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Primary School Pre-service Teachers with High and Low
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FROM THE EDITOR

Dear Colleagues,

The *Journal of Theoretical Educational Science* is pleased to present the third issue of 2025, featuring ten peer-reviewed and timely articles that reflect the diverse and interdisciplinary scope of educational research today. This issue showcases empirical and theoretical contributions addressing critical themes such as teacher development, social-emotional learning, media use, digital literacy, and the integration of artificial intelligence in education.

We begin with the article by Zekeriya Durmaz and Semiha Kahyalar Gürsoy, which investigates language teacher immunity, offering valuable insights into how language educators manage professional challenges and foster resilience. Their findings contribute meaningfully to the discourse on teacher well-being and professional growth.

Following this, Meltem Yıldız and Jale Eldeleklioğlu examine the relationship between secure attachment and perceived social support in high school students, highlighting the mediating roles of love and social intelligence. This study deepens our understanding of adolescent mental health and the interpersonal dynamics that support it.

In the context of digital behaviors, Özge Canoğulları explores how social media addiction contributes to psychological stress, focusing on the indirect role of doomscrolling. As digital engagement continues to rise among youth, this research underscores the need for greater awareness and support around healthy media habits.

Teacher training and classroom readiness are the focus of the article by Semih Şengel and Melike Özyurt, who analyze the learning and teaching processes of primary school pre-service teachers with differing levels of 21st-century teaching skills. Their findings offer direction for enhancing teacher education programs in line with modern pedagogical demands.

Broadening the scope to global higher education, Can Sakar provides a comprehensive review of Asian universities' world rankings from 2015 to 2025, shedding light on shifting educational priorities, internationalization efforts, and institutional strategies across the region.

In language education, Hasan Turfanda and Onur Uludağ assess the impact of interactive videos on fifth-grade students' English language learning. The study demonstrates both academic and attitudinal benefits, illustrating the value of multimedia tools in supporting language acquisition.

The cognitive dimension of learning is examined by Neşe Dokumacı Sütçü and Tuğba Örnek, who ask whether intelligence games improve students' problem-posing skills. Their findings support the use of educational games as tools for fostering critical and creative thinking in the classroom.

Artificial intelligence emerges as a prominent theme in the final three articles. Pelin Derinalp and Melek Halife explore pre-service EFL teachers' attitudes toward AI, revealing both opportunities and reservations regarding its use in language instruction. Building on this, Cemila Doğan and Seher Üretmen Karaoğlu gather EFL teachers' perspectives on integrating AI into

language education, offering practical insights into implementation and pedagogy.

The issue concludes with Demet Seban, Betül Arıkan, and Aziz Aslan, who explore preservice elementary teachers' media literacy, particularly in relation to entertainment-focused internet content. Their research highlights the importance of critical literacy in preparing future educators to navigate and teach in media-saturated environments.

We would like to thank all contributing authors for their scholarship and dedication, the reviewers for their thoughtful evaluations, and the editorial team for their continued commitment to excellence. As always, we are encouraged by the increasing interest from scholars around the world and invite submissions that advance the field of educational science through original, impactful research.

We hope this issue inspires further inquiry and collaboration across disciplines, and we look forward to your contributions in the upcoming volumes.

Kind regards,

Fatih GÜNGÖR, PhD
Afyon Kocatepe University
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Investigating Language Teacher Immunity: Challenges and Opportunities for Professional Development

İngilizce Öğretmenlerinin Öğretmen Bağışıklığı Üzerine bir Çalışma: Mesleki Gelişim Önündeki Zorluklar ve Fırsatlar

Zekeriya DURMAZ *  Semiha KAHYALAR GÜRSOY** 

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Research Article

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ABSTRACT: This study seeks to determine the psychological immunity levels of English language teachers and the variables that may affect their psychological immunity. Rather similar to biological immunity, teacher immunity manifests itself in two broad forms: productive immunity and maladaptive immunity (Hiver, 2016). The study also aims to shed light on the factors that have effect on EFL teachers' immunity state considering the possibilities and challenges in their teaching career. The data of the study were collected in two subsequent phases in a mixed method research design to accomplish the study's objectives. A 6-point Likert-type scale with 39 items was used in the first phase of the quantitative research to collect data from EFL instructors who were currently employed at foundation and state universities in the southern region of Türkiye. 15 open-ended questions were posed during the qualitative phase. The quantitative data showed that 117 participant teachers are around halfway immunity ($M=3.76$). The findings of the MANOVA test showed a statistically significant relationship between immunity level and gender, degree, and the kind of university that instructors are affiliated. Additionally, the qualitative data showed that teacher immunity is positively influenced by participation in professional development activities, pursuing lifelong learning endeavour in challenging circumstances, and academic collegiality.

Keywords: Complex dynamic systems theory, coping, English language teacher immunity, professional development resilience, teacher motivation.

ÖZ: Bu çalışma İngilizce öğretim görevlilerinin psikolojik bağışıklık düzeylerini ve onların psikolojik bağışıklıklarını etkileyebilecek adaptif veya maladaptif değişkenleri belirlemeyi amaçlamaktadır. Çalışma aynı zamanda İngilizce öğretim görevlilerinin profesyonel gelişimi açısından algılanan öğretmen bağışıklığına ve kariyerlerinde karşılaşılabilecekleri olasılıklara ve engellere ışık tutmayı amaçlamaktadır. Araştırmanın hedeflerine ulaşmak için karma yöntem araştırma tasarımı ile veri toplamının iki aşaması kullanılmıştır. Nicel araştırmanın ilk aşamasında, Türkiye'nin güney bölgesindeki vakıf ve devlet üniversitelerinde görev yapan üniversite yabancı dil öğretim elemanlarından veri toplamak amacıyla 39 maddeden oluşan 6'lı Likert tipi bir ölçek kullanıldı. Nitel aşamada ise 15 adet açık uçlu soru sorulmuştur. Niceliksel veriler, 3,76 ortalama puanla 117 katılımcı öğretmenin bağışıklığın yarısına yaklaştığını gösterdi. MANOVA testinin bulguları, bağışıklık düzeyi ile cinsiyet, derece ve öğretim elemanlarının ders verdiği üniversite türü arasında istatistiksel olarak anlamlı bir ilişki olduğunu gösterdi. Ek olarak, nitel veriler, mesleki gelişim faaliyetlerine katılım, zorlu koşullarda yaşam boyu öğrenmeyi sürdürme ve meslektaş dayanışmasının öğretmen bağışıklığını olumlu etkilediğini göstermiştir.

Anahtar kelimeler: Baş etme, dirençlilik, İngilizce dil öğretmeni bağışıklığı, karmaşık dinamik sistemler kuramı, mesleki gelişim, öğretmen motivasyonu.

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Teachers encounter physical and psychological difficulties along the way, such as managing their career cycles, dealing with the emotional demands of the teaching profession, and doing their best to live up to institutional or private life expectations as well as the expectations that are related to the teaching profession as a labor (Gkonou et al., 2020). Additionally, teachers look for employment possibilities that will help them advance their careers. For enthusiastic and motivated English as a Foreign Language (EFL) instructors with a strong desire to teach, to participate in professional development activities that are offered alongside their careers and also well-motivated to sustain their profession (Ushioda & Dörnyei, 2009) seem to be significant at any period of their profession. It is anticipated that this motivation would improve teaching methods as well as classroom effectiveness. Enhancing teachers through both internal and externally stimulating practices is crucial to ensuring this.

This study aims to investigate the motivational factors that drive university-level EFL instructors and examine the degree of their psychological immunity in the face of professional challenges. Given the critical role that teacher motivation plays in instructional effectiveness and learner outcomes (Dörnyei & Ushioda, 2021), understanding what sustains or undermines motivation among EFL teachers is essential. Additionally, psychological immunity—defined as an individual’s resilience and adaptive capacity in professional settings (Hiver & Dörnyei, 2017)—is explored as a key factor influencing teacher well-being and persistence in the field. While teacher archetypes and beliefs contribute to professional identity (Farrell, 2011), this study primarily focuses on the interplay between motivation and psychological immunity, shedding light on their implications for teacher development and retention.

Literature Review

Teachers have seen a more challenging evolution in recent decades (Hiver, 2018; MacIntyre et al., 2020), and they are susceptible to a number of challenges (MacIntyre et al., 2020). Most of them find it hard to persevere in the profession due to numerous negative circumstances which might have an effect upon their desire to teach. Some of these teachers tend to have more resilient and robust approach towards those hurdles and they are able to overcome with their own self-motivation and self-organizing strategies whereas some others usually feel inadequate to deal with these problems probably because they are unaware of their own identity and self (Gürsoy, 2018). Moreover, the main concern is to find out whether it is possible to raise teachers’ awareness about the issue and bring about the essential transformation on their motivation so that might redevelop more productively. In this regard, the concepts termed as it comes to resilience, motivation, and ultimately classroom performance, teachers’ psychological immunity is seen as crucial (Hiver, 2018). Prominent academics have researched motivation for decades, and they have done it from a variety of angles. For instance, Rogers (1962) asserted that motivation results from a desire to meet higher standards and that this desire is a product of outside factors known as stimuli. Similarly, Maslow (1954) proposed that needs act as triggers for stimuli, which is a driving force of individuals’ motivational acts, and Skinner (1968) identified those forces as conceptions that influence human conduct.

Gardner and Lambert (1972) proposed two types of motivational frameworks in their ground breaking study: integrative motivation and instrumental motivation.

Aligning with this, Gardner (1985) described motivation in this context as a "combination of effort plus desire to achieve the goal of learning the language" (p. 10). Additionally, Noels (2001) used self-determination theory, which theorizes that motivation is based on individuals' intrinsic interest (doing something for its own sake) in a certain activity and extrinsic desires (doing something for an external purpose) to the activity itself, which is somewhat similar to what they presented.

Recently, MacIntyre et al. (2015) stated that "motivation has adaptive and self-organizing properties, with feedback loops that continuously integrate internal and external contexts and act as reinforcing or counteracting forces, creating nonlinear changes in levels of motivated behavior" (p. 423, p. 423). Contemporary researchers (Hiver, 2017; Hiver & Larsen-Freeman, 2020) have taken these three reasons, which can operate as strong motivators on their own, to a new level by emphasizing the complexities of motivation. They argue that motivation is multifaceted, dynamic, and adaptive.

Overall, in modern psychology, the term "motivation" can refer to both the conscious sensation of desire and the full complex of ideas and emotions. Although it has been agreed upon the argument that motivation plays a major role in shaping human behavior, there does not seem to be a clear consensus regarding how motivation is perceived due to its complexity (Hiver & Larsen-Freeman, 2020).

Teacher Motivation

Motivation is defined as a "driving force in any situation that leads to action" in language learning and teaching (Richards & Schmidt, 2013), while students learn the language and teachers learn how to teach language and feel encouraged to participate in teacher development events, which is similar to the global definition. While research on L2 learner motivation has long gained attention and interest, studies delving into the emotions of English language teachers and their immediate psychology, that is, teachers' drive to continue teaching, have only recently received increased attention. As a result, an increasing number of scientists, such as Dörnyei et al. (2014), have investigated teacher motivation, teacher well-being, and other emotion-related themes.

Ushioda and Dörnyei (2009) distinguished two types of teacher motivation: motivation to teach and motivation to stay in the profession. In general, teaching can be regarded as an emotionally charged process in which each instructor experiences a range of pleasant and negative feelings. These feelings change depending on the situation and the time of day in this emotionally charged career. This intensity is referred to by Gkonou et al. (2020) as "emotional labor," which is defined as "the forced management of one's emotions to conform to the social norms associated with a professional role" (p.1). Gkonou et al. (2020) reinforce this theory by claiming that a psychological rollercoaster may be all that language teachers experience. This metaphorical rollercoaster goes up and down between school and personal life concerns, influencing their personal and professional well-being. Also, a recent study by Öruk (2023) proved that the development of participant's emotions is significantly influenced by the type of students' attitudes, the classroom environment, the quality of the relationship between instructor and students, and other factors.

Teacher Identity and Sense of Self

The motivation for learning a second language has been reframed in terms of self and identity (Ushioda & Dörnyei, 2009). Throughout this process, researchers (Mercer, 2011; Taylor, 2014; Zembylas, 2003) have examined 'self' from a variety of theoretical, philosophical, and analytical perspectives. For example, Mercer (2011), who extensively works in the field of ELT, emphasizes the multidimensional, complex, and dynamic features of self, which is a basic life system of individuals through which teachers can realize a place in life. Similarly, Kumaravadivelu (2012) proposed two categories of beliefs that impact teachers' professional development: core beliefs and peripheral beliefs. In addition, according to Taylor (2014), "the disclosure of a public self in social interaction is called self-presentation" (p.95).

In ELT, a teacher's sense of self is critical in directing their behaviors and methods. Teacher identity may not be easy to define, yet Zembylas (2003) describes it as dynamic, meaning that it changes over time in specific situations due to internal and external influences. According to Van Lier (2008), self is a notion with a future-oriented dimension. As a result, teachers can reframe their understanding of learning and teaching and gain agency in order to shape the future teacher selves, changing them into critical thinkers, devoted, and resilient educators (Dikilitaş & Comoglu, 2020) through feeding the contextual and instructional factors as well as individual teacher characteristics (Bilgi, 2023; Er & Küçükali, 2023, Durmaz, 2023).

Overall, the teacher's position and the prestige of teaching as a field have altered dramatically in recent years (Graham & Phelps, 2003) and the teachers' self-concept has also evolved as a consequence of the changing teaching methods of the age. According to Nias (1996), this shift has positioned teachers on the scene as self-sacrificing characters, the ones who devote their personal selves in their work and give up their personal identities. The endeavors for devotion to the profession, and positioning themselves as committing teachers, who struggle to cope with the challenges of teaching, are connected to their psychological state of immunity as a defense system to ensure the "professional equilibrium and instructional effectiveness" (Hiver, 2017, p. 669).

Language Teacher Immunity (LTI)

Language teacher immunity, conceptualized and used metaphorically by Hiver and Dörnyei (2017), refers to "a robust armouring system that emerges in response to high-intensity threats and allows teachers to maintain professional equilibrium and instructional effectiveness" (Hiver, 2017, p. 669). As a novel concept in ELT, Language Teacher Immunity (LTI) has become increasingly essential in the field of language teaching in recent years. While various researchers have researched related subjects like motivation, resilience, and burnout, no studies on teacher immunity (TI) had been conducted before Hiver (2015) proposed the term "language teacher immunity" to the field. As a novel idea coined by Hiver (2015), this "robust armouring system" addresses risks and improves the teacher's instructional effectiveness. Teacher immunity, according to Hiver and Dörnyei (2017), is built on aspects such as teacher motivation, teacher self-efficacy, coping, hardiness, teacher emotion (positive and negative teacher affectivity), resilience, openness to change, attitudes towards teaching, and burnout.

Hiver (2015) discovered that L2 teacher immunity shows itself favourably as productive immunity and negatively as maladaptive immunity in his study. It evolves through a dynamic process and, in the end, it may have an impact on teachers' professional identity, motivation, self-efficacy, and persistence.

Teacher immunity and emotion regulation are seen as interrelated and dynamically changing structures that impact and trigger a change within the context of Complex Dynamic Systems Theory (Larsen-Freeman, 2017). While emotion regulation (Collie et al., 2018) allows teachers to control their emotional reactions to these expectations, teacher immunity serves as an armouring system that functions like a shield for educators in navigating the demands and stressors of their profession. Emotional regulation functions as a regulator in this dynamic interaction, having effect on the resilience and flexibility of teacher immunity. Effective emotion regulation, for example, can strengthen adaptive immunity, promote resilience and career advancement, whereas poor regulation can strengthen maladaptive immunity, resulting in burnout or stagnation outcomes in teaching profession. Samavarchi and Hosseini (2019) conducted another study on learner immunity on Iranian language students at the university level using a qualitative case study approach. The researchers coined the phrase "language learner immunity" to distinguish it from Gürsoy's (2018) concept of "student immunity."

A small number of studies have looked into teacher immunity, which is the topic of this study. Hiver (2015, 2016, 2017) is clearly the well-known researcher who created the term "language teacher immunity" and conducted studies on it. Following Hiver, a small number of researchers conducted LTI or LTI-related research. Hiver (2015) and his supervisor Dörnyei conducted the first study on teacher immunity. They proposed the novel term "teacher immunity" in the study by contrasting it with more familiar related psychological terminology such as teacher resilience and teacher burnout. Hiver conducted an exploratory study with four committed Korean language teachers who successfully resisted negative teacher emotions such as stress and burnout in his multi-stage research study.

Following that study, Hiver (2017) undertook a second study with roughly 300 language teachers in Korea, feeling that many questions about maladaptive immunity had gone experimentally unaddressed. His main goal was to validate the LTI model and give more empirical evidence using Retrodictive Qualitative Modelling, which included language teachers and teacher educators. He performed in-depth serial interviews with representative respondents to obtain data. The study's findings revealed a link between teacher immunity and emotional, psychological, and cognitive functioning in the language classroom. As a result of the study's findings, Hiver concluded that "teacher immunity has the potential to bridge individual and situative concerns in second language teacher education and the psychology of language teaching and learning." (p.669). These studies which have been done so far function as the foundation stones of the language teacher immunity research field.

All in all, to the best of the researcher's knowledge, only a small number of recent researchers have introduced psychological immunity to the subject within the EFL framework (Gürsoy, 2018; HaseliSonghori et al., 2018; Hiver, 2015; Hiver, 2016, Hiver, 2017; Hiver & Dörnyei, 2017; Ordem, 2017; Rahmati et al., 2019; Rahimpour et al., 2020; Sariçoban & Kirmizi, 2021; Saydam, 2019). The majority of researchers have

concentrated on teacher psychological immunity, with minimal emphasis paid to learner immunity (Attaran et al., 2019; Gürsoy, 2018; Samavarchi & Hosseini., 2019). Gürsoy (2018) wanted to investigate the components that comprise "student immunity" via the perspective of complexity theory in their thorough PhD study. Attaran et al., (2019) did another immunity-related study in the EFL environment to introduce "language learner immunity" as a novel concept in the EFL context. They displayed the language learner immunity (LLI) model and discussed how it works, as well as discussing the deficits in the immune systems of foreign/L2 language learners. In another recent study done by Namaziandost et al. (2024) highlighted the noticeable gap in research regarding the significance of teacher immunity among EFL teachers, along with implications for further research. To contribute more to the literature on language teacher immunity concept, this study also aims to fill a void in that the immunity state of Turkish language teachers at university level is investigated. So, the findings can propose suggestions and may provide affordances for EFL teacher in Turkish universities context.

Research Questions

The study aimed to answer the following research question:

1. What level of immunity do English as a Foreign Languages teachers in Turkish universities have?
2. Is there a relationship between teachers' immunity level and the factors, such as age, gender, degree, department workplace, university type, and teaching experience?

Method

This study used a nonexperimental, descriptive research method based on questionnaire data and actual informant words (Dörnyei 2007). Table 1 displays the study's research strategy.

Table 1

The Research Design Table of the Study

	Quantitative	Qualitative
Data Collection Tools	The Language Teacher Immunity Questionnaire, a 6-point scale with 39 items (Hiver, 2016)	15 Open-ended Questions (Hiver, 2016)
Setting & Participants	117 EFL Instructors at 6 Universities in Türkiye	11 EFL Instructors at 6 Universities in Türkiye
Data Analysis	SPSS	Atlas.ti
Test & Analyses	Box's M & MANOVA (Büyüköztürk, 2020)	Thematic analysis (Creswell, 2014; Elliott, 2018; Gibbs, 2007; Saldaña, 2021)
Research Questions	Question 1: Defining the archetypes	Question 2: Identifying the factors and the relationship with teacher immunity

To achieve the study's objectives and answer the research questions, a mixed method research design was used, and data were collected from multiple sources,

including (1) a 6-point Likert type questionnaire and (2) open-ended questions. The use of the Language Teacher Immunity Questionnaire (LTIQ) was employed in the quantitative phase, and quantitative data were obtained from 117 EFL teachers working at universities in Türkiye. Also, 15 open-ended questions were posed to a group of EFL instructors (n=11), who were conveniently selected from among those who took part in the first phase of the study (Fraenkel & Wallen, 2006). The preference of the selection was based on factors such as ease of access, closeness, availability at a specific time, and willingness to participate (Dörnyei, 2007).

Table 2

Demographic Characteristics of the Participants

Descriptors	Sub-descriptors	Frequency (N=117)	Percentage
Age	21-30	41	35.0
	31-40	57	48.7
	41-50	13	11.1
	51-60	5	4.3
	+60	1	.9
Gender	Female	85	72.6
	Male	31	26.5
	N/A	1	.9
Degree	BA	22	18.8
	MA(or doing)	66	56.4
	PhD(or doing)	29	24.8
Department Working at	English Language Teaching	31	26.5
	School of Foreign Languages	85	72.6
	Other	1	.9
University Working at	State University	43	36.8
	Foundation University	74	63.2
	Less than a year	1	.9
Teaching Experience	1-3	19	16.2
	4-6	28	23.9
	7-10	21	17.9
	More than 10 years	48	41.0

Participants

The English language instructors at Türkiye's state and foundation universities were the study's target population. The participants constituted teachers working at English Language Preparation Schools and English Language Teaching departments at six universities in the Autumn and Spring terms of the 2021-22 academic year. Variables such as title, gender, age, and all others listed on the questionnaire vary in

terms of demographic traits. The sample size for the quantitative phase was 117 instructors, and the sample size for the qualitative phase was 11 instructors. It featured both native and non-native English language instructors from Türkiye. Nationality was not a variable in the study. The complete demographic information is given in Table 2.

Data Collection Tools

The Language Teacher Immunity Questionnaire (LTIQ)

Hiver (2016) created the questionnaire that was used in this study to measure LTI. It had 39 items on a 6-point scale (strongly disagree=1 to strongly agree=6) and was divided into seven components. Teaching self-efficacy, burnout, resilience, attitudes towards teaching, openness to experience, classroom affectivity, and coping were among the criteria considered. A reliability coefficient of .70 or above for a test is deemed adequate for test score reliability (Fraenkel & Wallen, 2006). The Cronbach Alpha coefficient was calculated for our study to evaluate the reliability of the scale (LTIQ), and it was .70. As a result, with a Cronbach's Alpha value of .70, the instrument Language Teacher Immunity Questionnaire demonstrated to be reliable (Fraenkel & Wallen, 2006).

Open-ended Questions

This study adopts the 15 open-ended questions originally used in Hiver's study (2017). The open-ended questions in his study were formulated to validate the LTI archetypes through Retrodictive Qualitative Modelling (RQM) and was conducted as a second study on 4 focus groups (roughly 44 teachers) including language teachers and language educators in Korean context. The open-ended questions were also used as the qualitative data collecting instrument to obtain thorough information on the probable elements impacting instructors' psychological immunity level.

