W., Boehnke, K., & Idemudia, E. S. (2023). Interpreting microaggression as a determinant of wellbeing. *Journal of Racial and Ethnic Health Disparities*, *10*(5), 2470-2481. https://doi.org/10.1007/s40615-022-01426-z

Adenusi, B. Z., Abbruzzese, L. D., Oluwole-Sangoseni, O., Bishop, K. L., Thurston, L. A., Maxwell, B., ... & Adeniran, R. K. (2025). A call to action for disrupting microaggressions, improving interprofessional collaboration, and optimizing outcomes: Nurse leaders have a role. *Nursing Outlook*, *73*(2), 102354. https://doi.org/10.1016/j.outlook.2025.102354

Ahmed, S. K. (2024). How to choose a sampling technique and determine sample size for research: a simplified guide for researchers. *Oral Oncology Reports*, *12*. https://doi.org/10.1016/j.oor.2024.100662

Anderson, A. (2022). Religion and Spirituality as a coping mechanism for racial microaggressions: A Literature Review.

Campbell, B., & Manning, J. (2014). Microaggression and moral cultures. *Comparative Sociology*, *13*(6), 692-726. https://doi.org/10.1163/15691330-12341332

Chao, R. C. L., Wei, M., Du, Y., Carrera, S. G., Lannin, D., Tittler, M. V., ... & Frickey, E. A. (2024). Effects of a video intervention and ethnocultural empathy on racial color-blindness, White empathy, and willingness to confront White privilege. *Cultural Diversity & Ethnic Minority Psychology*. https://doi.org/10.1037/cdp0000713

Choi, S., Clark, P. G., Gutierrez, V., & Runion, C. (2022). Racial microaggressions and latinxs' well-being: a systematic review. *Journal of Ethnic & Cultural Diversity in Social Work*, *31*(1), 16-27. https://doi.org/10.1080/15313204.2020.1827336

Cuevas, J. A., & Dawson, B. L. (2021). An integrated review of recent research on the relationships between religious belief, political ideology, authoritarianism, and prejudice. *Psychological Reports*, *124*(3), 977-1014. https://doi.org/10.1177/0033294120925392

Cundiff, N. L., & Komarraju, M. (2008). Gender differences in ethnocultural empathy and attitudes toward men and women in authority. J*ournal of Leadership & Organizational Studies*, *15*(1), 5-15. https://doi.org/10.1177/1548051808318000

Day, J. M. (2009). Conscience: Does religion matter? Empirical studies of religious elements in pro-social behaviour, prejudice, empathy development, and moral decision-making. In *The development and structure of conscience* (pp. 61-80). Psychology Press.

Deutsch, F., & Madle, R. A. (1975). Empathy: Historic and current conceptualizations, measurement, and a cognitive theoretical perspective. *Human Development*, *18*(4), 267-287. https://doi.org/10.1159/000271488

Duan, C., & Hill, C. E. (1996). The current state of empathy research. *Journal of Counseling Psychology*, *43*(3), 261. https://doi.org/10.1037/0022-0167.43.3.261

Dyche, L., & Zayas, L. H. (2001). Cross-cultural empathy and training the contemporary psychotherapist. *Clinical Social Work Journal*, *29*, 245-258. https://doi.org/10.1023/A:1010407728614

Eisenberg, N., & Strayer, J. (Eds.). (1990). *Empathy and its development*. CUP Archive.

Farber, R., Wedell, E., Herchenroeder, L., Dickter, C. L., Pearson, M. R., & Bravo, A. J. (2021). Microaggressions and psychological health among college students: A moderated mediation model of rumination and social structure beliefs. *Journal of Racial and Ethnic Health Disparities*, *8*(1), 245-255. https://doi.org/10.1007/s40615-020-00778-8

Fernández-Corbacho, A., Cores-Bilbao, E., & Flor-Arasil, P. (2024). Ethnocultural empathy development of future language teachers through digital multiliteracy resources for low-literacy adult migrants. *Frontiers in Psychology*, *15*, 1398457. https://doi.org/10.3389/fpsyg.2024.1398457

Goldstein, A. P., & Michaels, G. Y. (1985). *Empathy: Development, training, and consequences.* Routledge.