Regarding the validity of the data collection instruments, Hiver (2017) thought that many issues, especially those related to maladaptive immunity, had not been empirically addressed, therefore he conducted a second study on roughly 44 language teachers in Korea. His main objectives were to use Retrodictive Qualitative Modeling to validate the LTI model and provide further empirical evidence, involving language teachers and teacher educators. The findings of his study demonstrated a relationship between teachers' psychological, emotional, and cognitive functioning in the language classroom and their immunity. Based on the study's findings, Hiver stated that "Teacher immunity has the potential to bridge individual and situative concerns in second language teacher education and the psychology of language teaching and learning," (page 669). Respecting the validation process of the data collection tools, they were used in this study to collect data.

Data Collection Procedures

To obtain diverse data for the study, the study employed a two-phase data collection approach. In the first phase, quantitative data were gathered through LTIQ. The participants from selected universities and departments took part at this phase. The initial quantitative data were obtained in the first phase using Google Forms, a web-based survey tool. This method was chosen due to the restrictions of proximity and with the aim of facilitating broader reach, cost-effectiveness, and easier data handling for

analysis with SPSS. The survey, which included participant consent, was distributed through email and WhatsApp. Furthermore, in the second phase, qualitative data were collected through open-ended questions to complement and deepen the quantitative findings. Participants were conveniently selected from various universities and departments to ensure better representation. Due to the distance constraints, responses were gathered both in person (where possible) and through digital communication (email and mobile). Responses were then organized and stored for analysis.

Regarding the authors' roles, both authors work as EFL instructors at university context, and with more than ten years of teaching experience as well as administrative roles at the School of Foreign Languages, nested under higher education in Türkiye. Regarding the authors' contributions, the corresponding author completed the data collection, worked on data analysis, and was involved in the writing of the paper. Also, both authors participated in the design of the study, drafted and revised the research paper and participated in the analysis and interpretation of the results. Both authors read and approved the final work.

Data Analysis

The collected quantitative data were analyzed using the Statistical Package for Social Sciences software (SPSS) to address the first two study objectives. The descriptive measures of the study were highlighted based on the quantifiable data, and the mean scores and standard deviations were calculated to identify the demographic information of the study. The assumptions for doing a MANOVA (Tabachnick, 1989) were tested. In addition, Box's M test was used to determine the equivalence of several covariance matrices. The covariance matrices were equal, according to the Box's M statistic (Box's M = 63.521, $F = .955$, $p = .570.05$). As a result, we were able to run the MANOVA test. As a result, Multivariate Analysis of Variance (MANOVA) was used to see if there was a statistical difference between demographic characteristics and EFL teacher immunity (Fraenkel & Wallen, 2006).

The information acquired through the open-ended questions served as the basis for the qualitative portion of the study. Hiver's (2016) study was used to develop a set of open-ended questions. The replies were analyzed using a thematic analysis (Creswell, 2014). For the study's results to be reliable, appropriate coding and categorizing processes were used (Gibbs, 2007). The codes were found and categorized as a total of ten categories as a consequence of the content analysis using a hybrid approach of coding (Saldana, 2021). To provide reliability of the emerged codes and categories, a cross-examination process was followed. The dense data were first coded by the first author until saturation, and a peer debriefing process (Guba & Lincoln, 1994) was utilized by an external expert with PhD in ELT. Finally, the emerged codes and the categories were verified by the second author who checked the overlapping codes.

Results

To present the descriptive statistics, the quantitative data were analyzed using SPSS, and the qualitative data were analyzed using Atlas.ti software (Smit, 2021). Finding out the level of immunity that EFL teachers possessed as well as how the participating teachers were distributed among the various global types of teacher immunity and the corroborated teacher sub-types were two objectives of the study.

Hiver's four outcomes (immunocompromised, maladaptively immunized, halfway immunized, and productively immunized outcome) were utilized to demonstrate this, as shown in Table 3.

Table 3

The Accepted Points and the Archetypes in Terms of Mean Scores

The accepted points	Archetype/Outcome	Teacher Type
0-0.99	Immunocompromised	Overcompensator teacher
1-1.99	Maladaptively immunized	Sell-out, Fossilized teacher
2-3.99	Halfway immunized	Defeated teacher
4 +	Productively immunized	Spark plug, Visionary teacher

The statistical results show that all 117 participating teachers had a mean score of 3.76 on the 6-point Likert scale (1=Strongly disagree to 6=Strongly agree). Because of this, 117 participating teachers, with an average score of 3.76, are roughly halfway to immunity. This score of 3,76 on a 6-point Likert scale indicates that the teachers in this study are close to moving into the next phase of productive immunity, but some barriers still hinder their full professional thriving.

Based on Hiver's (2016) framework and the study results, "halfway immunity" refers to a transitional stage in a teacher's psychological and professional development, which indicates the participant teachers have started to develop coping mechanisms and resilience but have not yet fully achieved the adaptive state of productive immunity. Table 4 contains descriptive information about the subscales.

Table 4

The Descriptive Information of LTIQ Subscales

Subscales	N	Rang	Min.	Max.	Sum	Mean	s.d.
Teaching Self-efficacy	117	2.14	3.57	5.71	551.00	4.70	0.43
Coping	117	3.00	2.80	5.80	510.20	4.36	0.56
Classroom Affectivity	117	2.00	2.83	4.83	455.67	3.89	0.39
Openness to Change	117	3.00	1.83	4.83	412.17	3.52	0.59
Attitudes towards Teaching	117	3.00	2.00	5.00	383.80	3.28	0.53
Burnout	117	4.60	1.20	5.80	365.20	3.12	0.89
Resilience	117	3.00	2.00	5.00	361.20	3.08	0.63
Total						3.76	1.06

Teaching self-efficacy is demonstrated in the first subscale (M=4.70). Of all the study's subscales, the teaching self-efficacy subscale had the highest mean score (4.70). Many teachers believe they are effective at managing their students' academic success and having a positive impact on their students' lives, according to the Teaching Self-Efficacy subscale. Second, the findings on burnout (M=3.12) indicate that while a

sizable portion of the participating instructors experience renewal, a far smaller portion experience burnout in their line of work. Furthermore, the results of the Resilience subscale ($M=3.08$) showed that teachers have the ability to recover from traumatic experiences in the classroom and to continue working productively despite dangers and hazards unique to the teaching profession. To elaborate on these subscales respectively, self-efficacy refers to a teacher's belief in their ability to effectively influence student learning and classroom effectiveness. First, high self-efficacy is an indication of productively immunized teachers (e.g., Visionary or Spark Plug types), as it reflects confidence in their professional competence and adaptability (Hiver, 2016). Secondly, burnout reflects emotional fatigue, displacement, and a reduced sense of accomplishment that teachers may experience due to prolonged occupational stress. Burnout is often associated with maladaptively immunized or halfway immunized outcomes (Hiver, 2016). Finally, resilience is the capacity to bounce back from challenges or setbacks and to continue performing effectively despite adversity. Hiver (2016) suggests resilience as a key feature of the shift toward productive immunity. Therefore, these results indicate that the teachers in our context embody the visionary or spark plug types as they develop stronger, adaptive responses to the demands of the teaching profession.

The following subscale, Attitudes towards Teaching ($M=3.28$), reveals that teachers are only somewhat in favor of retaining their job as teaching as their primary career. Since the participating instructors' overall mean score on the Openness to Change subscale is $M=3.52$, it can be said that they are moderately receptive to change. The average scores for classroom affectivity ($M=3.89$) show that EFL instructors primarily feel fondness for teaching and believe they are rewarded for their dedication. Last but not least, the Coping subscale scores ($M=4.36$) show that teachers strongly agree that they can cope with challenges and unpleasant conditions at school.

To sum up, Item 3: "I have confidence in my professional ability to help students learn." has the highest mean score ($M=5.41$, $SD=0.80$), and Item 30: "While teaching, I regularly feel depressed." has the lowest mean score ($M=1.91$, $SD=0.95$), indicating that different instructors have varying levels of language teacher immunity. The language teacher instructors who took part in the study have a medium degree of language teacher immunity, according to Table 4's overall mean LTIQ score ($M=3.76$).

We utilized one-way MANOVA analysis to investigate the connection between demographic variables (age, gender, degree, department workplace, university type, and teaching experience) and teacher immunity. The statistical significance results revealed that, while their age, department, and teaching experience had no effect on their immunity level, their gender, the degree instructors held, and the institution type they worked for did. Table 5 summarizes the findings of the analysis.

Table 5

MANOVA Results regarding Teachers' Immunity Levels Based on the Independent Variables

Dependent Variables	Independent Variable	F	λ
Teaching Self-efficacy	Age	.726	.847
Burnout	Gender	1.770	.045*
Resilience	Degree (<i>Instructors hold</i>)	2.479	.003*
Attitudes towards Teaching	Department (<i>workplace</i>)	.685	.684
Openness to Change	University type (<i>State/Foundation</i>)	.533	.027*
Classroom Affectivity	Teaching experience	.999	.341

*p=.05

The MANOVA test findings revealed no statistically significant relationship between instructor age and teacher immunity levels (Wilks' Lambda =.847 F=.726, p.05). As a result, we can assume that the instructors' immunity level is unaffected by their age.

Second, as shown in Table 6, the MANOVA test findings based on participant gender revealed that female and male instructors differ in the Teaching Self-Efficacy dimension (Wilks' Lambda =.045 F=1.770, p.05). To put it another way, whether the instructors are male or female has minimal bearing on their immunity.

Table 6

MANOVA Results regarding Teachers' Immunity Levels Based on their Gender

Independent Variable	Dependent Variables	Gender	N	Mean	SS	Wilks' Lambda	F	p	Eta ²
	Teaching Self-efficacy	Female	85	4.75					
		Male	31	4.55	1.117		.098	.051	.051
		N/A	1	5.14					
	Burnout	Female	85	3.01					
		Male	31	3.43	4.246		1.225	.068	.046
		N/A	1	2.60					
	Resilience	Female	85	3.02					
		Male	31	3.27	1.425		.181	.174	.030
		N/A	1	3.00					
	Attitudes towards Teaching	Female	85	3.23					
		Male	31	3.38	1.349		2.802	.095	.041
		N/A	1	3.20					
Gender		N/A	1	3.20		.045			

Openness to Change	Female	85	3.55					
	Male	31	3.43	.371		9.358	.594	.009
	N/A	1	3.33					
Classroom Affectivity	Female	85	3.88					
	Male	31	3.92	.060		1.223	.687	.007
	N/A	1	3.16					
Coping	Female	85	4.43					
	Male	31	4.16	1.678		.545	.072	.045
	N/A	1	4.40					

Secondly, the MANOVA test was used to examine the association between instructors' academic degrees and their teacher immunity levels, and statistical significance was found between degree instructors have and immunity levels (Wilks' Lambda =.003 F=2.479, p.05). Table 7 shows the comprehensive MANOVA results.

Table 7

MANOVA Results Regarding Teachers' Immunity Levels Based on Their Degree

Independent Variable	Dependent Variables	Degree	N	Mean	SS	Wilks' Lambda	F	p	Eta ²
	Teaching Self-efficacy	BA	22	4.74		.003	.098	.907	.002
		MA (or doing)	66	4.69	381				
		PhD(or doing)	19	4.71					
	Burnout	BA	22	3.06			1.225	.298	.021
		MA (or doing)	66	3.22	748				
		PhD(or doing)	19	2.92					
	Resilience	BA	22	3.12			.181	.835	.003
		MA (or doing)	66	3.10	2.196				
		PhD(or doing)	19	3.02					
	Attitudes towards Teaching	BA	22	3.14			2.802	.065	.047
		MA (or doing)	66	3.38	897				
		PhD(or doing)	19	3.15					

Degree	Openness to Change	BA	22	3.81					
		MA (or doing)	66	3.58	581		9.358	.000	.141
		PhD(or doing)	19	3.16					
	Classroom Affectivity	BA	22	3.82					
		MA (or doing)	66	3.87	.522		1.223	.298	.021
		PhD(or doing)	19	3.98					
	Coping	BA	22	4.34					
		MA (or doing)	66	4.32	1.16		.545	.581	.009
		PhD(or doing)	19	4.45					

With over 80% of participants holding an MA or PhD in the subject, it is clear that the instructors' competence in the field strongly influences their teacher immunity level in terms of openness to change. In terms of departments, whether the instructors work in an English Language Teaching department of a Faculty of Education or a School of Foreign Languages has no effect on their teacher immunity level. Finally, data revealed that teachers' language teacher immunity levels change depending on whether teachers work for a state university or a foundation institution, according to the mean scores. Table 8 illustrates the MANOVA test results.

Table 8

MANOVA Results Regarding Teachers' Immunity Levels Based on Their University Type

Independent Variable	Dependent Variables	University Type	N	Mean	SS	Wilks' Lambda	F	p	Eta ²
University Type	Teaching Self-efficacy	State	43	4.55	1.695		9.602	.002	.077
		Foundation	74	4.80					
	Burnout	State	43	3.03	.482		.603	.439	.005
		Foundation	74	3.17					
	Resilience	State	43	3.20	.938		2.331	.130	.020
		Foundation	74	3.01					
	Attitudes towards Teaching	State	43	3.29	.011		.038	.846	.000
		Foundation	74	3.27		.027			
	Openness to Change	State	43	3.63	.866		2.499	.117	.021
		Foundation	74	3.45					
	Classroom Affectivity	State	43	3.82	.324		2.083	.152	.018
		Foundation	74	3.93					
	Coping	State	43	4.33	.063		.196	.659	.002
		Foundation	74	4.37					

Finally, the MANOVA test was conducted to test whether the relationship between teaching experience and instructors' immunity levels was statistically significant. The results have proved no statistical significance (Wilks' Lambda = .341, $F = .999$, $p > .05$).

Table 9

Codes of the Qualitative Phase

Theme	Language Teacher Immunity	Size		Size
Code Categories	Classroom Affectivity	15	Community of Practice	8
	Openness to Change	13	Teaching Self-Efficacy	8
	Positive Attitudes towards Teaching	11	Teacher well-being	7
	Professional Development	10	Coping	6
	Personality Trait	9	Profession Choice	6

This part of the study sought to identify potential factors influencing the immunity levels of the participating instructors. Ten elements are regarded as having an impact on instructors' language teacher immunity level as a result of the content analysis of the replies to the open-ended questions. Table 9 shows the number of sub-codes assigned to each category. Classroom affectivity is described as the conscious emotion, attitudes, and values that arise in response to an idea or experience in an educational setting (Garrett & Young, 2009). Some respondents' responses indicated that, while teaching is a tiring activity for teachers, the classroom provides a place to rejuvenate. This stage denotes instructors' positive classroom opinion. P1, for example, sees the classroom as a place where teachers recharge and embrace it as a source of motivation.

P1: "I enjoy organizational aspects such as the preparation of lesson plans, the preparation of classroom activities...at the end of the day, I enjoy going to my classroom, it's energizing me, I'm mentally and emotionally pretty exhausted, but that's okay with me."

According to Hiver's (2016) study, instructors see themselves as part of the solution, collaborating with their colleagues when problems arise. As a result, several teachers have indicated that they are prepared to face the rigors of their profession.

P8: "I had some classes because of which I wanted to resign and give up being a teacher. I felt that I could not deal with students who were really problems for me and their friends. They were making everything difficult and preventing me to teach. In time, I learned how to deal with them by applying different strategies to those naughty students."

The qualitative findings in the Classroom Affectivity category demonstrated that the instructors exhibit the Visionary Archetype of teacher immunity through the four stages outlined by Hiver (2016).

Attitudes towards Teaching is a component of LTI that focuses on teachers' sense of purpose and commitment to the profession in terms of organizational attitudes, professional attitudes towards the teaching profession, and dedication to their students (Hiver, 2016). As a result, P1, P2, P4, and P11's passion and interest in teaching demonstrated their favorable attitudes towards teaching, and they expressed their positive attitudes and internal factors for selecting teaching as a profession in very similar lines.

P1: "I love my job and I am happy with the decision I made."

P2: "I have never regretted studying this department and doing this job."

P4: "I have always had interest on languages and enjoyed teaching, particularly teaching English."

P11: "I have always been interested in English and wanted to turn this interest into a profession."

Additionally, the data related with Personality Trait category indicates that their positive personality traits help them be productively immunised. For instance, P1, P7 and P8 stress that patience is the prominent trait of a teacher.

P1: "I think a teacher should be absolutely, absolutely patient. I can say that since I started this profession, I have definitely felt this."

P7: "I am patient while waiting for my students to build up a step-by-step understanding of English."

P8: "I think that the most important characteristic is being patient and know how to deal with something."

The information derived from the responses to the open-ended questions on Teaching Self-Efficacy factor revealed that the participant instructors are eager to maintain commitment (Day et al., 2007), and when people see passion and advancement throughout their career cycle, they feel genuinely motivated, enjoy what they do, and have a high degree of competence. (Fessler & Christensen, 1992). The Participant P1, for example, asserted that they have the ability and intention to use successful teaching techniques in the following utterance.:

P1: "I want to see myself in classrooms where I feel as efficient and helpful as possible."

Also, Community of Practice has shown up as another important category in addition to Teacher well-being, Coping, and Profession Choice. According to the research (Fessler & Christensen, 1992; Bardakçı & Yoğun, 2023), when respondents communicated their thoughts on their future job as a teacher, there was a sense of collegiality, interchange of ideas, and willingness to novelty. P3, for example, emphasized the importance of teamwork and saw the transformation as a modern imperative. P3 also appears to be determined to help other instructors around.

P3: "Well, through experience and communication with the stakeholders, we will always change. I hope I will not be afraid of changing for a better future. I believe we will make use of online platforms more than we did in the past... I will also go on investing on teachers' professional development process."

Teachers who make an investment in their professional growth experience increased readiness and motivation to engage in professional development activities (Eken & Bosson, 2017). As a result, participation in trainings and reading to improve personal learning as a manner of engaging in PD activities even during difficult times has a beneficial impact on teacher immunity. They want to learn more as lifelong learners, and they want to participate in meaningful PD programs to update and develop. P2 highlights this point as follows:

P2: "In the future, I want to focus a little bit on the research dimension of education...The research dimension is a concept that lies both before and after the education progress. Examining this in detail will gain different perspectives."

This study's final goal was to identify potential influences on the psychological immunity of the participating instructors. As a result, the elements that are thought to have an impact on language teacher immunity levels have been found as shown in Table 9.

Table 9

The Factors Affecting Language Teacher Immunity Levels

Factors	Results
Classroom Affectivity	Characteristics of <i>Visionary Archetype</i>
Openness to Change	Embracing and willingness to change
Positive Attitudes towards Teaching	Positive attitudes indicate high level of teacher immunity
Personality Trait	Contribution of positive teacher characteristics to teacher's productive teacher immunity
Teaching Self-Efficacy	High level of self-efficacy
Teacher Well-being	Mostly positive emotions, and job satisfaction
Coping	Embracing challenges, managing emotions in adversities
Profession Choice	The teachers, language aptitude and the desire to make a positive impact.
Community of Practice	Collaboration and collegiality
Professional Development	Professional development boosts motivation and teacher immunity

In summary, as long as teachers are supported through professional development opportunities, even maladaptively immunized teachers can become productively immunized. As a result, participation in PD activities has an effect on teacher immunity because participating instructors exhibit a greater feeling of drive, wonder, and excitement to go beyond the parameters of their regular teaching duties (Ordem, 2017). Furthermore, teamwork and belonging to a community among staff members improve classroom practices and instructors' teaching abilities, resulting in classroom effectiveness (Bardakçı & Yoğun, 2023), job satisfaction, intrinsic motivation, and collegiality (Fessler & Christensen, 1992). As a result, it is possible to conclude that the concept of community of practice has a favorable impact on instructors' immunity. To summarize, training involvement, the desire to be a lifelong learner, and collegiality in academic life all have a favorable impact on teacher immunity.

Discussion and Conclusions

Finding out Turkish EFL teachers' psychological immunity level and potential contributing elements to either maladaptive or adaptive psychological immunity was the aim of this study. Therefore, the goal of the study was to ascertain how instructors' immunity is related to the influencing factors (age, gender, degree, department workplace, kind of university, and teaching experience).

This study sought to examine the immunity levels of Turkish EFL teachers and the factors influencing these levels, contributing to the emergent literature on language teacher immunity (LTI). While earlier studies (e.g., Hiver, 2015, 2016, 2017; Hiver & Dörnyei, 2017) have conceptualized LTI as a robust psychological shield that supports language teachers to sustain professional equilibrium, this study provides empirical support from a Turkish university context.

To accomplish the stated goals of the study in relation to the research questions, this study was carried out in two phases utilizing a mixed-method research

methodology. The study questions will be addressed in the section that follows, along with details regarding the participants' immunity levels, descriptive statistical results, the connection between teachers' immunity levels and demographic variables, and factors influencing teacher immunity.

The Immunity Level of EFL Teachers

Hiver's (2016) Language Teacher Immunity Questionnaire (LTIQ) was used to determine the level of immunity of EFL teachers. The findings indicate that teachers have a favorable, effective, and active teacher profile. As a result, with a 3.76 average score, we can deduce that the subjects in our study were somewhere near the halfway point of immunity, which means teachers, who embody a "halfway immunity" archetype, may display partial resistance to professional challenges, but they still experience significant struggles or emotional fatigue. They are not entirely vulnerable like immuno-compromised teachers, yet they haven't fully internalized adaptive skills that characterize productively immunized teachers. In comparison to Saydam's (2019) study, which was conducted in a very similar situation but with a different research strategy, we received a lower mean score. Despite this, our findings support Saydam's study, which had an average score of 4.7. In contrast to our findings, Ordem (2017)'s findings from a case study with one instructor revealed that "the teacher displayed maladaptive behaviors with low motivation" (p. 1).

A noteworthy contribution of this study lies in its multidimensional approach to LTI. For instance, the high self-efficacy subscale score ($M=4.70$) reinforces the literature that asserts teaching self-efficacy as a cornerstone of productive immunity (Hiver, 2017; Tschannen-Moran & Hoy, 2001). However, despite high efficacy, moderate scores in openness to change ($M=3.52$) and resilience ($M=3.08$) raise questions about the consistency of teachers' adaptive profiles. This suggests that while teachers feel capable, they may lack institutional or emotional scaffolding to support meaningful pedagogical change. This insight is consistent with Haseli Songhori et al.'s (2018) findings in the Iranian context, where receptivity to change was similarly limited.

Additionally, according to the results of Teaching Self-efficacy, the more the teaching performance turns into accomplishment, the greater the sense of effectiveness teachers have. Second, in terms of the Burnout subscale, the data revealed that teachers' working environments are surrounded by collegiality and professional development events, which is thought to prevent burnout. Furthermore, a significant proportion of instructors responded that they trust their experience to recover from tough times and that they are resilient to adversity on the Resilience subscale. This could be due to the unpleasant nature of teaching, as teachers appear to have faced numerous challenges over the last few decades. Additionally, we concluded from the findings on Attitudes towards Teaching that instructors marginally agree with the idea of loving the teaching profession and keeping it as their life's work. Furthermore, the data from the Openness to Change subscale revealed that, while some instructors are tempted to continue teaching with their previous implementations in order to avoid facing uncertain or unpredictable incidents, the majority of them reported that they were highly open to changes in their profession. The data also demonstrated that Classroom Affectivity

instructors are highly effective in the classroom, and they boldly seek a solution to overcome even the most difficult situations due to their coping skills.

The total mean score of LTIQ, taking into account all subscales, showed that the participating EFL instructors had a medium level of language teacher immunity. This may suggest that, even though the immunity level of EFL instructors is not demonstrated at a low level, it can still be raised through institutional improvements and psychological or professional reinforcement, which is thought to increase the immunity level of instructors. Through this assistance, instructors may feel more efficacious, exhibit more positive attitudes towards teaching, be more receptive to possible rapid changes in the profession, feel more affective, and build more effective coping methods in adversity.

Finally, Hiver (2016) and Larsen-Freeman (2020) treat motivation and immunity as relational systems shaped by both individual agency and environmental affordances. In this light, our findings expand the conceptual framework of LTI by evidencing how institutional type (e.g., foundation vs. state universities) can moderate immunity outcomes. Teachers in foundation universities reported significantly higher immunity, echoing Kızıltepe's (2008) observation that work conditions, such as workload, and professional autonomy, can affect well-being and immunity.

The Factors Affecting Immunity State and the Relationship with Teacher Immunity

Through statistical analysis, it was discovered that the immunity level of language teachers appears to be influenced by factors such as gender, degree, and university type, but not by factors such as age, department an instructor works in, or their overall amount of teaching experience. In accordance with this, MANOVA results on teachers' immunity levels based on gender suggest that female EFL instructors feel more efficacious in instructing, more refreshed, and have better developed coping skills than male EFL instructors. When the academic degree of the teachers was considered, the results revealed a statistically significant difference between the degree of the instructors and their immunity levels. The findings contrast the conclusions of Saydam's (2019) study, which found no overall impact of degree on teacher immunity. Given that certain circumstances produce certain results, this link may prompt scholars to investigate the intricacies and causes, as well as institutions to take the initiative to provide PD facilities and career development chances for their instructors.

In terms of the final point, our study's MANOVA test findings demonstrated that the difference between the means is statistically significant. As seen in Table 7, lecturers at foundation universities appear to be more effective. Similarly, research conducted by Kızıltepe (2008) and Mercer et al., (2020) demonstrated a disparity in the well-being of professors working in foundation institutions against those working in public universities. This disparity may also be related to the student profile, the university's physical conditions and opportunities, employment conditions, financial issues, or collegiality.

In the final phase of the study, data analysis revealed that teachers had generally good views towards instructing. They stated that they enjoyed and wanted to teach English. They also displayed positive attitudes by being effective in their classroom practices, motivated, and satisfied with their jobs as teachers. Furthermore, for

instructors, obstacles represented an opportunity to positively adapt, and they created strategies for dealing with stressful situations in their career.

In terms of openness to change, the qualitative findings contradict the quantitative findings. Because they do not want to face uncertainty, instructors are tempted to continue instructing in the same way they have in the past.

All in all, individual instructors and all other professional development service providers must enhance and refresh the varied, complicated, dynamic, and transitive aspects of teacher motivation and teacher immunity throughout time.

The qualitative phase of the study adds a more agentic and emotionally textured layer to these interpretations. Teachers' narratives reflect an evolving professional identity marked by classroom affectivity, self-reflection, and a desire for growth. The theme of "Community of Practice," for instance, illustrates Wenger's (1999) argument that belonging to a collegial network is vital for sustaining professional motivation and resilience. This aligns with Day and Sachs (2004), who stress the role of collaborative spaces in maintaining teacher well-being and emotional stamina—both of which are crucial for adaptive immunity. The quantitative data also revealed that instructors are resistant to novelty in their profession, preferring to stick to traditional practices while adhering to clearly specified standards. In summary, they displayed a lack of adaptability. Similarly, in an Iranian context research conducted by HaseliSonghori et al. (2018), all participants indicated limited receptivity to change. In our EFL teaching context, a number of variables, including the centralized, exam-focused educational system that places more emphasis on curriculum coverage than novelty, may contribute to resistance to novelty. Teachers may be discouraged to try novel approaches because of institutional pressures and strict adherence to standardized practices. Teachers may also be less open to change if they have limited access to professional development opportunities. Similar to studies in the Iranian context, these variables, along with a limited sense of agency, may contribute to a lack of flexibility.

Interestingly, the divergence between quantitative and qualitative data on openness to change deserves attention. While the scale scores suggest cautious attitudes, qualitative accounts reveal a more refined picture of conditional receptivity. Teachers reported a willingness to change, but only within supportive environments. This distinction highlights a possible limitation of Likert-type items in capturing the contingent nature of change readiness, which is better illuminated through open-ended narrative responses. As such, it supports recent calls in applied linguistics (e.g., Mercer & Kostoulas, 2018) for methodological pluralism to unearth complex teacher psychology constructs.

Another important insight from this study concerns professional development (PD). Our findings reinforce the strong correlation between PD participation and enhanced immunity, confirming arguments by Dikilitaş and Yaylı (2018) and Bardakçı and Yoğun (2023) that sustained PD nurtures adaptive teacher qualities. However, this study adds that it is not just access to PD but its meaningfulness and contextual relevance that matters. Teachers expressed a desire for PD aligned with their instructional realities, suggesting that generic training may fall short of fostering true professional transformation or strengthening psychological immunity. In line with this, we looked into participants' perceptions of professional development and the potential

impact of PD on language teacher immunity. According to the literature (Dikilitaş & Yaylı, 2018; Goktepe & Kunt, 2020), the examination of the responses to the associated open-ended questions yielded two categories: Community of Practice and Professional Development. As a result of the participants' overall favorable reactions, it is possible to conclude that the concepts of Community of Practice and Professional Development have a beneficial impact on teachers' immunity. One possible reason for the positive effect of Community of Practice on teacher immunity is that it offers a sense of belonging and collegial support, which helps teachers share experiences, reflect on challenges, and build resilience collectively (Wenger, 1999). Additionally, engaging in ongoing Professional Development allows teachers to enhance their skills and confidence, which can boost self-efficacy and reduce feelings of stagnation or burnout (Day & Sachs, 2004). Together, these factors contribute to a stronger, more adaptive form of teacher immunity by fostering growth and professional fulfilment.

Furthermore, every school is a learning institution that supports professional development programs for teachers through external assistance or in-service activities. A good learning organization requires motivated teachers to produce professional knowledge. These kinds of schools need teachers who are given opportunities so that teachers can actively participate in novelty, and develop institutional skills. Providing teachers with the mechanisms validating innovation, and implementing change is the responsibility of all other parties involved. Parents, teachers, and the school environment as a whole can all take the lead in bringing about, fostering, and improving change. All of these stakeholders have a substantial impact on teachers' willingness to change.

In summary, the quantitative and qualitative findings of the study complement each other in illustrating the multifaceted nature of language teacher immunity. Quantitatively, teachers demonstrated a medium level of immunity ($M=3,76$), with particularly high scores in teaching self-efficacy ($M=4,70$) and coping ($M=4,36$), indicating emerging resilience and professional certainty. These results are echoed in the qualitative data, where themes such as “Teaching Self-Efficacy”, “Classroom Affectivity”, and “Coping” reflect teachers’ personal accounts of professional fulfillment, emotional resilience, and classroom motivation. Furthermore, while the “Openness to Change” subscale showed only moderate receptivity ($M=3,52$), qualitative insights suggest a more nuanced willingness to adapt through collegial collaboration and professional development. Thus, the qualitative narratives enrich the quantitative data by revealing the underlying attitudes and values that contribute to the development of productive teacher immunity. In brief, involvement in training, striving to be a lifelong learner even during difficult times, and collegiality in academic life all have a beneficial impact on teacher immunity.

Implications

According to Hiver (2015), in order to empower teacher immunity as an armoring system, it is necessary to reinforce language teachers during pre-service education of prospective teachers (Boran, 2020), and through school-embedded professional development opportunities such as mentor-mentee or peer-coaching (Bardakçı & Yoğun, 2023) initiatives within a CPD framework throughout the in-service process. These PD initiatives and a strong feeling of community (Şahinkarakaş,

& Tokoz-Göktepe, F., 2018) would complement each other. In line with the literature, findings of the study suggest that professional development initiatives should be promoted among language teachers to boost teachers' motivation and teacher immunity.

Furthermore, teacher well-being comprises both positive and negative emotions (Seligman, 2011; Kızıltepe, 2008). Physical, emotional, mental or intellectual, and spiritual well-being of teachers should be prioritized. As a result, professional and emotional support from administration, colleagues, and all other stakeholders is critical in equipping instructors with effective teaching abilities (Namaziandost et al., 2024). Depending on the findings, enhancing collaboration and collegiality for the sake of positive emotions towards the profession and of the job satisfaction should be valued by the decision makers.

Finally, language teaching is clearly a complex and dynamic system (Larsen-Freeman, 2012, 2015; McDonough, 2007). As a result, we should emphasize that teachers' academic, psychological, and emotional requirements are intertwined and evolve over time. As the findings of the study suggest, to meet these complex and dynamic needs, as well as raise awareness of 21st century learning and innovation skills (Caena, 2011), teachers' professional development or training opportunities must be expanded, and teachers' psychological, emotional, academic, and societal needs must be considered during pre-service (Arslan & Almacioğlu, 2023) and in-service practices.

Limitations

It should be noted that a few constraints may have influenced the findings of this mixed-method study. To begin, one of our study's major weaknesses is the sampling of respondents. We included only a number of universities in two regions of Türkiye. For a broader picture, additional EFL instructors from different universities across the country can be included. The second limitation is the time frame for data collecting. The data collecting period for both the quantitative and qualitative stages of the study corresponded with the post Covid-19 pandemic period, which was a more difficult period with fluctuating emotions (Akour et al., 2020). During data collection period, the participants were asked to verbalize their overall emotions, but not the instant ones. Despite this, rather than concentrating on their overall ideas of the topics under investigation, they may have been influenced by the period's intensity while responding the questionnaire and the interview questions. The last limitation of the study could be about the data collection tools because both quantitative and qualitative tools had been used in only a few studies since they were developed by Hiver (2015). Although a reliability coefficient was calculated and deemed adequate for this study, use of the tools could give more reliable results in a different context, such as primary, secondary, and high schools. In this study, we investigated the factors impacting language teachers' immunity through a questionnaire and some open-ended interview questions, but we did not utilize any intervention. Future research on language teacher immunity may include an intervention that follows a well-established systematic approach of research. This kind of research may adopt process tracing method so that the fluctuations and the causal mechanisms impacting those fluctuations can be traced in their context.

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Statement of Responsibility

Zekeriya DURMAZ completed the data collection, worked on data analysis, and was involved in the writing of the manuscript. Semiha KAHYALAR-GÜRSOY and Zekeriya DURMAZ participated in the design of the study, drafted the manuscript and participated in the interpretation of the results. Both authors read and approved the final manuscript.

Conflicts of Interest

We have no conflicts of interest to disclose.

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Secure Attachment and Perceived Social Support among High School Students: The Mediating Roles of Love and Social Intelligence

Lise Öğrencilerinde Güvenli Bağlanma ve Algılanan Sosyal Destek: Sevgi ve Sosyal Zekânın Aracı Rolü

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ABSTRACT: The perception of social support during adolescence is a primary interpersonal resource that is critical for effective stress management. Moreover, it has been associated with psychological well-being during this sensitive developmental period. Secure attachment, indicative of positive internal working models, has been found to be associated with elevated levels of perceived social support. Furthermore, it has been demonstrated to be closely linked to the character strengths of children and adolescents. The present study seeks to elucidate the interconnections between the perceived social support, secure attachment and love, and social intelligence character strengths in high school students. The rationale underpinning this study is that character strengths support both personal adjustment and functioning, as well as social bonds. This assertion is based on the aforementioned relationships. The aim of the study was to examine the mediating role of love and social intelligence in more detail. The study group consists of a total of 537 high school students. The results of the models indicate that adolescents who have a strong sense of connection with their parents and peers — as evidenced by high levels of character strengths such as love and social intelligence — perceive greater social support from their teachers.

Keywords: Perceived social support from teachers, secure attachment to parent, secure attachment to peers, love character strength, social intelligence character strength.

ÖZ: Algılanan sosyal destek ergenlik döneminde stresle başa çıkmada kritik öneme sahip birincil kişilerarası kaynaktır ve yaşamın bu hassas döneminde psikolojik iyi oluşla ilişkilidir. Olumlu içsel çalışma modellerinin bir yansıması olan güvenli bağlanma hem yüksek düzeyde algılanan sosyal desteğe sahip olmakla ilişkilidir hem de çocuk ve ergenlerin karakter güçleriyle yakından bağlantılıdır. Karakter güçleri ise hem kişisel uyumu ve işleyişi hem de sosyal bağları destekler. Bu ilişkilerden yola çıkarak, bu çalışmanın amacı lise öğrencilerinde algılanan sosyal destek, güvenli bağlanma ve sevgi ile sosyal zekâ karakter güçleri arasındaki ilişkileri ortaya koymaktır. Ayrıca, Model 1’de sevgi karakter gücünün ve Model 2’de sosyal zekâ karakter gücünün aracılık rolü araştırılmıştır. Bu bağlamda araştırmanın çalışma grubunu 537 lise öğrencisi oluşturmaktadır. Model 1 ve Model 2, ebeveynlerine ve akranlarına güvenli bir şekilde bağlanan ergenlerin öğretmenlerinden daha yüksek sosyal destek algılamalarında sevgi ve sosyal zekâ karakter güçlerinin de etkili olduğunu ortaya koymuştur.

Anahtar kelimeler: Arkadaşa güvenli bağlanma, ebeveyne güvenli bağlanma, öğretmenden algılanan sosyal destek, sevgi karakter gücü, sosyal zekâ karakter gücü.

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Throughout the human life cycle, particularly during adolescence, environmental factors such as perceived social support (PSS) maintain their significance in terms of mental health. A substantial body of research has been dedicated to the study of PSS, which is commonly defined as an individual's own judgment of satisfaction in interpersonal relationships. Research on young people has demonstrated a correlation between the levels of social support perceived by young people from the three main sources of support (family, friends, and teachers) (Helsen, Vollebergh & Meeus, 2000; Peker & Eroğlu, 2015; Tai, 2017; Yıldız & Eldeleklioğlu, 2024). Research has indicated that PSS in adolescence is associated with high self-esteem, increased school engagement and academic achievement (Araque, 2006), positive learning experiences and academic success (Deschamps, 2016), happiness and good health (Li & Liu, 2016). The extant literature examining the relationship between PSS and adolescent mental health suggests that there is an association between PSS and lower levels of depression (Ouyang et al., 2021), less non-suicidal self-harm and suicidal behaviours (Forster et al., 2020), and less emotional burnout (Romano et al., 2020). The disclosure of the factors elucidating PSS, which is associated with numerous salutary outcomes in the lives of adolescents, can furnish significant information for PSS studies to augment and support.

Secure Attachment and Perceived Social Support

The concept of PSS originates from the internal working models of self and others during early childhood, and is associated with secure attachment (SA) style (B. R. Sarason, Pierce, & I. G. Sarason, 1990). The study conducted by Sarason et al. (1991) demonstrated that both the perceived number of potential supporters and satisfaction with available support are associated with positive self-views. In their study on adolescents, Blain, Thompson & Whiffen (1993) discovered that individuals with an SA style who hold a positive view of themselves and a positive view of others exhibit higher levels of PSS.

Research conducted on a sample of adolescents exhibiting an SA style of attachment revealed that these individuals reported receiving elevated levels of social support from their family members and friends in comparison to those exhibiting other attachment styles (Blain et al., 1993; Kobak & Sceery, 1988). As Zimmermann (2004) asserted, adolescents exhibiting an SA style were characterised by the presence of emotionally intimate friendships and a detailed friendship concept, in contrast to those exhibiting a dismissive attachment style. Furthermore, the subjects reported feelings of integration within a larger social group, the presence of adequate emotion regulation skills in situations of conflict with close friends, and low levels of hostility and social anxiety (Zimmermann, 2004).

Research on securely attached adolescents has also indicated that they perceive higher levels of social support from their teachers in comparison to adolescents with other attachment styles (Cotterell, 1992; Tulviste & Rohner, 2010). In a study designed to examine these results in the literature on adolescents, the relationships between secure attachment to parents (SAParent) and peers (SAPeer) and PSS from family, friends, and teachers were examined. In light of the findings, it can be concluded that adolescents who have a secure attachment to their parents exhibited elevated levels of PSS from their family environment. In addition, it was determined that adolescents who

had SAPeer exhibited an increased perception of social support from friends and teachers (Yıldız & Eldeleklioğlu, 2024).

Love and Social Intelligence

Character strengths (CSs) have been demonstrated to facilitate both personal harmony and functioning, as well as social bonding (Booker & Perlin, 2020). Humanity, one of the six main virtues of the VIA Classification of Character Strengths and Virtues, encompasses interpersonal CSs, including the capacity to establish and sustain human relationships, such as cultivating friendships. CSs within the virtue of humanity, which are also termed humanity strengths, contribute significantly to the formation and strengthening of ties within the community (McGovern, 2012). The concept of CSs within humanity (love, kindness, and social intelligence) is typically highly correlated with the social aspect of life (Mo, 2019).

A study was conducted to examine the mediating effect of kindness CS on the relationship between SAParent and SAPeer and PSS from family, friends, and teachers in adolescents. This study was based on evidence from the literature on the impact of humanity strengths on positive social relationships. In light of the findings, it was determined that kindness fully mediated the association between SAParent and PSS from teachers, and partially mediated the association between SAPeer and PSS from teachers (Yıldız & Eldeleklioğlu, 2024). It is hypothesised that love and social intelligence, which are among the strengths exhibited by humans, such as kindness, may mediate the link between secure attachment and PSS in adolescents. A paucity of studies in the literature examines the link between the CSs of love and social intelligence on both secure attachment and PSS.

The notion of love, intimacy, and other enduring relationships has been linked to kinship ties, characterised by reciprocal exchanges and the distribution of resources (Macdonald, Patch, & Figueredo, 2016). A body of research has previously indicated an association between love CS in adolescents and both PSS and the perception of family support (Noronha, da Silva, & Rueda, 2018; Noronha, da Silva, & Dametto, 2019). A study on adults related to love CS and attachment reported that avoidant attachment style negatively predicted love CS (Lavy & Littman-Ovadia, 2011). The findings of a further study on adults indicate an association between insecure attachment and love (see Gilbert, McEwan, Matos & Rivis et al., 2011).

Social intelligence is defined as the ability to utilise social skills to fulfil interpersonal tasks and/or to comprehend oneself in relation to others (Kaukiainen et al., 1999). The results of a study examining the link between social intelligence and social support networks among young people indicate the presence of positive relationships between emotional and social intelligence and social support systems (Iruloh & Ukaegbu, 2015). A study was conducted to examine the relationship between social intelligence and attachment among a sample of young adults. The study found that higher scores on social intelligence were positively related to secure attachment, supporting emotional skills and emotional regulation later in life (Anwer et al., 2017). Furthermore, the findings of multiple studies on adolescents indicate that a secure attachment-related mood during early adolescence is associated with elevated levels of peer acceptance, emotion regulation, and autonomy, as well as enhanced social competence over time (Allen et al., 2000). According to Engels et al. (2001),

adolescents who report higher levels of parental attachment are more likely to demonstrate social competencies and are less likely to feel anxious about performing these competencies.

The Present Study

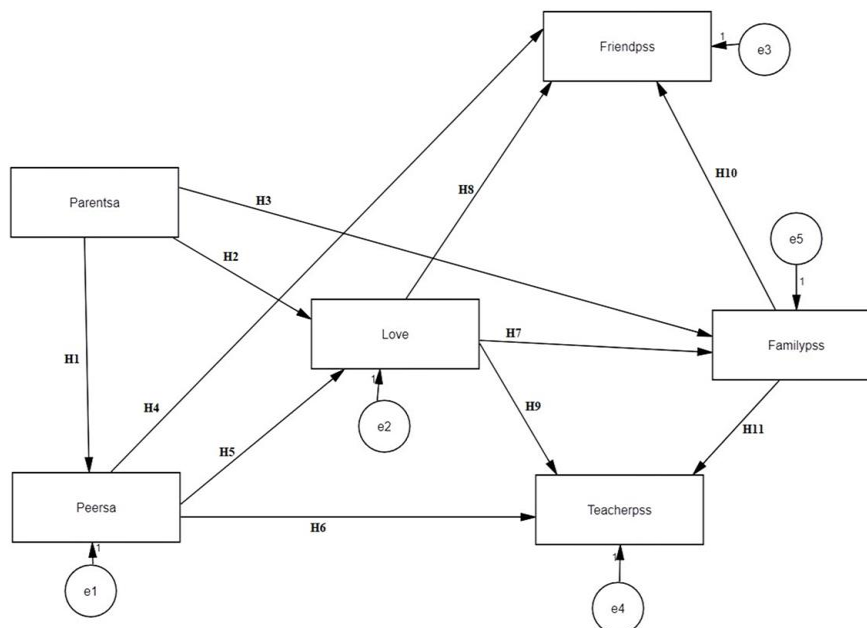
A review of the extant literature was conducted to examine the relationship between secure attachment, PSS, and CSs. In the extant literature on the prediction of CSs with social support, a study reported that older people's CSs have a direct impact on their social support (Noriega et al., 2022). However, the present study is unable to provide sufficient information about adolescence, a critical period in the development of both CSs and PSS. A study was conducted that demonstrated a correlation between secure attachment and CSs in adolescents. However, the study did not examine attachment to parents and peers in separate ways (Kerns et al., 2022). A review of the extant literature on the CSs of Turkish adolescents reveals a body of research indicating that love CS predicts family communication (Kabakçı & Stockton, 2022), closeness/compassion CS predicts SAPeer and subjective well-being in school (Ekşi et al., 2020), and kindness CS predicts PSS from teachers (Yıldız & Eldeleklioglu, 2024). A thorough examination of the extant literature reveals a paucity of research addressing the relationship between secure attachment, perceived social support (PSS), and social intelligence (CS). Furthermore, the interplay between love CS and PSS remains uncharted territory. The present study seeks to elucidate the inter-relationships between PSS, secure attachment, and love and social intelligence CSs among high school students.

Hypotheses

The proposed model, which is based on the hypothetical structural model 1, is presented in Figure 1.

Figure 1

Model 1: Love Mediates The Relation Between Secure Attachment to Parents And Peers And Perceived Social Support Received from Family, Friends And Teachers



Note. Familypss= Perceived social support received from the family, Friendpss= Perceived social support received from friends, Love= Love character strength , Parentsa=Secure attachment with parent, Peersa= Secure attachment with peers, Teacherpss= Perceived social support received from teachers.