Gonzales, L., Davidoff, K. C., Deluca, J. S., & Yanos, P. T. (2015). The mental illness mcroaggressions scale-perpetrator version (Mıms-P): Reliability and validity. *Psychiatry Research*, *229*(1-2), 120-125. https://doi.org/10.1016/j.psychres.2015.07.061

Goplen, J., & Plant, E. A. (2015). A religious worldview: Protecting one's meaning system through religious prejudice. *Personality and Social Psychology Bulletin*, *41*(11), 1474-1487. https://doi.org/10.1177/0146167215599761

Greenberg, J., Solomon, S., & Pyszczynski, T. (1997). Terror management theory of self-esteem and cultural worldviews: Empirical assessments and conceptual refinements. In Advances in experimental social psychology (Vol. 29, pp. 61-139). Academic Press. https://doi.org/10.1016/S0065-2601(08)60016-7

Griethuijsen, R. A. L. F., Eijck, M. W., Haste, H., Brok, P. J., Skinner, N. C., Mansour, N., et al. (2014). Global patterns in students' views of science and interest in science. *Research in Science Education*, *45*(4), 581–603. https://doi.org/10.1007/s11165-014-9438-6

Gupta, A. (2024). Breaking Bias: Where Stereotypes and Prejudices Come From–and the Science-Backed Method to Unravel Them. Hay House, Inc.

Güleç, İ., & Özden, E. (2019). Kasıtsız hakaret (microaggressions) ve Türkiye'de sık görülen örnekleri. *Akademik İncelemeler Dergisi, 14*(2), 121-162. https://doi.org/10.17550/akademikincelemeler.520645

Hall, N. D. (2023). *What discrimination? Christian microaggression rhetoric against nontheists.* Master's thesis, East Tennessee State University.

Hess, U., & Philippot, P. (Eds.). (2007). *Group dynamics and emotional expression*. Cambridge University Press. https://doi.org/10.1017/CBO9780511499838

Hutabarat, F. (2023). Navigating diversity: Exploring religious pluralism and social harmony in Indonesian society. *European Journal of Theology and Philosophy*, *3*(6), 6-13. https://doi.org/10.24018/theology.2023.3.6.125

Idle, J., Robinson, S., Fisher, K. R., Ikäheimo, H., Smyth, C., & Yoon, J. (2025). Conceptualising the everyday harm experienced by people with cognitive disability: A scoping review of microaggression and emotional and psychological abuse. *Journal of Intellectual & Developmental Disability*, *50*(1), 59-71. https://doi.org/10.3109/13668250.2024.2336076

Islam, M., & Bozdağ, Z. (2021). Using Turkish as mother tongue in a multicultural society: A sociological study on Turks in Germany. *Journal of Narrative and Language Studies*, *9*(16), 160-173.

Jana, T., & Baran, M. (2023). *Subtle acts of exclusion: How to understand, identify, and stop microaggressions*. Berrett-Koehler Publishers.

Kapıkıran, N. A. (2023). Sources of ethnocultural empathy: Personality, intergroup relations, affects. *Current Psychology*, *42*(14), 11510-11528. https://doi.org/10.1007/s12144-021-02286-2

Karasar, N. (2014). *Bilimsel araştırma yöntemi.* Ankara: Nobel Yayıncılık.

Kiper, J. (2023). Religious hate propaganda: Dangerous accusations and the meaning of religious persecution in light of the cognitive science of religion. *Religions*, *14*(2), 185. https://doi.org/10.3390/rel14020185

Kline, R. B. (2015). *Principles and practice of structural equation modeling*. Guilford press.