Table 1 presents hypotheses in theoretical model 1.

Table 1

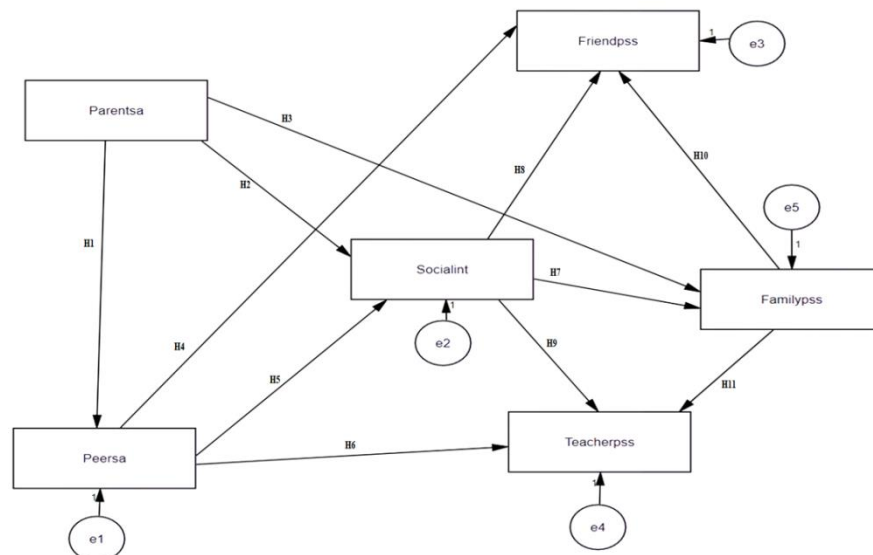
Model 1 Hypothesis

Hypothesis Nr.	Hypothesis
1	SAParent positively and significantly predicts SAPeer in high school students.
2	High school students' SAParent positively and significantly predicts love CS.
3	SAParent of high school students positively and significantly predicts the level of Familypss.
4	High school students' SAPeer positively and significantly predicts the level of Friendpss.
5	High school students' SAPeer positively and significantly predicts love CS.
6	High school students' SAPeer positively and significantly predicts the level of Teacherpss.
7	Love CS of high school students positively and significantly predicts the level of Familypss.
8	High school students' love CS positively and significantly predicts the level of Friendpss.
9	Love CS of high school students positively and significantly predicts the level of Teacherpss.
10	The level of Familypss positively and significantly predicts the level of Friendpss by high school students.
11	The level of Familypss by high school students positively and significantly predicts the level of Teacherpss.
12a	High school students' love CS plays a mediating role in the relationship between SAParent and Familypss.
12b	High school students' love CS plays a mediating role in the relationship between SAPeer and Friendpss.
12c	High school students' love CS plays a mediating role in the relationship SAPeer and Teacherpss.

The proposed model, which is based on the hypothetical structural model 2, is presented in Figure 2.

Figure 2

Model 2: Social Intelligence Mediates The Relation Between Secure Attachment to Parents And Peers And Perceived Social Support received from Family, Friends And Teachers



Note. Socialint= Social intelligence character strength

Table 2 presents the hypotheses in theoretical model 2:

Table 2

Model 2 Hypothesis

Hypothesis Nr.	Hypothesis
1	SAParent positively and significantly predicts SAPeer in high school students.
2	High school students' SAParent positively and significantly predicts social intelligence CS.
3	SAParent of high school students positively and significantly predicts the level of Familypss.
4	High school students' SAPeer positively and significantly predicts the level of Friendpss.
5	High school students' SAPeer positively and significantly predicts social intelligence CS.
6	High school students' SAPeer positively and significantly predicts the level of Teacherpss.
7	Social intelligence C of high school students positively and significantly predicts the level of Familypss.
8	High school students' social intelligence CS positively and significantly predicts the level of Friendpss.
9	Social intelligence CS of high school students positively and significantly predicts the level of Teacherpss.
10	The level of Familypss positively and significantly predicts the level of Friendpss by high school students.
11	The level of Familypss by high school students positively and significantly predicts the

	level of Teacherpss.
12a	High school students' social intelligence CS plays a mediating role in the relationship between SAParent and Familypss.
12b	High school students' social intelligenceCS plays a mediating role in the relationship between SAPeer and Friendpss.
12c	High school students' social intelligenceCS plays a mediating role in the relationship between Friendpss and Teacherpss.

Method

The present study seeks to examine the relationship between secure attachment and love and social intelligence CSs in order to ascertain their role in explaining the levels of perceived social support experienced by high school students (Fraenkel, Wallen, & Hyun, 2023).

Participants

The extant literature does not provide a simple rule for determining the sample size required for structural equation modeling. Moreover, power analyses conducted to determine the optimal sample size for structural equation modeling led researchers to recognise that they frequently operate with smaller samples in order to achieve sufficient statistical power (Loehlin & Beaujean, 2017). In order to address this confusion, researchers propose a sample size-to-parameter ratio of 20:1 for models where all results are continuous and normally distributed, and estimation methods are maximum likelihood (Kline, 2023). In light of the 17 parameters examined in this study, the minimum recommended sample size is 340. The study sample comprised 676 high school students from public high schools in Turkey. The data were obtained from students in grades 9, 10, 11 and 12 of these high schools (mean age = 15.72, standard deviation = 0.81). The administration of measurement tools was conducted online, a decision that was made in response to the global pandemic caused by the novel coronavirus. The final participant group comprised 134 male (25%) and 403 female (75%) students.

Data Collection Procedure

A total of ten high schools situated in the city centre were selected for inclusion in the study, with the selection process being random. The data was collected during the 2021-2022 academic year. The school principal and school psychological counsellors were also apprised of the fact that the three scales would be administered simultaneously and online. The application link for the scale was disseminated by school principals or school psychological counsellors via the Educational Informatics Network (EBA) and social communication channels. The online form was meticulously designed to facilitate the participation of students who had obtained their parents' consent. These students were instructed to access the scales by selecting the "I would like to volunteer" option. The participants did not receive any form of incentive for their participation in the study.

Measures

Demographic Information Form

This form, developed by the researchers, includes items about the age, gender, and grade of the students participating in this study.

Perceived Social Support Scale-Revised (PSSS-R)

In 1997, Yıldırım developed this scale for the purpose of evaluating individuals' perception of the social support they receive from their immediate social environment. Subsequently, in 2004, Yıldırım undertook a revision of the scale (PSSS-R). The scale, which comprises 50 items, is scored using a response format based on three-point Likert scales. The scale comprises three subscales: family support, friend support and teacher support. The scale comprises twenty items that measure family support, thirteen items that measure friend support, and seventeen items that measure teacher support. It is notable that each subscale of the scale contains one reverse-scored item. The scale's internal consistency coefficients were calculated as .91 for the total scale, .83 for family, .77 for friends, and .83 for teachers support (Yıldırım, 2004). In the present study, the internal consistency coefficients of the scale were calculated to be .90 for FamilyPSS, .81 for FriendPSS, and .93 for TeacherPSS.

Inventory of Parent and Peer Attachment-Revised (IPPA-R)

In 1987, Armsden and Greenberg developed an attachment inventory comprising 53 items designed for use in middle and late adolescence. The items are scored using a three-point Likert scale. The inventory was adapted to Turkish culture by Yavuz, Yüksel, and Göksan Yavuz (2018) using adolescents aged 15-17 years. The questionnaire comprises twenty-eight statements related to parental attachment and twenty-five related to peer attachment. Thirteen statements from the parent attachment part and seven statements from the peer attachment part of the inventory were reverse-coded. In terms of the inventory's internal consistency coefficients, it was determined that the Cronbach alpha coefficients of the scales assessing attachment to parents and attachment to peers were .89 (Yavuz et al., 2018). The inventory's internal consistency coefficients for this study were .93 regarding parental attachment and .69 regarding peer attachment. It is evident that an increase in the total scores is indicative of an enhanced level of secure attachment.

Values in Action Inventory of Character Strengths for Youth (VIA-Youth)

The inventory was devised by Peterson and Seligman (2004) with the objective of identifying six virtues and twenty-four CSs, as established by the VIA classification, in individuals between the ages of 10 and 17. The inventory in question comprises one hundred ninety-seven individual items. The items are scored using a five-point Likert scale. In 2013, Kabakçı adapted the inventory to Turkish culture with high school students. Each CS subscale can be employed as a stand-alone measure within the inventory, which comprises a total of fifty-four reverse-scored items (Kabakçı, 2013). The inventory demonstrated internal consistency coefficients exceeding .70, with the exception of curiosity (.64), modesty (.67), and judgment (.68) (Kabakçı, Ergene, & Doğan, 2019). In the present study, the sub-dimensions of the inventory employed for the assessment of the CSs of love and social intelligence were utilised exclusively. The

love CS component comprises nine items, while the social intelligence CS component consists of eight items. It has been determined that three items in the love CS part and two items in the social intelligence CS part of the inventory are reverse-coded. The study found internal consistency coefficients of .74 for love and .62 for social intelligence.

Data Analysis

Prior to the execution of the statistical analyses, it was imperative to ascertain whether any participants had completed the 676 application forms incorrectly or incompletely. Following the identification of 90 participants who had incorrectly completed the measurement tools, the decision was taken to exclude their data from the data pool. Subsequently, the data set was analysed in terms of the prerequisites of path analysis. The findings of this analysis indicated that the sample under scrutiny demonstrated a normal distribution. Furthermore, an investigation of the data in terms of extreme values revealed the necessity for the removal of 40 data points from the data set. Given that the data satisfied the assumption of multivariate normal distribution, a series of path model tests were conducted using the maximum likelihood (ML) estimation method with the statistical software. The study utilised a total of 5,000 bootstrap samples, with each sample possessing a 95% confidence interval. As stated by Hayes (2009), the presence of a non-zero confidence interval for an indirect effect indicates the presence of a statistically significant mediating effect. Subsequently, the mediating effects of the CSs of love and social intelligence were evaluated using a bootstrapping method (5000 bootstrapped samples with 95% bootstrap confidence intervals [CI]). In accordance with the classification proposed by Kline (2005), values with a standardized path coefficient below .10 are designated as having a small effect size, those around .30 are designated as having a medium effect size, and those above .50 are designated as having a large effect size (Cohen, 1988). In the present study, this classification was considered during the interpretation of the effect sizes.

Ethical Procedures

The study was granted approval on 2nd October 2020 by the Social and Human Sciences Research and Publication Ethics Committee of Bursa Uludağ University, conducted under the auspices of the 2020/07 number. Following a thorough evaluation of the proposal, the Bursa Provincial Directorate of National Education formally sanctioned the project on 5th March 2021.

Results

Descriptive Statistics

The means, standard deviations, and bivariate correlations between the principal study constructs were calculated. The findings are set forth in Table 3.

Table 3

Descriptive Statistics and Correlations among Principal Study Constructs

Variables	1.	2.	3.	4.	5.	6.	7.	<i>M</i>	<i>SD</i>	<i>N</i>
1. Love	1	.45**	.64**	.45**	.53**	.43**	.30**	3.66	.68	537
2. Socialint		1	.32**	.24**	.27**	.19**	.19**	3.84	.52	537
3. Parentsa			1	.34**	.82**	.23**	.30**	68.66	10.79	537
4. Peersa				1	.33**	.71**	.23**	63.32	4.43	537
5. Familypss					1	.28**	.33**	53.83	6.09	537
6. Friendpss						1	.18**	36.63	2.98	537
7. Teacherpss							1	41.31	7.64	537

Note **p < .01

As demonstrated in Table 3, both love and social intelligence are found to have statistically significant relationships with SAParent and SAPeer, as well as PSS from family, friends, and teachers.

Path Model

The path analysis was used first to test the first eleven hypotheses of Model 1. Analyses were repeated three times to achieve the final model. As a result of removing non-significant paths from the model, the fit indices were within the acceptable fit index values: RMSEA = .043, χ^2/df = 2.01, CFI = .995, GFI = .991, NFI=.990, TLI = .990, SRMR = .023. Except for the predictive power of PSS from the family on PSS from teachers, SAParent on PSS from the family, and SAPeer on PSS from friends, no predictive coefficients showed an increase. Figure 3 illustrates the final model (Model 1).

Figure 3
Final Model 1

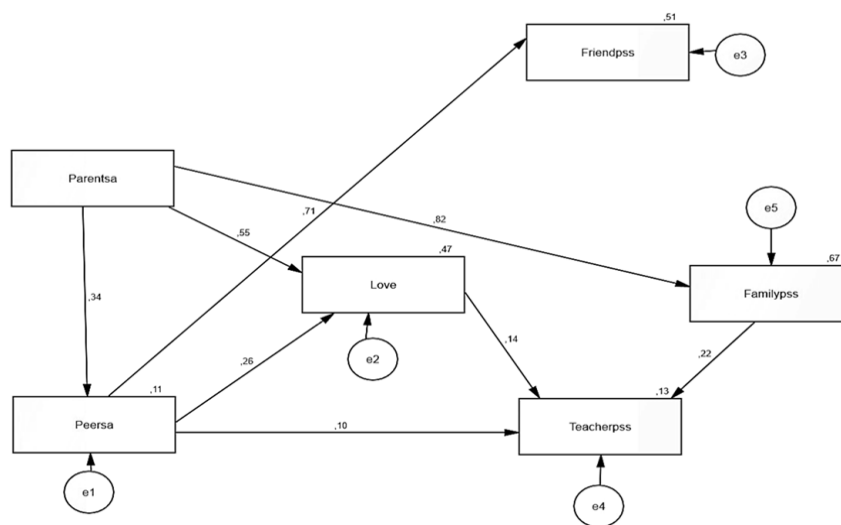


Table 4 illustrates the significance of the path coefficients identified between the variables.

Table 4

Unstandardised And Standardised Regression Coefficients Of Final Model 1 Parameters And Hypothesis Tests

Hypothesis	Pathways	RW	SE	SRW
H1	Parentsa → Peersa	.14*	.02	.34
H2	Parentsa → Love	.04*	.00	.55
H3	Parentsa → Familypss	.46*	.01	.82
H4	Peersa → Friendpss	.48*	.02	.71
H5	Peersa → Love	.04*	.01	.26
H6	Peersa → Teacherpss	.16*	.01	.10
H9	Love → Teacherpss	1.54*	.57	.14
H11	Familypss → Teacherpss	.28*	.01	.22

Note *p < .05

The results of the analysis provide substantiated evidence that validates the following hypotheses, as outlined in Table 4: 1., 2., 3., 4., 5., 6., 9., and 11.

Then, the method of path analysis was used to test the first eleven hypotheses of Model 2. Analyses were repeated three times to achieve the final model. As a result of removing non-significant paths from the model, the fit indices were within the acceptable fit index values: RMSEA = .043, χ^2/df = 2.08, CFI = .994, GFI = .991, NFI = .988, TLI = .986, SRMR = .024. With the exception of the predictive power of SAPeer on PSS from friends, no predictive coefficient demonstrated an increase.

Figure 4 illustrates the final model (Model 2).

Figure 4

Final Model 2

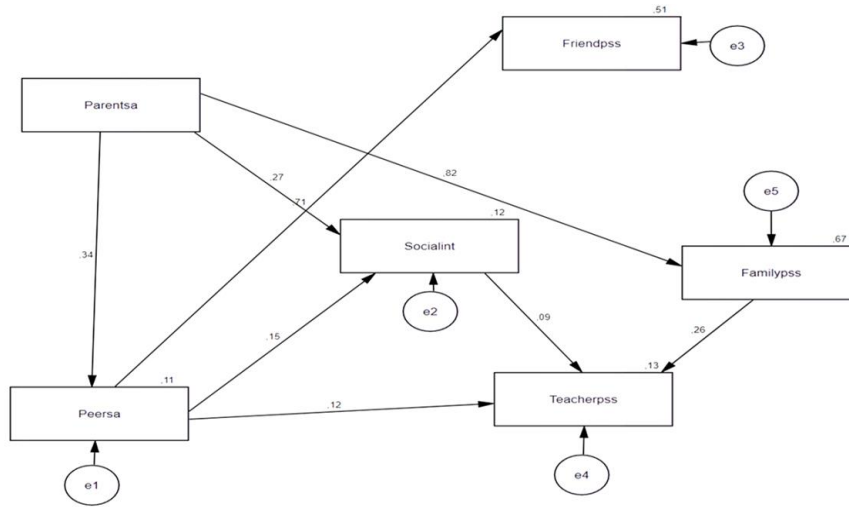


Table 5 illustrates the significance of the path coefficients identified between the variables.

Table 5

Unstandardised And Standardised Regression Coefficients of Final Model 2 Parameters And Hypothesis Tests

Hypothesis	Pathways →	RW	SE	SRW
H1	Parentsa → Peersa	.14*	.02	.34
H2	Parentsa → Socialint	.01*	.00	.27
H3	Parentsa → Familypss	.46*	.01	.82
H4	Peersa → Friendpss	.48*	.02	.71
H5	Peersa → Socialint	.02*	.01	.15
H6	Peersa → Teacherpss	.21*	.07	.12
H9	Socialint → Teacherpss	1.39*	.63	.10
H11	Familypss → Teacherpss	.33*	.05	.26

Note *p < .05

As evidenced in Table 5, the hypotheses posited in Model 2, namely 1., 2., 3., 4., 5., 6., 9., and 11., have been validated.

Mediation Tests

According to the ultimate Model 1, love serves as a partial mediator. Table 6 provides an overview of the total, direct, and indirect effects between the variables.

Table 6

Direct, Indirect and Total Effects in Model 1

Estimated Variables	Predictive variables	Direct SRW	95 % CI		Indirect SRW	95 % CI		Total SRW	95 % CI	
			Lower Bound	Upper Bound		Lower Bound	Upper Bound		Lower Bound	Upper Bound
Peersa ($R^2=.11$)	Parentsa	.34**	.27	.41	-	-	-	.34**	.27	.41
Familypss ($R^2=.67$)	Parentsa	.82*	.78	.85	-	-	-	.82*	.78	.85
Love ($R^2=.47$)	Parentsa	.55***	.48	.60	.09***	.19	.29	.64***	.58	.68
	Peersa	.26***	.20	.33	-	-	-	.26***	.20	.33
Friendpss ($R^2=.51$)	Parentsa	-	-	-	.24***	.19	.29	.24***	.19	.29
	Peersa	.71**	.67	.77	-	-	-	.71**	.67	.77
Teacherpss ($R^2=.13$)	Parentsa	-	-	-	.30**	.23	.37	.30**	.23	.37
	Peersa	.01***	.01	.19	.04***	.01	.07	.13**	.05	.22
	Familypss	.22**	.12	.32	-	-	-	.22**	.12	.32
	Love	.14***	.05	.24	-	-	-	.14***	.05	.24

Note * $p < .001$ ** $p < .01$ *** $p < .05$, 5000 bootstrap.

The results indicate that SAParent and SAPeer, which predict love CS, explain 47% of the variance in this variable. Among the variables examined, only SAParent was found to predict love CS in both direct and indirect ways. Evaluating the variables in terms of their total predictive power, it can be demonstrated that both variables exhibit statistically significant predictive power. Examining the total predictive power of the variables on love CS in terms of effect sizes, it can be seen that SAParent ($\beta = .64$, $p < .05$) has a large effect, whereas SAPeer has a small effect ($\beta = .26$, $p < .05$).

Table 6 indicates that SAParent and Peersa, Familypss, and love CS explain 13% of the variance in Teacherpss. Among the aforementioned variables, only SAPeer was found to predict the level of Teacherpss directly or indirectly. The total predictive powers of all variables were found to be statistically significant. Examining the effect sizes of the total predictive power of these variables on the level of Teacherpss, and it was found that SAParent ($\beta = .30$, $p < .01$) had a moderate effect, whereas the level of Familypss ($\beta = .22$, $p < .01$), SAPeer ($\beta = .13$, $p < .01$) and love CS ($\beta = .14$, $p < .05$) had a small effect.

The ultimate Model 2 indicates that social intelligence CS serves as a partial mediator. Table 7 presents all the effects between the variables, including the total effect, direct effect, and indirect effect.

Table 7

Direct, Indirect and Total Effects in Model 2

Estimated Variables	Predictive variables	Direct SRW	95 % CI		Indirect SRW	95 % CI		Total SRW	95 % CI	
			Lower Bound	Upper Bound		Lower Bound	Upper Bound		Lower Bound	Upper Bound
Peersa ($R^2=.11$)	Parentsa	.34**	.27	.41	-	-	-	.34**	.27	.41
Familypss ($R^2=.67$)	Parentsa	.82***	.78	.85	-	-	-	.82***	.78	.85
Socialint ($R^2=.12$)	Parentsa	.27**	.18	.35	.05**	.02	.09	.32**	.24	.40
	Peersa	.15***	.06	.23	-	-	-	.15***	.06	.23
Friendpss ($R^2=.51$)	Parentsa	-	-	-	.24***	.19	.29	.24***	.19	.29
	Peersa	.71**	.67	.77	-	-	-	.71**	.67	.77
Teacherpss ($R^2=.13$)	Parentsa	-	-	-	.28**	.21	.35	.28**	.21	.35
	Peersa	.12**	.04	.21	.01***	.00	.04	.14**	.05	.23
	Familypss	.26**	.17	.35	-	-	-	.26**	.17	.35
	Socialint	0.10***	0.02	0.20	-	-	-	0.10***	0.02	0.20

Note * $p < .001$ ** $p < .01$ *** $p < .05$, 5000 bootstrap.

Table 7 shows that SAParent and SAPeer, which predict social intelligence CS, explain 12% of the variance in this variable. Of the variables considered, only SAParent was found to predict social intelligence CS both directly and indirectly. Evaluating the variables in terms of their overall predictive power, it can be shown that both variables have statistically significant predictive power. When examining the overall predictive power of the variables on social intelligence CS in terms of effect sizes, it can be observed that SAParent ($\beta = .32$, $p < .01$) has a medium effect, whereas SAPeer ($\beta = .15$, $p < .05$) has a small effect.

It can be seen that SAParent and SAPeer, the level of Familypss, and social intelligence CS, which predict the level of Teacherpss, explain 13% of the variance in this variable. Among the variables considered, only SAPeer was found to predict the level of Teacherpss, both directly and indirectly. When evaluating the variables in terms of their overall predictive power, it can be shown that the predictive powers of all variables were statistically significant. The analysis of the total predictive power of the variables on the level of Teacherpss, as indicated by the effect sizes, shows that SAParent ($\beta = .28$, $p < .01$), the level of Familypss ($\beta = .26$, $p < .01$) and SAPeer ($\beta =$

.14, $p < .01$) have a small effect on the outcome in question. Moreover, social intelligence CS has a small effect ($\beta = .10$, $p < .05$).

Discussion

The present study aims to examine the relationships between SAParent and SAPeer, and Familypss, Friendpss, and Teacherpss. The present study has been meticulously designed to examine the mediating effects of love and social intelligence on CSs. The findings pertaining to the initial research question suggest that high school students' SAParent exerts a substantial influence on their love and social intelligence CSs, both directly and indirectly through their SAPeer. The findings of the second research question analysis indicate that high school students' level of SAPeer directly predicts love and social intelligence CSs. The findings of the third research question's analyses demonstrate that the critical factors of love and social intelligence among high school students predicted the Teacherpss at a notable level.

A review of the extant literature on the relationship between secure attachment and love CS reveals the existence of studies reporting results similar to those of the present study. Obeldone and Kerns (2020) discovered that secure attachment was a significant predictor of positive emotions, including love, in their study with pre-adolescents. This finding aligns with the results of the current study, thereby providing support for the current body of research in this area. Furthermore, the research conducted by Liu and Wang (2021) revealed that parental emotional warmth, attachment to parents, and attachment to peers are effective in the development of CS. Research results pertaining to the development of positive emotions and empathy also revealed findings consistent with this study. A study by Laible (2007) found that adolescents with secure attachment relationships with their parents and peers reported negative emotions less frequently and positive emotions more frequently on a daily basis. Furthermore, adolescents who reported secure attachment indicated a reduced tendency to express negative emotions and exhibited less aggressive behaviour compared to their peers with insecure attachment. The author further emphasised that peer attachment exhibits stronger direct relationships with all aspects of socio-emotional development than parental attachment. This finding is consistent with the present study, which reports that secure attachment with peers serves as a mediator (Laible, 2007). As posited by Sanchez-Jiménez et al. (2008), love can be conceptualised as a manifestation of the need for interpersonal proximity and emotional attachment. Positive internal working models acquired through secure attachment from responsive caregivers facilitate adolescents' evaluation of both themselves and the people around them as lovable and important, thereby laying the foundation for love CS. Furthermore, it has been demonstrated that adolescents who acquire positive internal working models from SAParent and have these models confirmed in their peer group also develop SAPeer. Positive internal working models, reinforced by secure attachment to both sources, may contribute to the more pronounced emergence of love CS in adolescents.

The extant literature supporting the present study's result on social intelligence CS indicates that secure attachment has a significant positive relationship with social intelligence and predicts it significantly (Alghamdi et al., 2016; Anwer et al., 2017). In a study conducted with Turkish adolescents, Baytemir (2016) found that increased SAPeer was associated with enhanced interpersonal competencies among adolescents.

Moreover, experimental studies by Bar-On (2000) and Bakermans-Kranenburg et al. (2011), in which insecure attachment style was demonstrated to have a negative effect on social intelligence, documented similar results. The meta-analysis study conducted by Benson, McWey and Ross (2006) posited the hypothesis that general social competence in adolescents is associated with parental attachment and the quality of their relationships with their closest friends. Furthermore, numerous studies have indicated that SAPeer predominantly fosters socio-emotional competence in adolescence (e.g., Laible, 2007; Markiewicz, Doyle & Brendgen, 2001). The results of the present study demonstrate a congruence with those of previous research, which has indicated that secure attachment with a parent is associated with higher levels of social intelligence. Adolescents who acquire social skills through modelling of such skills by their primary caregivers in a secure attachment relationship with their parents are better able to exhibit these social skills in their interpersonal relationships. It is evident that adolescents are capable of establishing a SAPeer, which has been shown to positively meet the need for intimacy and sharing, by utilising the internal working models they possess. This is facilitated by SAParent. The development of their social skills is evident in the secure relationship they have established with their parents, as well as in the safe environment of their peer relationships. Peer relationships are characterised by a greater degree of equality and mutuality in comparison to other types of relationships. Consequently, peer attachment relationships have the capacity to facilitate the cultivation of specific socio-emotional competencies in adolescents, including empathy and prosocial conduct. The development and emergence of love and social intelligence, which are classified as interpersonal CSs, is facilitated by the nurturing and secure environment characteristic of close friendship relationships.

When synthesising the findings of the present study with the results of the study on kindness under the virtue of humanity (Yıldız & Eldeleklioğlu, 2024), it can be concluded that secure attachment to parents predicts the character strength of love more strongly, while secure attachment to friends predicts the character strength of kindness more strongly. It can be interpreted that love is a more strongly predictor of perceived teacher support among the three character strengths. It is important to note that the current explanations regarding the synthesis of the results of these two studies, which were conducted on different samples, should be evaluated within the limitations of this study.

Research findings indicate that CSs play a pivotal role in fostering or sustaining social relationships, which are of significant importance across all life stages (Martinez Marti & Ruch, 2014; Noriega et al., 2022). In one of the studies on love and PSS, Noronha et al. (2019) revealed that love is one of the CSs predicting PSS received from family. Research findings that have yielded analogous results have demonstrated that love exerts a favourable influence on the academic performance and behaviour of students (Cloninger, 2008; Dennis, 2012; Golstein, 1998). In a study conducted by Ekşi et al. (2020), it was found that adolescents' self-perceived social ability (SAPeer) and their perceived level of closeness and compassion (CSs) were significantly predictive of their subjective well-being at school. The findings of the present study indicate a significant association between love CS and PSS from teachers. Consequently, it can be posited that students who contribute to a positive school climate receive more social support from their teachers or perceive the social support they receive more positively.

A review of extant literature indicates a significant positive association between higher levels of social intelligence and higher levels of PSS (Kalefeld, 2020; Rowsell et al., 2014). As posited by B. R. Sarason et al. (1985), the quality of supportive interpersonal relationships is significantly influenced by the individual's own capacity for effective relational functioning and social competence. Consequently, the finding that adolescents with high social intelligence possess superior social and relational skills may facilitate more positive experiences in their social relationships. In the context of the school environment, students who possess high social intelligence are able to cultivate successful relationships with their teachers, as well as establish positive relationships with their peers. It is hypothesised that students who demonstrate such behaviour may receive increased attention from their teachers, which could result in a more positive perception of their relationship with their teachers. This is predicated on the assumption that such students contribute positively to the school climate through the cultivation of positive interpersonal relationships and their more positive approach to their teachers.

It can be hypothesised that the absence of a substantial correlation between love and social intelligence, and the PSS received from family and friends in the present study, may be ascribed to the fact that the study was conducted under exceptional social circumstances (being in isolation due to the pandemic). During this period, the relationships of adolescents with their families, friends, and teachers may have been subject to varying degrees of disruption from each other. When securely attached, adolescents can begin to demonstrate love and social intelligence, along with other CSs, in their relationships with their peers in the school environment. In order to foster these positive traits, teachers may seek to provide additional guidance to these students. Alternatively, individuals may perceive their relationships with their teachers to be more nurturing as a result of their positive internal working models with secure attachment and their love and social intelligence CSs.

Conclusion

The findings of this study suggest that SA_{Peer} is associated with both love and social intelligence, whereas SA_{Parent} is related to these CSs directly and indirectly. Furthermore, it was revealed that love and social intelligence CSs fully mediated the relationship between SA_{Parent} and PSS from teachers, and partially mediated the relationship between SA_{Peer} and PSS from teachers. The significance of SA_{Parent} and SA_{Peer} in the development of love and social intelligence CSs is a salient factor in explaining the variance in PSS from teachers. The present study demonstrated that both emotional intelligence, a subtype of social intelligence, and perceived emotional support from teachers are negatively associated with school exhaustion (Romano et al., 2020). Consequently, there is a compelling argument for the integration of parental education into school-based prevention programs, with a view to establishing a secure connection with the parent. This connection is an essential component in the development of the child's emotional and social intelligence. In addition, the integration of emotional regulation and social skills training into the early years' education curriculum is recommended, with the objective of cultivating a secure friendship. By focusing on love and social intelligence in school-based prevention programmes, it is possible to enhance the PSS students from teachers, as well as to prevent the onset of school exhaustion and

similar mental health problems. A healthy and peaceful school environment is conducive to the development of adolescents' love and social intelligence CSs. Furthermore, adolescents from disadvantaged families can play a protective role in the emergence or exacerbation of mental health problems. It is therefore imperative that educators are equipped with the necessary guidance to recognise and utilise these character strengths. It is imperative that these CSs are incorporated into the training curricula of teacher training institutions. In addition, it is essential to ensure that teachers receive the requisite information through in-service training.

Limitations and Implications

Despite the significance of this study's contribution to the extant literature on the relationships between PSS, secure attachment, love and social intelligence in CSs, it is not without certain limitations. Firstly, the present study employed a correlational design and adopted a descriptive model. The cross-sectional design of the study precludes the possibility of making causal inferences and generalising the findings. Furthermore, the fact that the sample consists of predominantly female students, individuals studying in Anatolian high schools and those residing in a certain province also limits the generalisability of the results. The variables analysed in this study are limited to the measurements obtained from self-report instruments. It is imperative to exercise caution when interpreting the results pertaining to the internal reliability coefficient of the instrument utilised to assess social intelligence character strength, a pivotal variable in the study. This is due to the fact that the instrument exhibits a low internal reliability coefficient for this particular subscale.

The results of this study carry significant implications for researchers operating within the domain of perceived social support and educators who implement practices to augment perceived social support:

1. The validity of the present models can be tested for individuals with different demographic characteristics (age, being under institutional care, different family and school types, etc.). The enhancement of these studies through the utilisation of interview and observational methods, in conjunction with self-report measurement tools, has been demonstrated to be a highly effective approach.
2. Multilevel structural equation models facilitate the re-evaluation of relationships between relevant variables, taking into account a range of demographic characteristics of the participants.
3. In light of the documented positive and significant relationships between the social support perceived from teachers and students' character strengths of love and social intelligence in extant models, studies in which these character strengths are supported in educational environments can be planned.
4. The positive relationships between secure attachment to friends and the character strengths of love and social intelligence identified in the extant models can be used in peer bullying studies.

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Statement of Responsibility

All authors were responsible for the initial conceptualisation and design of the study. The responsibility for material preparation, data collection and analysis was assumed by the corresponding author. All authors contributed to the first draft of the article and provided feedback on earlier drafts. All authors have read and approved the final version of the article. All authors played an equal role in the drafting of the final article.

[dataset] 2023; Secure attachment and perceived social support among high school students: The mediating roles of love and social intelligence, Harvard Dataverse, Draft Version, <https://doi.org/10.7910/DVN/HZG9UV>

Conflicts of Interest

The authors state that they have no conflicting interests in regard to this manuscript.

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The Effect of Social Media Addiction on Psychological Stress: The Indirect Role of Doomscrolling

Sosyal Medya Bağımlılığının Psikolojik Strese Etkisi: Felaket Kaydırmasının Dolaylı Rolü

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ABSTRACT: The literature indicates that there is a relationship between social media addiction and psychological stress. However, there is still limited understanding of the specific ways in which social media addiction leads to psychological distress. This study examines the mediating role of disaster shifting in the relationship between social media addiction and psychological stress. In the 2022-2023 academic year, a sample of 460 university students (358 women, 78%, and 102 men, 22%) aged between 18 and 30 was analyzed using snowball sampling. The study utilized the Bergen Social Media Addiction Scale, the Doomscrolling Scale, and the Depression, Anxiety, and Stress Scale (DASS-21) with a structural equation model. Findings indicated a positive association between social media addiction, psychological distress, and doomscrolling. Moreover, doomscrolling was also associated with increased psychological distress. Importantly, the connection between SMA and psychological distress was mediated by doomscrolling, underscoring its role as an intermediary factor. These findings suggest that social media addiction contributes to psychological distress, with doomscrolling further intensifying this effect. The study highlights the need for interventions to reduce both social media addiction and doomscrolling behaviors. Raising awareness and encouraging healthier social media habits through educational programs and media campaigns are crucial to safeguarding mental health.

Keywords: Doomscrolling, social media addiction, psychological distress.

ÖZ: Sosyal medya bağımlılığı ile psikolojik stres arasında ilişki olduğu alan yazında belirtilmektedir. Bununla birlikte, sosyal medya bağımlılığının psikolojik strese tam olarak nasıl katkıda bulunduğunu anlama konusunda bir boşluk bulunmaktadır. Bu çalışma, sosyal medya bağımlılığı ile psikolojik stres arasındaki ilişkide felaket kaydırmasının aracılık rolünün incelemektedir. 2022-2023 eğitim- öğretim yılında kartopu örnekleme yoluyla yaşları 18 ila 30 arasında değişen 460 üniversite öğrencisinden (358 kadın-%78), 102 erkek- %22) oluşan bir örneklem analiz edilmiştir. Çalışmada Bergen Sosyal Medya Bağımlılığı Ölçeği, Doomscrolling Ölçeği, Depresyon, Kaygı, Stres Ölçeği (DASS-21) ile yapısal eşitlik modeli kullanılmıştır. Sonuçlar, sosyal medya bağımlılığının hem psikolojik stres hem de felaket kaydırması ile pozitif bağlantılı olduğunu göstermiştir. Ayrıca, felaket kaydırması da artan psikolojik stres ile ilişkilendirilmiştir. Daha da önemlisi, sosyal medya bağımlılığı ile psikolojik stres arasındaki bağlantıya felaket kaydırması aracılık etmiş ve sosyal medya bağımlılığının aracı bir faktör olarak rolünün altını çizmiştir. Bu bulgular, sosyal medya bağımlılığının psikolojik strese katkıda bulunduğunu ve felaket kaydırmasının bu etkiyi daha da yoğunlaştırdığını göstermektedir. Bu çalışma hem sosyal medya bağımlılığı hem de felaket kaydırması davranışlarını azaltmaya yönelik müdahalelere duyulan ihtiyacı vurgulamaktadır. Eğitim programları ve medya kampanyaları yoluyla farkındalığın artırılması ve daha sağlıklı sosyal medya alışkanlıklarının teşvik edilmesi, ruh sağlığının korunması için çok önemlidir.

Anahtar kelimeler: Felaket kaydırması, sosyal medya bağımlılığı, psikolojik stres.

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The Internet, which has become an essential tool in modern life due to advancements in communication technology and digital platforms, is now crucial for people of all age groups. With the user-friendly nature of the Internet, the global and national rates of Internet usage continue to rise annually. According to data from TUIK (2024), the Internet usage rate in Turkey increased from 87.1% in 2023 to 88.8% in 2024. Social media is one of the most popular platforms for Internet use (Schivinski et al., 2020). Social media is defined as web-based services that enable individuals to create public or semi-public profiles within large networks, allowing them to view and interact with their own connections as well as others within the system (Boyd & Ellison, 2007). Commonly used social media platforms include Facebook, Instagram, YouTube, Twitter, WhatsApp, and LinkedIn. These platforms offer users opportunities to communicate, form friendships, socialize, access information easily, and stay updated with news (Heo et al., 2015; Schivinski et al., 2020; Tifferet, 2020; Wang et al., 2019).

Social media is most commonly used by young adults, particularly university students aged 18 to 29 (Perrin, 2015). While these platforms offer benefits to young people, excessive use can also lead to negative consequences. In particular, the tendency to make social comparisons can increase feelings of inadequacy, body image issues, and depressive symptoms in individuals (Appel et al., 2016). Furthermore, the constant stream of notifications can lead to distractions and decreased productivity, while the replacement of offline social interactions with digital interactions can intensify feelings of social isolation (Twenge et al., 2018). At the forefront of these negative effects is addiction. Prolonged and uncontrolled use of social media can result in addiction, neglect of real-life relationships, and difficulties in managing time. This phenomenon is referred to as Social Media Addiction (SMA) in the literature (Kuss & Griffiths, 2017). SMA is classified as a behavioral addiction and is characterized by several symptoms. Individuals affected by SMA tend to spend more time on social media than initially intended, with their usage gradually increasing. Additionally, social media is often used as a means of escaping negative emotions or personal issues. When unable to access social media, individuals may feel sad, anxious, or irritable. Excessive social media use can lead to both mental and physical health problems, as well as strained relationships with others. Furthermore, people often spend excessive time on social media or are mentally consumed by the content on these platforms (Griffiths, 2005; Griffiths, 2013; Twenge et al., 2018).

Social media addiction (SMA) may lead young people to develop a constant desire to keep up with ever-changing content. As social media platforms provide fast communication and continuously updated information, users tend to spend increasing amounts of time on these apps. This is especially true during extraordinary events such as disasters, crises, terrorism, and pandemics, when individuals tend to stay more connected and follow news updates more frequently (Price et al., 2022). During the recent Covid-19 pandemic and the earthquake in Kahramanmaraş, Turkey on February 6, 2023, it was observed that people spent significantly more time on social media, continuously tracking the news. This behavior is known as "doomscrolling" in the literature (Anlı, 2023; Satıcı et al., 2023), which refers to the compulsive habit of endlessly scrolling through negative news content on social media (Jennings, 2020; Sharma et al., 2022). It is noteworthy that recent studies on doomscrolling are mostly conducted during the pandemic period (Covid-19) (Ytre-Arne & Moe, 2021). During

the pandemic, people's living conditions changed due to the closure of schools and workplaces, and they became dependent on staying at home (Galea et al., 2020). During this period, news feeds on social media further increased the need to be informed and made it easier to stick to negative news more than usual (Sharma et al. 2022).

Individuals may also need to follow social media more frequently during natural disasters or crises such as storms, floods, and earthquakes (Spence et al., 2007). Misleading, inaccurate, or exaggerated information and erroneous news about disasters on social media may also come to the agenda and cause the event to be perceived more negatively. For young people who are involved in SMA, such events may increase their disaster-swiping behavior. Existing studies on doomscrolling have also indicated a relationship between SMA and doomscrolling (Fergen et al., 2021; Price et al., 2022; Satici et al., 2023). These studies stated that social media is used more frequently during doomscrolling and that doomscrolling may increase due to SMA.

The exposure to negative content during doomscrolling significantly impacts the psychological well-being of young individuals. The constant exposure to disaster-related news on social media platforms results in a decline in the mood and emotional well-being of users (Baker & Algorta, 2016). Consequently, heightened levels of depression and anxiety are likely to accompany the experience of psychological distress. Psychological distress, as described by Ridner (2003), refers to an intensely uncomfortable emotional state triggered by specific stressors or demands, resulting in temporary or lasting harm to oneself. This condition is frequently associated with symptoms commonly seen in depression, such as a loss of interest, sadness, and feelings of hopelessness, as well as anxiety-related symptoms like restlessness and tension (Mirowsky & Ross, 2002). A study by Wathélet et al. (2020) suggests that individuals who spend excessive time-consuming news on social media experience higher levels of psychological stress, including symptoms of distress, anxiety, and depression. These symptoms manifest in various ways, such as difficulty initiating sleep, poor sleep quality, decreased appetite, diminished interest in activities, and reduced motivation to perform daily tasks (Watercutter, 2020). Shabahang et al. (2024) examined the "doomscrolling" habits of a total of 800 university students from the US and Iran in terms of existential anxiety, pessimism about human nature, and distrust of people. A significant relationship was found between high levels of doomscrolling and existential anxiety among participants. Taskin et al. (2024) used structural equation modeling on 400 Turkish adults to evaluate the relationship between doomscrolling and mental well-being. According to the results, excessive consumption of negative content has negative effects on an individual's mental health by reducing mindfulness and triggering secondary traumatic stress. In essence, engaging in doomscrolling through social media platforms not only induces psychological distress but also undermines both the psychological and physiological health of individuals.

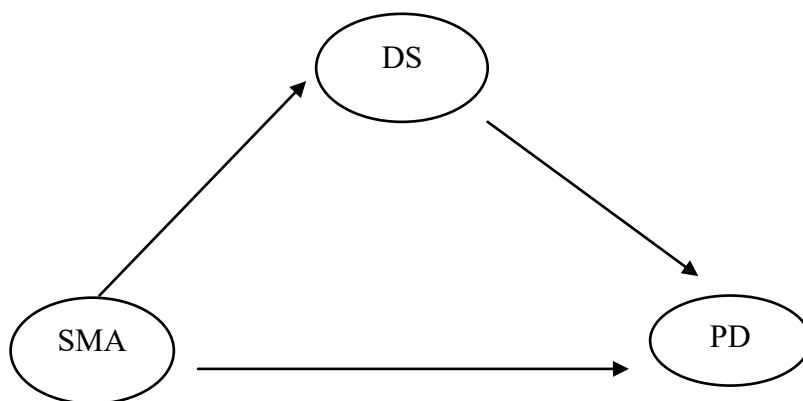
The interconnection among SMA, doomscrolling, and psychological distress is evident. It can be argued that doomscrolling acts as a mediator between SMA and psychological distress. As young individuals frequently engage with social media to stay updated on news, they encounter numerous pessimistic news stories that amplify feelings of anxiety, worry, depression, uncertainty, and panic. In this case, the time spent on social media causes both individuals to experience negative emotions and to try to cope with stress (Park et al., 2020). In essence, doomscrolling serves as a factor

influencing both SMA and psychological distress. University students are important architects of education and the future. When they graduate, they will touch the lives of many people in the institutions where they will work. Recent studies also indicate that social media addiction among young people has increased significantly (Ayaz & Barış, 2024; Kolhar, 2021). For this reason, it is one of the duties of university educators to encourage young people to use social media consciously and to protect their mental health. Studies show that university students suffer from mental disorders such as depression and anxiety (Koç & Polat, 2006; Polat Olca, 2023). However, there are limitations in studies on the factors that trigger these disorders. For this reason, investigating the triggering factors will also guide university educators.

While existing studies have individually examined the concepts of social media addiction, doomscrolling, and psychological distress, few have explored how these variables interact within a single model, particularly among university students. This study distinguishes itself from prior research by investigating the mediating role of doomscrolling in the relationship between SMA and psychological distress. Unlike previous studies that often focused on the effects of doomscrolling during the COVID-19 pandemic (e.g., Ytre-Arne & Moe, 2021; Sharma et al., 2022), this research expands the scope by addressing post-pandemic patterns and including recent sociocultural events (e.g., natural disasters) as contextual factors. Moreover, by targeting university students—a population increasingly vulnerable to digital stressors and psychological challenges—the study provides timely insights for both academic and mental health interventions. Therefore, this research contributes a comprehensive and current understanding of how digital behaviors impact young adults' psychological well-being.

The investigation into the mediating role of doomscrolling is pivotal not only for grasping a novel concept but also for comprehending its ramifications. Moreover, it is anticipated that the findings will guide the creation of interventions aimed at tackling SMA and doomscrolling. The study is expected to provide educational benefits to students in terms of adding courses that prevent social media addiction to university programs and supporting studies to protect mental health. As such, this study endeavors to scrutinize the correlation among SMA, doomscrolling, and psychological distress among university students. Additionally, the study seeks to delve into the mediating function of doomscrolling in the nexus between SMA and psychological distress. The hypotheses of the study are delineated below, accompanied by a hypothetical model depicted in Figure 1.

Figure 1
Hypothetical Model Regarding the Mediating Role



Note. SMA; Social Media Addiction, DS; Doomscrolling, PD; Psychological Distress.