Kuşat, A., & Bulut, M. B. (2016). Dini dünya görüşleri ölçeğinin Türkçeye uyarlanması: Geçerlik ve güvenirlik çalışması. *Uluslararası Sosyal Araştırmalar Dergisi, 9*(43), 2502-2509. https://doi.org/10.17719/jisr.20164317809

Mackie, D. M., Maitner, A. T., & Smith, E. R. (2015). *Intergroup emotions theory*. In Handbook of prejudice, stereotyping, and discrimination (pp. 149-174). Psychology Press.

Major, B., Kaiser, C. R., O'Brien, L. T., & McCoy, S. K. (2007). Perceived discrimination as worldview threat or worldview confirmation: implications for self-esteem. *Journal of Personality and Social Psychology*, *92*(6), 1068. https://doi.org/10.1037/0022-3514.92.6.1068

Mensitieri, D., Boroş, S., & Toma, C. (2025). Bringing microaggressions from the shadows to the spotlight: Unveiling silencing mechanisms and distinct patterns in coping. *Gender, work & organization*, *32*(3). https://doi.org/10.1111/gwao.13256

Moffit, D. M., Evans, K., & Judge, K. (2022). Beyond cultural competency: Considering ethnocultural empathy. *Athletic Training Education Journal*, *17*(4), 277-282. https://doi.org/10.4085/1947-380X-22-003

Mohammad Vali Samani, N. (2024). *The good, the bad, and the Microaggressions: How identity and context ınfluence daily experiences and psychological outcomes over time*. The University of Western Ontario

Moss, K. R. (2020). *Muslim, Jewish, and Christian Women Living with Resilience Amidst Microaggressions and Macroaggressions in King County*. Seattle University.

Özdikmenli-Demir, G., & Demir, S. (2014). Testing the psychometric properties of the scale of ethnocultural empathy in Turkey. *Measurement and Evaluation in Counseling and Development, 47*(1), 27-42. https://doi.org/10.1177/0748175613513805

Peifer, J. S., & Taasoobshirazi, G. (2022). Heightened cognitive empathy through ethnic ıdentity and ıntercultural competence for ındividuals with historically marginalized ıdentities. *International Journal on Social and Education Sciences*, *4*(2), 290-306. https://doi.org/10.46328/ijonses.324

Pentaris, P. (2018). The marginalization of religion in end of life care: signs of microaggression?. *International Journal of Human Rights in Healthcare, 11*(2), 116-128. https://doi.org/10.1108/IJHRH-09-2017-0053

Preacher, K. J., & Hayes, A. F. (2004). SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behavior Research Methods, Instruments, & Computers, 36*, 717-731. https://doi.org/10.3758/BF03206553

Quintana, S. M., Ybarra, V. C., Gonzalez-Doupe, P., & Baessa, Y. D. (2000). Cross-cultural evaluation of ethnic perspective-taking ability: An exploratory investigation with US Latino and Guatemalan Ladino children. *Cultural Diversity and Ethnic Minority Psychology, 6*(4), 334. https://doi.org/10.1037/1099-9809.6.4.334

Ridley, C. R., & Lingle, D. W. (1996). Cultural empathy in multicultural counseling: A multidimensional process model. In P. B. Pedersen, J. G. Draguns, W. J. Lonner, & J. E. Trimble (Eds.), *Counseling across cultures* (4th ed., pp. 21–46). Sage Publications, Inc.

Roszak, P., Horvat, S., Huzarek, T., Litak, E., Wółkowski, J., & Oręziak, B. (2022). Majority harassed by the minority? Microaggressions based on religiosity in contemporary Poland. *European Journal of Science and Theology, 18(*2),61-77.

Salvucci, S., Walter, E., Conley, V., Fink, S., & Saba, M. (1997*). Measurement error studies at the national center for education statistics.* Synectics for Management Decision, Inc., Arlington, VA.