The hypotheses for the study are as follows:

1. There is a positive relationship between SMA and psychological distress.
2. SMA positively predicts the occurrence of doomscrolling.
3. Doomscrolling is positively associated with psychological distress.
4. Doomscrolling serves as a mediator in the relationship between SMA and psychological distress.

Method

Design

In line with the purpose of the study, a quantitative research design employing a correlational model was used, as it enables the examination of relationships among multiple psychological constructs without manipulating any variables. Structural Equation Modeling (SEM) was applied to test both direct and indirect relationships among variables, offering a comprehensive approach to assess complex mediational pathways. Specifically, SEM was utilized to examine whether doomscrolling mediates the association between SMA and psychological distress. This approach was chosen due to its ability to estimate measurement errors and provide goodness-of-fit indices, thereby strengthening the validity of the hypothesized model. The mediating role of doomscrolling was theoretically grounded in existing literature suggesting that excessive social media use may lead to maladaptive scrolling behaviors, which in turn contribute to increased emotional distress.

Participants

The sample size for this study was calculated using G*Power (Faul et al., 2007). There should be at least 390 participants to exhibit an effect size between small and medium, where there are two estimated variables ($f^2=0.04$, $1-\beta= 0.95$, $\alpha = 0.05$). Snowball sampling was used to select the participants. A web-based survey was utilized to recruit a total of 460 participants, comprising 358 females (78%) and 102 males (22%). These participants were selected from 71 out of 81 cities in Turkey. The participants were university students aged between 18 and 30 years, with a mean age of

21.53 years (SD=2.43). Of the students, 105 (23 %) were studying in 1st grade, 143 (31%) in 2nd grade, 117 (25%) in 3rd grade, and 95 (21%) in 4th grade. Participants stated that 23 (5%) of them used social media for 0-1 hour, 156 (34%) for 2-3 hours, 187 (41%) for 4-5 hours, 61 (13%) for 6-7 hours and 33 (7%) for 8+ hours.

Measures

Bergen SMA Scale (BSMAS)

The BSMAS was originally developed by Andreassen et al. (2017) and later adapted into Turkish by Demir (2019). This scale utilizes a 5-point Likert-type format, where participants rate items from 1 (very rarely) to 5 (very often). It was applied to measure Problematic Social Media Use (PSMU). The scale comprises six items within a single dimension (e.g., "Has using social media too much affected your work/studies negatively?"). No items were reverse-coded. The factor loadings for the scale ranged from 0.43 to 0.90. Demir (2019) reported that the Turkish version of the BSMAS demonstrated a unidimensional structure with satisfactory fit indices: $\chi^2=10.80$, $df=9$, SRMR=0.03; CFI=0.99; TLI=0.99; RMSEA=0.04.

Doomscrolling Scale (DS)

The Doomscrolling Scale (DS) was initially developed by Sharma (2022) and later adapted into Turkish by Satıcı et al. (2023). The scale employs a 7-point Likert-type format, where participants indicate their level of agreement with statements, ranging from 1 (strongly disagree) to 7 (strongly agree). In this study, the short form of the scale, which consists of a single dimension and does not include reverse-coded items, was used. Psychometric analyses were conducted for both the 15-item long form and the 4-item short form, with the short form selected for use in the study (e.g., "When I read bad news on social media, I don't realize how time flies."). The factor loadings for the short form ranged from 0.63 to 0.84. Satıcı et al. (2023) reported that the unidimensional structure of the short form of the scale demonstrated acceptable fit indices: $\chi^2=28.78$, CFI=0.95, NFI=0.94, IFI=0.95, and SRMR=0.04.

Depression Anxiety Stress Scales-21 (DASS-21)

The scale was originally developed by Henry and Crawford (2005) and later adapted into Turkish by Yilmaz et al. (2017). It uses a 4-point Likert-type format, where participants rate their level of agreement with statements on a scale from 0 (not suitable for me at all) to 3 (suitable for me completely). Higher scores reflect higher levels of psychological distress. The scale includes 21 items across three dimensions: depression, anxiety, and stress (e.g., "I had difficulty relaxing"). Yilmaz et al. (2017) reported that the Turkish version of the DASS-21 demonstrated acceptable fit indices, including GFI=0.985, RMR=0.028, AGFI=0.982, and NFI=0.979. The scale contains no reverse coded items, and factor loadings ranged between 0.41 and 0.81.

Procedure

The research data were gathered during the spring semester of the 2022-2023 academic years. A survey was created using Google Forms and shared through various social media platforms, including WhatsApp, Instagram, and Facebook. Participants were invited to complete the survey and encouraged to forward the link to others,

helping to reach individuals from different provinces. The survey ensured the confidentiality of personal data, and informed consent was obtained from all participants, who were also informed that they could withdraw from the study at any time. The online survey was designed so that all questions could be answered to ensure completion. Additionally, this study adhered to the ethical guidelines set forth in the Declaration of Helsinki, and approval was granted by the ethics committee of the university with which the principal investigator was affiliated.

Data Analysis

The multivariate statistical assumptions were tested first. The Mahalanobis distance ranged from 0.01 to 11.42, meeting the criterion set by Leys et al. (2018), indicating that this value is less than 15. Skewness values ranged from 0.08 to 1.52, and kurtosis values ranged from -0.69 to 0.55. These values ensure that the distribution is within the range of +1.5 and -1.5, as recommended by Tabachnick and Fidell (2001), indicating approximate normality.

Additionally, the reliability coefficients for McDonald's omega (ω), Cronbach's alpha (α), and Guttman's lambda (λ_6) for the variables were all above 0.70, indicating strong internal consistency. For convergent and discriminant validity, AVE > 0.05, CR > 0.07, and CR > AVE are required (Hair et al., 2014). In this study, CR is between 0.86 and 0.91, AVE is between 0.51 and 0.72, and CR value was found to be greater than AVE value in all variables (See Table 1). VIF below 10, tolerance above 0.10, multiple linearity problem, and Durbin-Watson between 1 and 3 are required to determine the correlation between residuals (Field, 2016). In this research, VIF is 1.12, tolerance is 0.88 and Durbin-Watson value is 1.81. Herman's single-factor test cutoff score for the absence of a common method bias problem should be less than 50% (Podsakoff et al., 2003). The cut-off score for this test was 43.82%. After all assumptions were met, Structural Equation Modeling (SEM) was performed.

In this study, the Structural Equation Modeling (SEM) analysis was conducted in two stages following the approach outlined by Anderson and Gerbing (1988). The first stage involved establishing the measurement model, while the second stage involved testing the structural model. Age and gender were included in the analysis as control variables. When assessing the fit of the model, Hu and Bentler's (1999) cutoff criteria for fit indexes were employed. The model fit was considered satisfactory if it met the following criteria: $3 < \chi^2/df < 5$, RMSEA < 0.08, SRMR < 0.08, TLI > 0.90, GFI > 0.90, CFI > 0.90, and AGFI > 0.90. Additionally, confidence intervals were tested using bootstrapping with 5000 resampling iterations. A result was considered significant if the confidence interval did not contain zero.

The analyses were conducted using various statistical software packages including SPSS 23, JASP 0.16, SmartPLS 3, and AMOS 23. These packages were utilized to ensure robustness and accuracy in the analysis procedures.

Ethical Procedures

All studies conducted as part of this research adhered to the principles outlined in the Helsinki Declaration of 1975, as revised in 2000. Approval for the studies was obtained from the Artvin Çoruh University Scientific Research and Ethical Review Board (E-18457941-050.99-87334/11.12.2023).

Results

Descriptive Statistics

Pearson correlation analysis was conducted to examine the relationships among SMA, doomscrolling, and psychological distress. The variables in the study exhibited positive correlations with each other, as shown in Table 1. Specifically:

- SMA was positively correlated with both doomscrolling ($r = 0.34$, $p < 0.01$) and psychological distress ($r = 0.40$, $p < 0.01$).
- Doomscrolling was positively correlated with psychological distress ($r = 0.49$, $p < 0.01$).

Table 1

Descriptive Statistics and Correlation Values of the Variables

Variable	Mean(SD)	Skewness	Kurtosis	α	ω	λ_6	CR	AVE	1	2	3
1. SMA	16.63(5.05)	0.08	-0.69	0.81	0.80	0.79	0.86	0.51	-		
2. DS	10.10(6.03)	1.13	0.59	0.87	0.87	0.86	0.96	0.58	0.34**	-	
3. PD	22.35(16.52)	0.52	-0.55	0.96	0.97	0.98	0.91	0.72	0.40**	0.49**	-

Note. ** $p < .001$, SMA; Social Media Addiction, DS; Doomscrolling, PD; Psychological Distress.

Measurement Model

The measurement model in this study comprises three latent variables: SMA (items PSMU1-PSMU6), doomscrolling (items DM1-DM4), and psychological distress (including anxiety, depression, and stress dimensions). The model fit statistics for the measurement model were found to be within the acceptable range, with $\chi^2/df = 2.46$, CFI = 0.97, GFI = 0.95, AGFI = 0.93, TLI = 0.96, RMSEA = 0.05, and SRMR = 0.04. Furthermore, the standardized factor loadings ranged from 0.58 to 0.93, indicating that the items were adequately associated with their respective latent variables.

Structural Model

Several alternative models were tested to identify the most suitable structural model. In Model A, the sequence doomscrolling $\rightarrow$ SMA $\rightarrow$ psychological distress was tested, explaining 33% of the dependent variable. Model B, which tested the sequence psychological distress $\rightarrow$ doomscrolling $\rightarrow$ SMA, explained 22% of the dependent variable. Model C, testing psychological distress $\rightarrow$ SMA $\rightarrow$ doomscrolling, explained 26% of the dependent variable. Model D, which examined doomscrolling $\rightarrow$ psychological distress $\rightarrow$ SMA, explained 23% of the dependent variable. In Model E, the sequence SMA $\rightarrow$ doomscrolling $\rightarrow$ psychological distress was tested, explaining 34% of the dependent variable. Lastly, Model F tested SMA $\rightarrow$ psychological distress $\rightarrow$ doomscrolling, explaining 27% of the dependent variable. Of all the alternative models, Model E was selected as the structural model due to its highest explanatory power and theoretical support. While multiple models were explored, Model E was not selected solely based on statistical superiority. Its structure is also supported by prior theoretical and empirical research indicating that SMA leads to increased doomscrolling, which in turn contributes to psychological distress (Fergen et al., 2021;

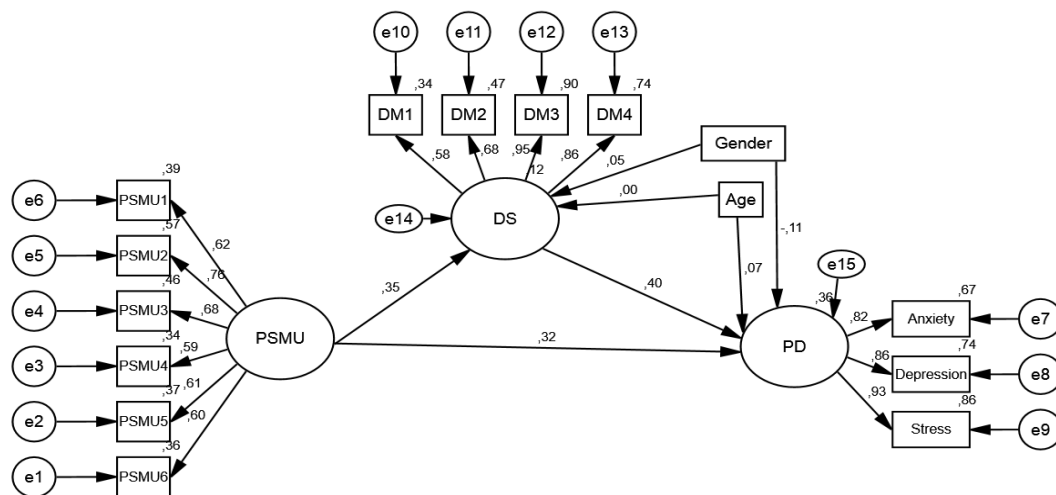
Sharma et al., 2022). Therefore, the final model reflects both theoretical rationale and empirical fit.

In the structural model analysis (see Figure 2), gender and age were included as control variables. Gender and age were included as control variables to account for their potential confounding effects on the relationships among the main variables. Previous studies have shown that social media usage patterns, addiction levels, and psychological distress may vary by gender and age (e.g., Keles et al., 2020; Twenge et al., 2018). Controlling for these demographic factors helps ensure that the observed associations are not spuriously influenced by differences in gender or age.

The results revealed significant total and direct effects of SMA on psychological distress, with $\beta = 0.45$ ($p < 0.01$) for the total effect and $\beta = 0.32$ ($p < 0.01$) for the direct effect. Additionally, SMA was found to have a direct effect on doomscrolling ($\beta = 0.35$, $p < 0.01$).

Figure 2

Structural Model for the Mediating Role



Note. PSMU/SMA; Social Media Addiction, DS; Doomscrolling, PD; Psychological Distress

Furthermore, the direct effect of doomscrolling on psychological distress was significant ($\beta = 0.40$, $p < 0.01$). Importantly, doomscrolling was identified as mediating the relationship between SMA and psychological distress, with $\beta = 0.14$ and a 95% confidence interval of [0.09, 0.19] (see Table 2). The model fit statistics for the structural model were deemed acceptable, with $\chi^2/df = 2.08$, CFI = 0.97, GFI = 0.95, AGFI = 0.93, TLI = 0.96, RMSEA = 0.05, and SRMR = 0.04.

Table 2

Total, Direct and Indirect Effect of Social Media Addiction on Psychological Distress

Pathway	B	SE	Coefficient	Lower Bound	Upper Bound
SMA→ PD (Total effect)	0.40		0.45	0.36	0.54
Direct effect					
SMA→ PD	0.28	0.05	0.32	0.21	0.42
SMA→ DS	0.46	0.08	0.35	0.24	0.44
Indirect effect					
SMA→ DS→ PD	0.12		0.14	0.09	0.19

Note. SMA; Social Media Addiction, DS; Doomscrolling, PD; Psychological Distress.

Discussion and Conclusion

The primary aim of this study was to examine the mediating role of doomscrolling in the relationship between social media addiction and psychological distress among university students. The findings revealed that excessive and uncontrolled social media use, as seen in SMA, has a detrimental impact on young individuals. Additionally, compulsive engagement with negative news on social media, referred to as doomscrolling, was shown to worsen psychological distress, contributing to mental health problems such as stress, anxiety, and depression. The study provides valuable insights into the complex relationship between SMA, doomscrolling, and psychological distress among university students. Notably, it highlighted doomscrolling's role as a mediator in the connection between SMA and psychological distress. These results align with existing research and emphasize the need to address problematic social media use and doomscrolling to protect young people's mental health. In conclusion, the study enhances our understanding of the negative effects of SMA and doomscrolling on university students' mental health.

The findings of the study confirmed the first hypothesis, indicating that SMA positively predicts psychological distress. SMA refers to a condition where individuals struggle with managing their time on social media platforms and experience negative impacts on various aspects of their lives, including social relationships and academic or occupational environments (Kuss & Griffiths, 2017). Numerous studies support the notion that SMA has detrimental effects on psychological health. For instance, Kircaburun and Griffiths (2018) reported associations between SMA and psychological issues such as depression, anxiety, loneliness, and low self-esteem. Huang (2022) identified a link between SMA and heightened stress levels, which in turn negatively impact psychological well-being. Additionally, Şahin, Türk, and Hamamcı (2022) found a positive association between SMA and stress and anxiety. Additionally, Keles, McCrae, and Grealish (2020) categorized SMA into four distinct areas: time usage, activities, investment, and addiction. Their research revealed that each of these areas was linked to depression, anxiety, and psychological distress, emphasizing the negative impact of SMA on mental well-being.

The findings of Demirci (2019) indicating that SMA positively predicts anxiety and depression are consistent with the results of the current study. Moreover, several other studies have also demonstrated a relationship between SMA and psychological distress, including depression, stress, and anxiety (Balcı & Baloglu, 2018; Bilge et al., 2020; Karadağ & Akçınar, 2019; Lin et al., 2020; Thorisdottira et al., 2020; Shensa et

al., 2017; Stronge et al., 2019). These findings support the notion that problematic use of social media can have detrimental effects on psychological health, leading to increased levels of stress, anxiety, and depression.

However, there are also studies that present conflicting results. For instance, Asibong et al. (2020) observed high levels of psychological distress among university students, particularly among those less dependent or not dependent on social networks, suggesting that SMA may not always be the sole contributor to psychological distress. Similarly, Chang et al. (2022) found no significant difference in anxiety levels between students with varying degrees of SMA in their longitudinal study.

Although findings vary, the overall research highlights a connection between SMA and psychological distress. It indicates that excessive social media usage can jeopardize students' mental health, potentially leading to conditions like stress, anxiety, and depression. Consequently, raising awareness about balanced social media practices and offering guidance on managing its use may serve as effective measures to tackle mental health challenges in young people.

The study confirmed the second hypothesis, demonstrating that SMA positively predicts doomscrolling. Existing research supports this finding by highlighting the relationship between doomscrolling and SMA. For instance, Pennycook et al. (2019) found that individuals prone to SMA are more likely to be exposed to disaster news, leading to increased stress levels. Similarly, Satici et al. (2023) identified an association between doomscrolling and SMA. In a longitudinal study conducted on adolescents (Akat & Hamarta, 2025), it was similarly reported that there was a positive relationship between SMA and doomscrolling. Furthermore, research indicates that doomscrolling might play a role in the emergence of SMA. According to Lee et al. (2020), frequent exposure to negative news and the compulsion to seek out such content can lead individuals to spend extended periods on social media. This behavior may elevate their likelihood of developing SMA and encountering psychological distress. While there is ample evidence supporting the relationship between SMA and doomscrolling, no studies have shown a lack of relationship between these variables. Thus, it can be inferred that there is indeed a relationship between SMA and doomscrolling, and this association negatively impacts psychological health.

Furthermore, the study's third hypothesis, which posited that doomscrolling positively predicts psychological distress, was also confirmed. Research during the Covid-19 pandemic has shown a positive relationship between doomscrolling and anxiety levels and psychological distress (Anand et al., 2021; Xiao et al., 2020). Shabahang et al. (2023) found that doomscrolling is linked to mental health, depression and stress in their study in Iran. Buchanan et al. (2021) also stated that exposure to negative news content on social media causes negative emotional consequences. Continuous exposure to negative news content can elevate stress levels and contribute to the development of psychological health issues.

In summary, the study's findings align with existing literature, highlighting the interrelatedness between SMA, doomscrolling, and psychological distress. Continuous exposure to negative news on social media platforms can exacerbate stress levels and contribute to psychological health problems.

The study validated the fourth hypothesis, showing that doomscrolling mediated the relationship between SMA and psychological distress. Although the mediating effect involving these three variables has not been directly examined, existing research supports their interconnectedness. For instance, Satıcı et al. (2023) identified a positive association between doomscrolling and SMA, with psychological distress mediating the link between doomscrolling and well-being. Similarly, Ytre-Arne and Moe (2021) observed an increase in doomscrolling during the Covid-19 pandemic due to heightened news consumption on social media, which negatively affected individuals' mental health. Sharma et al. (2022) also highlighted the close connection between doomscrolling, problematic internet and social media use, anxiety, poor self-regulation, and various personality traits. Price et al. (2022) stated that increased social media use during the Covid-19 period led to doomscrolling and as a result, disorders such as depression and post-traumatic stress disorder increased. In the scale development study conducted by Soraci et al. (2025), doomscrolling was found to be associated with both SMA and mental health. Moreover, Buchanan et al. (2021) suggested that consuming negative news on social media leads to adverse emotional outcomes. These findings imply that SMA may provoke doomscrolling, resulting in emotional distress among students. Conversely, doomscrolling could amplify both SMA and psychological distress, underscoring its mediating role and the risks it poses to students' social media use and mental health.

In summary, while there may not be direct evidence of the mediation effect of all three variables, the existing literature supports the notion that SMA, doomscrolling, and psychological distress are interconnected, with each potentially influencing the others in a complex manner.

This study is original in testing a mediation model that has not been previously explored, offering a meaningful contribution to the existing literature. The findings reveal that young people often engage with social media in an unconscious and problematic manner. Therefore, it is crucial to raise awareness among young individuals about managing their social media usage effectively, developing balanced content consumption habits, and establishing healthy boundaries. In this context, it is recommended that universities undertake initiatives and programs focused on promoting the healthy and mindful use of social media. Students from faculties of communication (Journalism, Public Relations and Publicity, Radio, Television and Cinema) or students from faculties of education and young people from other faculties can come together. Or university professors in those departments can inform the students. In faculties of education, elective courses can be added to students to prevent social media addiction. Considering the mediating role of doomscrolling between SMA and psychological distress, seminars can be held for young people on topics such as limiting the news sites followed in the media and becoming healthy media literate. With regard to the relationship between psychological disorders such as depression, anxiety and stress and SMA and doomscrolling, elective courses can be added to universities on topics such as stress and anxiety management and the protection of psychological health. Professors of Psychological Counseling and Guidance and Psychology departments of universities can organize informative seminars on related topics.

Implications

This study has several limitations that should be acknowledged. Firstly, the sample was limited to university students from various provinces in Turkey. To gain a broader perspective, future research could include more diverse groups, such as middle or high school students, to examine the relationship between SMA, doomscrolling, and psychological distress across different age ranges.

Secondly, the use of convenience and snowball sampling methods may reduce the generalizability of the findings to the wider population. Employing more rigorous sampling methods, such as proportional stratified or systematic sampling, in future studies could yield more representative samples and improve the external validity of the results.

Thirdly, the study's cross-sectional design limits the ability to infer causal relationships among the variables. Future research could adopt longitudinal or qualitative approaches to better understand the evolving dynamics between SMA, doomscrolling, and psychological distress over time, offering richer insights into these interactions.

Finally, a meta-analysis could provide valuable insights into the association between SMA and specific psychological disorders, such as depression, anxiety, and loneliness. By integrating results from various studies, a meta-analysis could offer a more nuanced understanding of the strength and direction of these relationships.

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Statement of Responsibility

The entire study was conducted by the corresponding author.

Conflicts of Interest

There is no conflict of interest in this study.

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Investigation of the Learning and Teaching Processes of the Primary School Pre-service Teachers with High and Low 21st Century Teaching Skills *

21. Yüzyıl Öğreten Becerileri Yüksek ve Düşük Olan Sınıf Öğretmeni Adaylarının Öğrenme Öğretme Süreçlerinin İncelenmesi

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ABSTRACT: The aim of this study is to examine the learning and teaching processes of primary school pre-service teachers with high and low 21st century teaching skills. The study group of the study, in which the qualitative research method was used, consists of eight primary school pre-service teachers studying in the last year of a XXX University Education Faculty. The 21st Century Teaching Skills Scale was applied to determine the pre-service teachers in the study group and the assessments of the participants of the teaching practice courses of the group were consulted. The data sources of the research are consist of the lesson plans and online lesson records created by each pre-service teacher in the study group. The data obtained in the study were analysed by content analysis. As a result of the study, it was determined that the primary school pre-service teachers with high 21st century teaching skills prepared their lesson plans in more detail and were better equipped in terms of activities, materials, techniques and strategies. In addition, it was determined that these pre-service teachers exhibited more effective behaviours in terms of classroom management and communication, and preferred to use teaching activities and assessment activities by diversifying them.