Schraub, D. (2023). Microaggressions as negligence. *Journal of Social Philosophy*. 1-18. https://doi.org/10.1111/josp.12519

Scott, N. E., & Borodovsky, L. G. (1990). Effective use of cultural role taking. Professional Psychology: *Research and Practice, 21*(3), 167-170. https://doi.org/10.1037/0735-7028.21.3.167

Sele, J. P., Nyakerario, F., & Wanjiku, C. (2024). Faith, Gender, and Governance in Conflict-Ridden Societies: A Theological Approach to Peacebuilding and Inclusive Development. *Greener Journal of Social Sciences, 14*(2), 262-272. https://doi.org/10.15580/gjss.2024.2.112024174

Shunchao, L. (2023). The study of ethnocultural empathy in a pluralistic society: exploring ınter-ethnic relationships among javanese and chinese children in Surakarta. *International Journal of Emerging Issues in Social Science, Arts and Humanities, 2*(1), 123-135. https://doi.org/10.60072/ijeissah.2023.v2i01.013

Singleton-Gonzalez, M. (2025). *Exploring the relationship between compassionate empathy and becoming a white anti-racist: a constructivist grounded theory approach* .Doctoral dissertation, Barry University.

Starling, T. (2024). *Examination of the influence of social emotional learning techniques on coping, academic self-efficacy, belongingness, microaggressions, and affect of Black students*. Doctoral dissertation,

Sue, D. W. (2005). *Multicultural social work practice.* John Wiley & Sons.

Sue, D. W., Alsaidi, S., Awad, M. N., Glaeser, E., Calle, C. Z., & Mendez, N. (2019). Disarming racial microaggressions: Microintervention strategies for targets, White allies, and bystanders. *American Psychologist*, *74*(1), 128. https://doi.org/10.1037/amp0000296

Suryani, A., & Muslim, A. B. (2024). Religious tolerance, intellectual humility, and democratic education. In *Embracing diversity: Preparing future teachers to foster religious tolerance* (pp. 13-34). Singapore: Springer Nature Singapore. https://doi.org/10.1007/978-981-97-1616-6_2

Şata, M. (2020). Nicel araştırma yaklaşımları. In. E. Oğuz. (Ed.), *Eğitimde araştırma yöntemleri* (s. 77-90). Eğiten Kitap Yayınları.

Taiba, S., Shabana, R., & Moin, Z. (2023). Pluralism, Tolerance, and Islamic Philosophy: Implications for Global Peace and Conflict Resolution. *Harf-o-Sukhan*, *7*(2), 1-11.

Torino, G. C., Rivera, D. P., Capodilupo, C. M., Nadal, K. L., & Sue, D. W. (Eds.). (2018). *Microaggression theory: Influence and implications.* John Wiley & Sons.

Valieva, F., & Fazlitdinova, R. (2023, November). The development of ethno-cultural empathy within a multicultural educational environment: Peculiarities and role-playing experiences. In *International Conference on Professional Culture of the Specialist of the Future* (pp. 230-243). Cham: Springer Nature Switzerland.

Wang, Y. W., Davidson, M. M., Yakushko, O. F., Savoy, H. B., Tan, J. A., & Bleier, J. K. (2003). The scale of ethnocultural empathy: Development, validation, and reliability. *Journal of Counseling Psychology*, *50*(2), 221. https://doi.org/10.1037/0022-0167.50.2.221

Watson, T., Hodgson, D., Watts, L., & Waters, R. (2022). Historiography of empathy: Contributions to social work research and practice. *Qualitative Social Work*, *21*(4), 714-730. https://doi.org/10.1177/14733250211033012

Webster, M. (2018). Idea. Merriam Webster dictionary.

Williams, M. T. (2019). Microaggressions: Clarification, evidence, and impact. *Perspectives on Psychological Science*, *15*(1), 3-26. https://doi.org/10.1177/1745691619827499

Williams, M. T., Ching, T. H., & Gallo, J. (2021). Understanding aggression and microaggressions by and against people of colour. *The Cognitive Behaviour Therapist*, *14*-25. https://doi.org/10.1017/S1754470X21000234