Keywords: 21st century teaching skills, learning teaching process, primary school pre-service teacher.

ÖZ: Bu araştırmanın amacı 21. yüzyıl öğrenen becerileri yüksek ve düşük sınıf öğretmeni adaylarının öğrenme öğretme süreçlerini incelemektir. Nitel araştırma yönteminin kullanıldığı araştırmanın çalışma grubunu XXX Üniversitesi Eğitim Fakültesi son sınıfta öğrenim gören sekiz sınıf öğretmeni adayı oluşturmaktadır. Çalışma grubunda yer alan öğretmen adaylarının belirlenmesi için “21.Yüzyıl Öğreten Becerileri Ölçeği” uygulanmış ve belirlenen grubun öğretmenlik uygulaması derslerini yürüten öğretim üyelerinin öğretmen adaylarının 21. yüzyıl öğrenen becerileri yeterliklerine ilişkin değerlendirmelerine başvurulmuştur. Araştırmanın veri kaynaklarını, çalışma grubunda yer alan her bir öğretmen adayının oluşturduğu ders planları ve uzaktan eğitim ders kayıtları oluşturmaktadır. Araştırmada elde edilen veriler içerik analizine tabi tutulmuştur. Araştırma sonucunda 21.yüzyıl öğrenen becerileri yüksek sınıf öğretmeni adaylarının ders planlarını daha ayrıntılı hazırladıkları, etkinlik, materyal, teknik ve strateji kullanımı açısından daha donanımlı oldukları tespit edilmiştir. Ayrıca bu öğretmen adaylarının sınıf yönetimi ve iletişim bakımından daha etkili davranışlar sergiledikleri, öğretim faaliyetlerini ve ölçme değerlendirme etkinliklerini çeşitlendirerek kullanmayı tercih ettikleri belirlenmiştir.

Anahtar kelimeler: 21.yüzyıl öğrenen becerileri, öğrenme öğretme süreci, sınıf öğretmeni adayı.

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Developments in science and technology and globalisation cause changes in the field of education as in every field of life. This change covers various phenomena from the physical and technological equipment of educational institutions to the competences of educators. This change is also reflected in the skills aimed to be developed in students and the roles of teachers and students. In other words, in today's world where the information and technology age is experienced, the perspective on many phenomena related to education has changed.

In addition to basic skills such as adapting to the changes that occur, catching up with technology, obtaining information by selecting, analysing and evaluating information among the masses of rapidly produced information, using the obtained information in daily life and transforming it into products, having higher order thinking skills and competencies makes it easier for the individual to keep up with the age (Aygün et al., 2016). These skills and competences can be defined as 21st century skills. Many studies and projects have been carried out to define 21st century skills.

Assesment & Teaching of 21st Century Skills (ACTS 21), North Central Regional Educational Laboratory (NCREL), International Society for Technology in Education (ISTE), Partnership for 21st Century Learning (P21), Organization for Economic Co-operation & Development (OECD), European Commission (EC), and Asia-Pacific Economic Cooperation (APEC) classified them in different ways. However, some skills are common and prominent in all these frameworks. These include new skills of literacy such as information, digital media literacies. In addition, creativity and productivity, problem solving, critical thinking, effective communication, collaborative working, social & cultural skills, and learning to learn are among these skills (APEC, 2008; EC, 2018; Griffin & Care, 2014; Metiri Group & NCREL, 2003; NETS/ISTE, 2016; OECD, 2005; P21, 2009b).

Individuals can acquire competences and skills appropriate to the requirements of the age only through education. In order to achieve this, qualified curricula and competent teachers are needed. In this context, 21st century skills have become a key focus of education reforms globally, with many countries incorporating them into their curricula. (Adamson & Darling-Hammond, 2015; MoNE Ontario, 2010; MoNE Singapore 2010; Gelen, 2017; OECD, 2010; Søreide et al., 2021; Sabag & Cohen, 2022; Griffin et al., 2012; Martinez, 2022; TTKB, 2017).

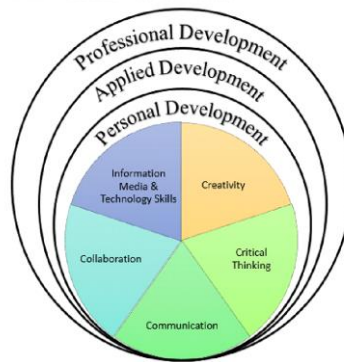
However, renewal of curricula is not enough to equip students with the competencies and skills appropriate to the requirements of the new era. Teacher competences are also an extremely important element in ensuring this. Because teachers play a vital role in improving the quality of education, especially in addressing the challenges of global change in the 21st century (Utami & Hasanah, 2020). In this context, 21st century teachers are expected not only to provide learners with content and assess them, but also to be able to carry out learning-teaching processes in a way that enables action oriented, learner-centered, and transformative learning (UNESCO, 2017; UNESCO, 2020). In fact, 21st century teachers' competencies related to attitude and behaviour such as being a guide, having interpersonal communication skills, knowing student characteristics are more important than professional knowledge such as classroom management, content knowledge, and pedagogical content knowledge (Tingil, et al., 2023). It is also important for teachers to develop communication skills, collaboration, creative and innovative practices and information & communication

technology (ICT) literacy to foster interactive learning and, ultimately, enhance the quality of teaching (Hatlevik, 2016; Omar & Ismail, 2020; Palmer, 2015; Sulaiman & Ismail, 2020; Van Laar et al., 2017).

In this context, Saavedra and Opfer (2012) stated that 21st century teachers should employ nine key principles in their teaching and learning processes. These include making learning relevant, teaching through the disciplines, and developing students' thinking skills. Teachers should also encourage learning transfer and teach students how to learn by promoting metacognitive strategies. Addressing misunderstandings directly is essential to ensure accurate comprehension. Additionally, educators should treat teamwork as a valuable outcome, exploit technology to support learning, and foster creativity to prepare students for the demands of the modern world.

Urbani et al., (2017) also pointed out that creative thinking, critical thinking, collaboration, communication, and information, media and technology skills of 21st century teachers should be developed through teacher education programmes and presented the model in Figure 1.

Figure 1: Model for developing 21st century skills in teacher education programs



(Urbani et al., 2017).

This model proposes developing the targeted skills through three stages. **Personal Development:** Building preservice teachers' capacity to understand and apply these skills in various contexts beyond educational settings. **Applied Development:** Expanding individual capacity while fostering skill development in students during supervised teaching fieldwork. **Professional Development:** Continuously enhancing these skills when working with students, colleagues, parents, and administrators as in-service teachers.

Beside this model Orhan Göksun & Kurt (2017) examined the level of pre-service teachers' use of 21st century teaching skills in five dimensions and defined these dimensions as 'managerial skills'; 'technopedagogical skills'; 'affirmative skills', 'flexible teaching skills' and 'generative skills'. Managerial skills refer to pre-service teachers' skills such as classroom management, process and activity management, assignments and assessments. Technopedagogical skills refer to the skills that emerge when technology and pedagogical skills are employed together. Affirmative skills are defined as the display of approaches that affirm targetted behaviours by transforming them into teaching skills. Flexible teaching skills refer to the skills that make teaching independent from the classroom environment. Generative skills refer to the material,

activity and assessment tolls production skills of pre-service teachers (Orhan Göksun, 2016).

When all these studies are examined, it is seen that 21st century teachers are expected to structure the learning-teaching process based on action-oriented, learner-centered, transformative learning, collaborative. They are also expected to realize meaningful learning, to guide students in the learning process, and to develop students' higher order skills (HOT). Beside these 21st century teachers are expected to have interpersonal communication skills, generative skills, managerial skills, affirmative skills, flexible skills, technopedagogical competencies, and ICT literacy skills.

A review of the literature reveals that many studies focus on assessing the 21st century teaching skill levels of both teachers and preservice teachers (Aydemir et al., 2020; Demirtaş & Özer, 2007; Erten, 2022; Gürültü et al., 2019; İncik, 2020; Korkmaz, 2019; Kıyasoglu & Çeviker Ay, 2020; Kozikoğlu & Özcanlı, 2020; Murat, 2018; Nuhoglu & Seçkin, 2021; Orhan Göksün & Kurt, 2017; Özdemir, 2023). These studies revealed that the use of 21st century teaching skills by teachers and pre-service teachers was above the middle level. Additionally, when examining 21st century teaching skills based on gender, Orhan Göksün (2016) found a significant difference, with female teachers demonstrating higher skill levels. Murat (2018), Aydemir et al., (2020), Sulaiman and Ismail, (2020), and Erten (2022) determined that gender is not a variable that makes a difference in 21st century teaching skills. Valtonen et al. (2021) investigated how pre-service teachers' learning skills, collaboration dispositions, and ICT competencies evolved during their university education. As a result of the research, it was determined that while there was no significant change in the learning skills and collaboration dispositions of the pre-service teachers, their skills related to the use of ICT increased.

In summary, it is emphasised in the literature that teachers should have 21st century teaching skills in to improve the standard of education and to conduct more interactive and learner-centred studies (Hatlevik, 2016; Omar and Ismail, 2020; Sulaiman et al., 2020; UNESCO, 2017; Van et al., 2017). For this, it is necessary to focus on pedagogy and curricula that will ensure skill acquisition (Martinez, 2022). These programmes should also be learner-centred (Palmer, 2015). In this context, a learner-centred education model has been presented for the improvement of teachers' 21st century teaching skills (Urbani et al., 2017; Michaels et al., 2015). Various studies have explored teachers' proficiency in 21st century teaching skills. However, there is no research that provides concrete findings on how the presence or lack of 21st century teaching skills is reflected in the learning teaching process. In addition, today, there are many situations that make it compulsory to carry out education and training activities online. Examples of these situations are the Covid 19 pandemic and natural disasters such as earthquake and fire. The revolutionary developments in instructional technologies prepare a suitable ground for online education activities to be carried out online even outside of compulsory situations. This situation can be considered as an indicator of the potential for online education to become widespread in the future. In this context, the research is carried out with the aim of examining the online learning teaching processes of pre-service teachers with high and low competencies related to 21st century teaching skills and determining the differences, if any. The research is expected to provide results that will contribute to the teacher training system and current

practices and the research is considered valuable in this respect. The research questions are listed as:

1. How do pre-service primary school teachers with low and high levels of 21st century teaching skills plan the learning teaching process? Does their planning differ? If so how?
2. What kind of practices do pre-service primary school teachers with low and high level of 21st century teaching skills do in the online learning teaching process? Do these practices differ? If so how?

Methodology

Research Design

This research, which aims to examine the learning teaching processes of pre-service primary school teachers with high and low 21st century teaching skills levels, was designed as a comparative case study. Case studies are defined as a method in which one or more cases, environments, programmes or other interconnected systems are examined in depth (Christensen et al., 2015; Lester and Lochmiller, 2017; McMillan, 2000). This research design is employed to identify and analyze the details of a case, develop potential explanations for it, and conduct a comprehensive evaluation. (Büyüköztürk et al., 2016, p. 260). In comparative case studies, there are two or more cases. These situations are analysed in depth and compared to determine changes and similarities (Christensen et al., 2015). In this study, the research design was determined as a comparative case study since two groups of pre-service primary school teachers with high and low characteristics in terms of 21st century teaching skills were examined. In the study, in order to provide in-depth analysis, multidimensional data collection was employed and the lesson plans and course records of the participants were analysed.

Study Group

The participants of the study consisted of eight pre-service teachers with high (4) and low (4) 21st century teaching skills, who were determined by the outlier sampling technique, one of the purposeful sampling methods, at a state university in Türkiye. A two-stage process was followed while determining the participants. In the first stage, the '21st Century Teaching Skills' scale was applied to 43 pre-service teachers studying in the fourth grade of the primary teaching program (Orhan Göksun & Kurt, 2017). This five-point Likert-type scale consisting of 27 items has a five sub-dimensional structure called as 'managerial skills'; 'technopedagogical skills'; 'affirmative skills', 'flexible teaching skills' and 'generative skills'. The scale is graded as always (5) and never (1). The highest score that can be obtained from the scale is 135, and the lowest score is 27. The scores obtained as a result of the application of the scale were ranked from low to high, and the significant difference between the scores of the students from 11 low and 11 high groups corresponding to 27% of the participants was examined and a significant difference was found between the groups.

In the second stage, the lecturers who conducted the 'Teaching Practice' course of these pre-service teachers were asked to evaluate them in terms of 21st century teaching skills. In this context, the participants were observed in the context of 21st

century teaching skills such as communication, collaboration, ICT literacy, and HOTS. Also their studies, homework, presentations, and reports were analysed in the context of generative skills. After these processes, a total of eight pre-service teachers, four with the highest and four with the lowest characteristics in terms of 21st century teaching skills, were determined as the participants of the study. Afterwards, the participants were informed about the purpose of the research and that their personal information would be kept confidential. All of the eight participants were included in the study voluntarily. Pre-service teachers with high 21st century teaching skills were coded as H1, H2, H3 and H4, and those with low 21st century teaching skills were coded as L1, L2, L3 and L4. Table 1 presents the demographic characteristics of the pre-service teachers who constitute the study group.

Table 1

Demographic characteristics of the study group pre-service teachers

Participants	Scale Score	Gender	Observed Skills				
			Communication	Collaboration	ICT Literacy	Generative Skills	Evoke HOTS
H1	127	F	Higher	Higher	Higher	Higher	Higher
H2	126	F	Higher	Higher	Higher	Higher	Higher
H3	126	F	Higher	Higher	Higher	Higher	Higher
H4	125	F	Higher	Higher	Higher	Higher	Higher
L1	110	F	Lower	Lower	Lower	Lower	Lower
L2	109	F	Lower	Lower	Lower	Lower	Lower
L3	109	F	Lower	Lower	Lower	Lower	Lower
L4	108	M	Lower	Lower	Lower	Lower	Lower

As seen in the Table 1 the participants with high characteristics scored between 127-125 on the scale. The ones with low characteristics scored between 108-110. Study group consists of seven female, one male pre-service teachers. According to the scores obtained from the scale, pre-service teachers in the high group have higher skills in the context of 21st century teaching skills defined as ‘managerial skills’, ‘technopedagogical skills’, ‘affirming skills’, ‘flexible teaching skills’ and ‘generative skills’. In this context, pre-service teachers with high managerial skills have the ability to use student-centered, transformative learning skills, to awake HOTS in students, and to make qualified assignment and evaluation in learning and teaching processes. Pre-service teachers with high technopedagogical skills have ICT literacy skills in addition to using technology and pedagogical skills together. Pre-service teachers with high affirmative skills exhibit skills in exhibiting affirmative approaches by transforming targeted behaviors into teaching skills as well as interpersonal communication skills. Flexible teaching skills include skills for planning social and educational activities in out-of-class learning environments including action oriented activities. Out of class learning includes also online learning settings. Lastly generative skills include the skill of producing original materials, activities and assessment tools for lessons. In this context, the demonstration of this skill requires higher order thinking skills such as critical thinking and creative

thinking as well as technopedagogical skills. According to academicians' observation, candidates in this group have higher skills in terms of communication skills, collaboration, ICT literacy, evoking students' HOT skills and generativity. The pre-service teachers in the lower group are at a low level proficiency in terms of the mentioned skills. All participants were undergoing teaching practice training at a primary school with a middle socioeconomic level, located in the city center of Gaziantep, Türkiye.

Data Sources

In the study, lesson plans and observation (recorded online classes) were used as data sources to examine the practices of pre-service teachers with high and low 21st century teaching skills regarding the learning teaching process.

Lesson Plans

With the lesson plans, the aim was to gather in-depth information about how pre-service teachers with both characteristics plan their learning and teaching processes. In this context, four lesson plans of each pre-service teacher were analysed. These plans were the plans of the observed lessons and included Maths, Turkish, Social Studies, Science and Music lessons.

Recorded Online Classes

Observation according to the analysis framework based on MoNE Teaching Practice Assessment Form aimed to gather in-depth information on how preservice teachers demonstrated 21st century teaching skills in the learning and teaching process. This was achieved by examining their recorded instructional practices in a virtual classroom environment during teaching practice courses, with four lesson hours observed for each preservice teacher.

Data Collection Process

In the study, data were collected in the spring semester of the 2020-2021 academic year. During this period, online education is carried out due to the Covid-19 outbreak. At the beginning of the process, the participants were informed about the purpose of the research and the studies to be conducted. Afterwards, the participants were asked to prepare lesson plans for four of the lessons they would teach within the scope of the teaching practice course and to record the lessons in which they implemented these plans. In this context, each lesson was asked to be planned for at least 30 minutes. First, lesson plans were collected from the participants and then the records of the lessons realized according to these plans were requested. The lessons were made online and recorded via Zoom. The data collection process took two months.

Data Analysis

In the study, lesson plans and lesson videos of pre-service teachers with high and low 21st century teaching skills were analysed to determine the function of 21st century teaching skills in the learning teaching process. During the analysis, the components of the learning teaching process of the MoNE Teaching Practice Assessment Form were taken as reference (MoNE, 2019). In this form, the learning teaching process is analysed under three headings: teaching process, classroom management and communication.

Assessment was limited to the statement ‘2.11. To be able to use assessment techniques appropriate to the outcomes’ under the title of teaching process. However, it was thought that assessment was an important element that should be analysed separately in the learning teaching process. In this regard, the opinions of two experts from the fields of measurement and assessment, and curriculum and instruction were consulted and it was found appropriate to examine assessment as a separate dimension. In line with the expert opinions, the literature review on the main components of the learning teaching process and taking into consideration the dimensions of the MoNE Teaching Practice Assessment Form, the components of the analysis framework were determined as planning, teaching practices, classroom management, assessment and communication skills. Afterwards, lesson plans and lesson records were subjected to content analysis in an inductive way. The codes obtained were placed in this framework determined by a deductive approach. In this context, the codes were grouped into five themes that constitute the components of the analysis framework. As a result of the data analysis, a total of 38 codes were reached, including eleven codes each in the planning and teaching practices themes, six codes in the classroom management theme, and five codes each in the assessment and communication skills themes. While analysing the data, pre-service teachers with high 21st century teaching skills were coded as H1, H2, H3 and H4 and those with low 21st century teaching skills were coded as L1, L2, L3 and L4. The plans of these pre-service teachers were coded as H1P1 and their course records were coded as L2R4. For example, H1P1 refers to the first plan of pre-service teacher number one who has higher 21st century teaching skills. L2R4, on the other hand, refers to the fourth lesson record of second pre-service teacher who has lower 21st century teaching skills. The names of the students in the quotations are not the real names of the students, but the names chosen randomly by the researchers.

Validity and Reliability

Since the research is a qualitative research, measures have been taken regarding the validity and reliability of the data analysis process. For this purpose, the study group, data collection and analysis process were presented clearly and in detail. The research results were confirmed through gathering data by different data collection methods such as lesson plans and camera records. All data were recorded in order to prevent data loss. Also inter-coder reliability was employed in data analysis. In this context, the researchers analysed the data set independently of each other. Then, the researchers came together and compared their coding and the inter-coder reliability coefficient was calculated according to the formula “Number of agreed codes / (Number of agreed codes + Number of disagreed codes) x 100” (Miles & Huberman, 1994). And this code is determined as .92. Afterwards, the codes on which there was disagreement were discussed and a consensus was reached. For the transparency and credibility, the study group, data collection and analysis process were presented clearly and in detail. The analyses were presented with quotations in the findings section.

Ethical Procedures

The ethics committee permission of the research was obtained with the decision numbered 25 taken at the meeting of Gaziantep University Social and Human Sciences Ethics Committee dated 14.01.2022 and numbered 01.

Results

In this section, the findings related to the planning and implementation of the learning teaching process of pre-service teachers with low and high 21st century teaching skills are presented comparatively under two main headings. First one is planning the learning teaching process and the second one is implementations in the learning teaching process. The findings related to the implementations in the learning teaching process were analysed under four sub-headings: teaching practices, classroom management, assessment, and communication.

Planning the Learning Teaching Process

In this context, four lesson plans of pre-service teachers with low and high levels of 21st century teaching skills in terms of managerial skills, technopedagogical skills, flexible skills and generative skills were analysed in this heading. The total number of plans analysed was 32 in total, 16 from the low group and 16 from the high group. These plans are related to Mathematics, Turkish, Social Studies, Science, Music courses. Table 2 presents the findings related to the low and high study group pre-service teachers' planning of the learning teaching process according to the analysis according to the analysis framework based on MoNE Teaching Practice Assessment Form.

Table 2

Findings Related to Planning

Theme	Code	High (f)	Low (f)
Planning	Including technology	15	12
	Clear and understandable planning	15	10
	Including details	15	5
	Using various methods, techniques and strategies	15	2
	Using various materials	14	2
	Specifying activities	12	5
	Using various assessment methods	12	6
	Planning according to 5E model	12	0
	Including resources	8	0
	Linking to the previous lesson	1	2
	Non- assessment	0	8
Sum		119	52

Table 2 shows that both groups of pre-service teachers made clear and understandable plans and included the use of instructional technologies in their plans. Information on the use of technology was presented under the title of 'Instructional Technologies - Tools and Equipment Used' in the plans. These technologies are generally limited to zoom, powerpoint presentations and various web links. For

example, in H4P1, there are explanations about the use of technology as ‘*Natural and artificial sound sources (bird sound, rain sound, piano sound, horn sound) are briefly listened to the students in order*’.

<https://www.youtube.com/watch?v=Vj4FfG5a-xk>), rain sound

<https://www.youtube.com/watch?v=OE6zifMR570>), piano sound...

In L3P4, ‘*word graphic pictures, computer, zoom, word questions*’ explanations were given regarding the use of technology.

In Table 2, it is also seen that pre-service teachers with high 21st century teaching skills make more detailed plans, explain the activities, diversify the use of materials and create their plans according to the 5E planning model of the constructivist approach. In addition, pre-service teachers with high 21st century teaching skills also include diversity in the implementation of strategies, methods, techniques and the use of and assessment methods. This is due to their competent use of 21st century teaching skills such as managerial skills, generative skills and flexible skills in terms of planing online learning settings effectively. Brcause theseThese pre-service teachers also indicated the resources they used in their plans. Giving links to the bird and horn sounds to be listened to or explaining the source of the text or poem to be read can be given as examples of source indication. Examples of this are presented below.

‘Students are first made to read silently by opening the reading text titled ‘Bird Child’ from the MEB Turkish textbook. The poem ‘Commander-in-Chief Mustafa Kemal’ related to the objective of reading poetry is read by giving each student a stanza (H1P1).’

‘MoNE curriculum, MoNE textbook (H4P1).’

An excerpt from the plans in which the 5E model of the constructivist approach was used and the use of methods, techniques and strategies was diversified is given below.

“Engage: Introduction to the new unit is made. Students' attention is drawn with preparation questions. Students are motivated to the lesson with the role-playing technique through the text in the textbook. Brainstorming is done with the students through the answers given to the review and preparation questions. A short exercise is done with the students about directions and their positions.

Explore: Students are encouraged to discuss the thought-provoking open-ended questions questions given on the ppt presentation and students are encouraged to explore the information.

Explain: In line with the questions and answers given, students are asked to explain the information they have comprehended. Then the teacher summarises the explanations and makes a short summary.

Elaborate: Practice questions are done with the students. Afterwards, Socratic questioning and brainstorming method is applied in line with the answers given.

Evaluate: A quizz is applied to the students and their learning is assessed.

Methods, Techniques and Strategies: Demonstration, Question-answer(Socratic questioning), Brainstorming, Visual reading, Role playing, Induction, *Deduction*, *Group discussion*” (H3P1).

In the plans of pre-service teachers with low 21st century teaching skills in terms of managerial, technopedagogical, flexible skills and generative skills, it is seen that the above-mentioned issues are rarely or not included at all. For example, it was determined that none of the plans of the pre-service teachers in this group applied the 5E model and did not include resources, and only two plans diversified the use of methods, techniques and materials. In addition, in half of the lesson plans of the pre-service teachers in this group, it is seen that there is no practice on the assessment of the achievement of the objectives at the end of the lesson. For example, in L3P4, there is the statement ‘

...assessment will not be made'. This is an indication that these pre-service teachers are unable to put managerial skills to work.

Implementations in Learning Teaching Process

Under this title, the findings on how the learning teaching processes applied by pre-service teachers with low and high characteristics differed in the context of 21st century teaching skills defined as managerial skills, technopedagogical skills, affirmative skills, flexible teaching skills, generative skills, communication, collaboration, using ICT and evoking students' HOT skills are presented comparatively. The findings were obtained through the analysis of pre-service teachers' course records. While presenting the findings, they were presented under four sub-headings in line with the components of the analysis framework. These titles are teaching practices, classroom management, assessment and communication respectively.

Teaching Practices

Findings related to teaching practices in the learning teaching process are given in Table 3.

Table 3
Findings Related to Teaching Practices

<i>Theme</i>	<i>Code</i>	<i>High (f)</i>	<i>Low (f)</i>
<i>Teaching Practices</i>	Utilization of technology	15	12
	Teaching according to the plan	15	12
	Giving reinforcement	15	10
	Diversification of method, technique and strategies	15	2
	Using time efficiently	15	7
	Linking the lesson with daily life	15	6
	Summarising what has been learned	15	5
	Asking thought-provoking questions	14	10
	Using various activities	13	8
	Using various materials	10	4
	Making corrections	7	7
<i>Sum</i>		159	83

As presented in Table 3, when the teaching practices of pre-service primary school teachers with low and high 21st century teaching skills in the learning teaching process are analysed, it is seen that both groups exhibit similar characteristics in practices such as using technology, teaching according to the plan and making corrections. What is meant by the use of technology is the use of activities and materials accessed from digital sources other than the textbook or created with WEB 2.0/ AI tools

while the pre-service teacher is teaching in the zoom virtual classroom environment in the distance education process. In this context, it is seen that the use of digital materials is at the forefront in both low and high groups, and activities created with WEB 2.0 tools are applied rarely. As examples of the use of technology; ‘*What are the benefits of knowing the directions? Does anyone want to play the role of Karagöz and Hacivat that I will project on the screen? Now let's do an activity with you. Look at the map. What is to the east of XXX? What's to the south? What's to the north? Let's find the missing parts in the statements projected on the screen together (H1R4).*’ or ‘*There is a cartoon on the side, what do you see? There is a very nice cartoon here, let's first look at the picture and then the proverb. The cartoon and the proverb do not mean the same thing, right?(L1R3)*’ may be given. In these examples, the use of technology is limited with use of digital materials accessed from digital sources. ‘*I prepared a game activity (via wordwall) to remind the lighting tools. Let's do that activity first. (L3R3)*’ can be given as an example of technology-supported activities developed using WEB 2.0 tools. At this point, it is seen that although the technopedagogical competencies of pre-service teachers in the low and high groups differ, they exhibit similar performances in developing technology-supported learning materials.

Pre-service teachers with high 21st century teaching skills in terms of managerial skills, affirmative skills, evoking students’ HOT skills and generative skills exhibit practices such as giving reinforcement, asking thought-provoking questions and using various activities more frequently than pre-service teachers in the low group. There are also significant differences between the groups with high and low 21st century teaching skills in diversifying methods, techniques and strategies, using time efficiently, linking the lesson with daily life, summarising what is learnt, diversifying activities, and using various materials in teaching. This may be due to the different levels of 21st century teaching skills such as managerial skills, generative skills, evoking students’ HOT skills, flexible teaching skills, collaboration skills. While the high groups frequently use these practices in learning teaching processes, the low groups use these practices occasionally or rarely. For example, ‘*What would happen if there were no tools used for lighting in daily life? (H2R3)*’ and ‘*What can be used to save money in daily life? For example, what can we do with stale bread? (H3R4)*’ are aimed at both asking thought-provoking questions and linking what is learnt with daily life. ‘*What do you think is the settlement in the picture? (Time is given, answers are taken.) This is a picture of the reeve's office. Our reeve will give us information about the reeve system (H4R2).*’ is an example of brain storming and collaborative work (inviting the reeve to the lesson). ‘*Can you read what was asked of us in the second activity? Let's listen to a song first. What does the song tell us about? Open the Turkish course workbook and fill in the blank. (H3R4).*’ and ‘*I am reflecting the fill-in-the-blank activity on Okulistik education software. Who will answer the first question? Let's do an activity on the map. Which city is northwest of Konya?... (H1R4)* are examples of questioning, ‘*Now, we will sing the song together. ... (H2R1)*’ and ‘*I prepared a game activity (via wordwall) to remind the lighting tools. Let's do that activity first in groups (L3R3).*’ can be given as examples of collaborative work and educational games (wordwall activity). As seen in the examples, methods and techniques such as teamwork (inviting the head to the lesson), brainstorming, questioning, group work and educational games (word wall activity) were used in teaching practices, and digital and non-digital activities and materials

(textbook, digital visuals, music, maps, etc.) were utilized by high group more diversified.

Classroom Management

The findings related to the classroom management practices of pre-service teachers in the learning teaching process are presented in Table 4.

Table 4
Findings Related to Classroom Management

Theme	Code	High (f)	Low (f)
Classroom Management	Ensuring effective participation	15	8
	Starting the lesson by drawing attention	15	6
	Preventing interruptions	15	5
	Giving each student the right to speak	14	12
	Using appropriate reinforcement	12	10
	Homework assignment	12	0
Sum		83	41

In Table 4, it is seen that pre-service teachers with high 21st century teaching skills especially in managerial skills, flexible skills, ICT skills, affirmative skills and communication skills, exhibited classroom management behaviours more frequently than pre-service teachers in the low group. In particular, it can be said that they are more effective in ensuring students' active participation in the lesson, starting the lesson by drawing attention and preventing interruptions than pre-service teachers with low 21st century teaching skills in managerial skills.

'Dear students, how can we learn about time if there is no clock? (H4R3)' may be given as an example of starting the lesson by drawing attention. '... Berrak, can you switch off your voice, it echoes'; 'Don't write on the screen.... Very good thank you (H2R4).'; 'Let's listen to our friend. If we don't listen to someone who is talking, we would be disrespectful (H3R3).'; 'Your camera will always be on, I will see you. Press the raise hand button from the zoom when you want to tell something. Do not interrupt the lesson by calling out "teacher, teacher" Ok? (H2R4)' are examples of preventing interruptions, demonstrating affirmative and communication skills. The last example can also be given as an example of how pre-service teachers with high 21st century teaching skills in terms of flexible skills and ICT skills employ classroom management in online settings.

'We will start by watching a video with you first. Children, switch on your videos and let me see if you are listening or not. ... What kind of a message does he give with the saying that we did not inherit the world from our ancestors but entrusted it to our children? Write a short text about it (H2R4).' are among the examples of practices to ensure effective participation in the lesson.

Pre-service teachers also show different approaches in terms of assigning homework. The ones with low 21st century teaching skills did not give homework at all, while those with high 21st century teaching skills assign homework in 12 of the 16 lessons. This is another example of how the higher group represents managerial skills. Some examples from the lesson records about homework are presented below.

‘Friends, I want you to practise the song this week (H2R1).’

‘I want you to think about future lighting technologies and make a design for lighting technology (H2R3).’

However, both groups were similar in exhibiting behaviours such as giving each student the right to speak and using appropriate reinforcement. For example;

‘... Hilal, Pelin, let me see who is among those who never speak. I’ll choose from those who raise their fingers, okay? Aynur, you tell me (H3R4).’

‘... Elif should tell us. Let Mehmet tell us the second one. Everyone switch on their images so I can see everyone. Yes, it is a bar graph. Right, there is one more graph, let someone else tell us. Yes, frequency graph (L3R4).’

Assessment

Table 5 presents the findings related to the practices in the learning teaching process.

Table 5
Findings Related to Assessment

Theme	Code	High (f)	Low (f)
Assessment	Using traditional tools	12	2
	Evaluating the achievement of the learning outcomes	11	4
	Technology assisted	10	1
	Using alternative tools	4	1
	Non-assessment	0	8
Sum		37	18

As can be seen in Table 5, there are significant differences between pre-service teachers with high and low 21st century teaching skills such as managerial skills, technopedagogical skills, flexible skills and generative skills. While the pre-service teachers in the low group did not include measurement and assessment in half of the lessons analysed, the pre-service teachers with high 21st century teaching skills frequently carried out practices related to the assessment of the achievement of the learning outcomes. This may be due to the fact that pre-service teachers in the higher group have higher management skills. These pre-service teachers do not limit measurement and assessment only with question and answer or applications in which the assessment activities in the book are reflected on the screen. They also develop and apply technology-supported alternative or traditional tools. This is the result of their high level of technopedagogical skills and generative skills. This is also a result of their

flexible skills because these pre-service teachers use the online settings more effectively and adapt to teaching in these settings more quickly than the lower group. In the following examples given, *'Now let's do this fill-in-the-blank activity together. (H1R4)'*, *'What effects does force have on the event you see in the picture you see on the screen? ...Yes, don't push. (H2R2)'*, *'Let's solve this problem now, please....(H4R3)'*, it is seen that traditional measurement tools such as fill-in-the-blank, open-ended, multiple-choice questions are used. In the examples presented below, alternative assessment and evaluation tools such as project assignments and performance tasks are used.

'I want you to make a design. What source will the lighting device we designed provide illumination and what can we say about savings and lifespan? Do this next week dear children. (H2R3)' and *'I want you to write a story or make a picture or design a model in which you explain the formation of sound...(H4R1)'* are examples of alternative assessment activities.

In addition; *"We will continue with the word building game. We start with Ayda. Ayda, what could this word be? Well, let's continue with Ufuk, what could this word be? Yes, thank you very much. (H4R4)"* The educational game for measurement and evaluation purposes in this quotation is an example of technology-supported assessment activity. As indicated in the table and the quotations, evaluation were frequently made by pre-service teachers with high 21st century teaching skills. The ones with low 21st century teaching skills, on the other hand, rarely made assessment and evaluation to determine the achievement of the learning outcomes. They tended to monitor the learning situation only from time to time with instant questions directed to the students. Even though some pre-service teachers from this group included assessment and evaluation in their plans, they did not reflect this in the learning teaching process. For example, in L2P1, the plan for measurement and evaluation is *'Individual assessment: Why do the problems in our lives arise? How should we go about solving problems? Why is it important to learn our rights? Group assessment: Can he/she express his/her feelings and thoughts freely?'*, but assessment was not included in practice. Similarly, in L2P3, *'Individual evaluation: How to read poetry? Has anyone written a letter before? Group assessment: Can he/she express his/her feelings and thoughts comfortably?'*, but there is no assessment in the course record.

Communication Skills

Table 6 presents the findings on how pre-service primary school teachers with low and high 21st century teaching skills display their communication skills in the learning teaching process.

Table 6
Findings Related to Communication

Theme	Code	High (f)	Low (f)
Communication	Building dialogue	15	11
	Listening	15	10
	Providing instructions and/or explanations	15	10
	Paying attention to accents	15	4
	Using verbal language effectively	15	1
Sum		75	36

As indicated in Table 6, pre-service teachers with high 21st century teaching skills in terms of communication skills exhibit various communication skills quite effectively. On the other hand, pre-service teachers in the low group frequently exhibited communication skills such as dialogue, listening, giving instructions and/or explanations, but they were inadequate especially in paying attention to emphasis and using verbal language effectively. For example, in the following quotations: ‘*Good evening, boys. How are you? Are you all right? What are you doing? How nice that we see each other every week, are you happy to see us? I’m also very happy that I’ve lessons with you. Hello Elif. Sema, could you read me what we wrote, dear? (H3R3)*’ and ‘*Hello, children, how are you? How’s everything going? I’m fine, thank you. Furkan, do you have something to say? You raised your hand? Are you tired? You’ve had two lessons. (L2R1)*’ It is seen that pre-service teachers from both groups dialogue with students with similar approaches in dialogues. Similar situation is also valid for listening. When the pre-service teachers in both low and high groups exhibited this skill, they listened to the students patiently, made the students feel that they were listening with expressions such as ‘*Yes*’ and ‘*Okay*’ during the conversation, and summarised the sentences of the students to make them realise that they understood what they meant. ‘*... Melih, we are listening to you. What kind of a thing did you experience? (When the student is talking) Yes. Yes. (When the student finishes speaking) You just argued. Okay. (L4R2)*’ As in this example, both low and high group pre-service teachers effectively applied the listening skill.

However as mentioned above, pre-service teachers with high 21st century teaching skills in affirmative skills and communication skills use verbal language effectively and pay attention to emphasis. While these pre-service teachers use verbal language with a lively, emphasised tone of voice and fluent language where necessary, the pre-service teachers with low 21st century teaching skills use a more stable speech

flow and frequent interruptions by saying ‘*hmm*’. The following quotations show how the pre-service teachers in the high group use verbal language and emphasis. ‘(Using the question words in a loud and vivid voice.) *Can Yiğit read this question to us? Yiğit, can you read it again for us? (H1R3)*’ As seen in the example pre-service teacher of high group used a loud and vivid voice and repeated the question in different forms. And another example may be given as ‘(In a loud and melodic voice.) *It rains every spring, rain rain rain rain (fast in rhythm). The koala climbs the tree. The leaves protect him. The rabbits are running away, jumping up and down (fast to the rhythm). They are eating carrots in their hands (fast in rhythm). (H2R3)*’ In this example, it is seen that the pre-service teacher in the high group uses her voice effectively in terms of being rhythmic, loud and melodic. And this quotation, (with a stable unstressed voice) ‘*Well, our lesson today is social studies, you should have your textbooks with you again, we can also benefit from them. So today's lesson is the economic activities in my family and my environment. ... You can listen to the video when I switch it on. OK, OK, OK, OK, OK. Well, you hear the sound, don't you? (L3R2)*’ is an example of the pre-service teacher in the low group who used her voice stably and unstressed. In these examples, it is clearly seen that pre-service teachers with high and low group in terms of communication skill exhibit different behaviours in using verbal language and emphasising words.

Discussion and Conclusion

As a result of the research, it was determined that both groups of pre-service teachers made clear and understandable plans and included the use of instructional technologies in their plans. However, pre-service teachers with high 21st century teaching skills in terms of managerial, technopedagogical, generative and flexible skills make more detailed plans than those with low 21st century teaching skills. These pre-service teachers explain the activities in their plans and diversify the use of strategies, methods, techniques, materials and measurement and evaluation practices. In addition, they often create their plans according to the 5E model of the constructivist approach and indicate the resources they use in their plans. However, it was determined that these issues were rarely or never included in the plans of pre-service teachers with low 21st century teacher skills. In this context, it can be said that pre-service primary school teachers with high 21st century teaching skills are more successful in planning the teaching process than pre-service teachers with low 21st century teaching skills. The ability to prepare a lesson plan includes skills such as choosing various methods, techniques and strategies suitable for the purpose, using various materials and activities, using examples from daily life and planning the teaching process (Kablan, 2012). Making plans with the mentioned qualities requires the utilisation of many 21st century teaching skills such as managerial skills, generative skills including HOT skills and technopedagogical skills with ICT literacy. Teachers who prepare qualified lesson plans are able to set achievable goals, motivate students to learn, employ a variety of participatory and innovative teaching techniques, maximize time efficiency, assess students' progress through engaging activities, and provide constructive feedback (Liakopoulou, 2011; Öztürk & Özyurt, 2020). These are also related with interpersonal communication skills, collaborative skills and affirmative skills of the 21st century teachers (Orhan Göksün & Kurt, 2017). Lesson plans designed in detail have an important value for improving the quality of the learning teaching process (Bilen, 2002;

Emidar & Indriyani, 2023; Lui & Bonner, 2016). It is also a guide for students about what they will learn and how they will be evaluated (Ramirez, 2021). In this context, the development of 21st century teaching skills of pre-service teachers in terms of is also important in terms of more effective planning of learning and teaching processes and thus increasing the quality of education. In addition, research results of the related literature shows that as seniority increases, teachers' competences related to planning the learning teaching process also increase (Doğanay & Öztürk, 2011; Fernandez & Ritchie, 1992). For this reason, it can be ensured that pre-service teachers have the skills related to planning that they can develop with seniority much earlier by developing 21st century teaching skills (Sulaiman & Ismail, 2020).

When the findings of the study related to the practices in the learning teaching process were analysed, it was found that both groups used instructional technologies and generally taught according to the plan. In this context, it can be said that the courses in teacher training programmes provide pre-service teachers with these competencies. Since techno-pedagogical content knowledge (TPACK) has a significant positive impact on the intention to integrate technology into teaching (Lai Wah & Hashim, 2021). In addition, literature review also shows that teachers and pre-service teachers have high levels of readiness to use multimedia in learning and teaching processes (Lubis et al., 2017) and their use of technology (Elçiçek, 2023). However, there are significant differences between the groups with high and low 21st century teaching skills in diversifying methods, techniques and strategies, using time efficiently, giving reinforcement, linking the learning with daily life, summarising what is learned, diversifying activities, and using various materials in teaching. These practices are related with the managerial, affirmative, generative, collaborative and HOT skills. While pre-service teachers with high 21st century teaching skills in terms of mentioned skills frequently use these practices in learning teaching processes, those with low skills use these practices occasionally or rarely. However, each of these practices contributes to the effectiveness of the learning teaching process. While linking what is learnt with daily life serves to realise transformative learning, diversification of activities, methods, techniques and strategies promote interactive learning and ultimately improve the quality of teaching. The more sensory organs are addressed in the teaching process, the more qualified the learning is (Demirel et al., 2004). The teacher's building activities addressing the objectives, student's level of readiness and diversifying these activities increase the effectiveness of teaching (Brooks & Brooks, 1999; p. 21). In addition, practices such as diversifying methods, techniques, strategies and linking the lesson with daily life also contribute to effective classroom management (Toraman & Cakmak, 2020). High quality instructional materials support and facilitate the learning process (Wulandari & Purwanto, 2017). Thus, they facilitate the teacher in achieving the objectives of the course (Rahadini et al., 2022) and respond to the needs of the students (Bykova et al., 2019; Nugraheni & Marsigit, 2021). By considering the individual differences of students, instructional materials can address their developmental needs, making teaching more enjoyable and effective (Şimşek & Yazıcı, 2021). In this context, the teaching practices of pre-service teachers with high 21st century teaching skills can be considered as an indicator that they perform a more qualified teaching.

In the study, it was also determined that pre-service teachers with high 21st century teaching skills in terms of managerial, affirmative, flexible, ICT, collaborative

and communication skills exhibited classroom management behaviours more frequently than pre-service teachers in the low group. It was determined that they were more effective than pre-service teachers with low skills especially in ensuring students' active participation in the lesson, starting the lesson by attracting attention and preventing interruptions. Also, there is a significant difference between the groups in giving homework. While pre-service teachers with low 21st century teaching skills did not give homework at all, those with high skills gave homework in 12 of the 16 lessons. As seen in the findings, the pre-service teachers as well as teachers with high 21st century teaching skills have the competence to structure learning teaching processes in a way that enables learner-centred, action oriented and transformative learning (UNESCO, 2017; UNESCO, 2020). In addition, they are equipped to use skills such as communication and collaboration effectively (Hatlevik, 2016; Omar & Ismail, 2020; Palmer, 2015; Sulaiman & Ismail, 2020; Van Laar et al., 2017). At this point, it can be said that the classroom management behaviours exhibited by pre-service teachers with high 21st century teaching skills, such as ensuring active participation in the lesson and preventing interruptions, are a product of the learner-centred, action-oriented teaching skills and communication skills they have developed. In addition, unlike the other group, it is possible to associate the fact that these pre-service teachers frequently assign homework with the transfer of learned knowledge, which is also a 21st century teaching skill defined as managerial skills. According to Okutan (2006), effective participation of all students in classroom practices, effective use of practices and behaviours such as drawing attention and reinforcement in the classroom require good management skills and knowledge. Teachers' ability to prevent interruptions, efficient use of the time allocated for teaching and ensuring students' active participation in the lesson are indicators of good classroom management (Ağaoğlu, 2008). Similar to these findings, Freitas et al., (2004) stated that experienced teachers teach their lessons in ways that attract students' attention and based on active participation. According to the constructivist approach, in order to develop various skills and meta-cognitive behaviour, only in-class activities are not enough, and homework is also needed (Güneş, 2014). In this context, giving homework by teachers plays a positive role in developing students' skills. The main factor in classroom management is the teacher's skill. For a qualified education, teachers should have developed classroom management skills in addition to their educational skills (Demirtaş, 2009). Based on the literature, it is understood that skills such as active participation, drawing attention, assigning homework and preventing interruptions are important in classroom management. All these are related with managerial skills. However, ICT skills and flexible skills are also among the skills needed to realize effective classroom management practices in online settings. Based on the findings from the research, it can be concluded that pre-service teachers with high 21st century teaching skills in terms of managerial skills, flexible skills and ICT skills are more effective in online classroom management.

In the study, significant differences were found between pre-service teachers with high and low 21st century teaching skills regarding measurement and evaluation. While pre-service teachers with high 21st century teaching skills frequently made practices related to the evaluation of the achievement of the outcomes, those in the low group rarely made evaluation; they limited the measurement and evaluation only with question and answer or applications in which the evaluation activities in the book were

reflected on smartboard. In addition to these practices, pre-service teachers with high 21st century teaching skills in terms of managerial, technopedagogical, flexible and generative skills developed and applied technology-supported alternative or traditional measurement tools inline with the objectives. 21st century teachers are expected to employ address misunderstandings directly and exploit technology to support learning behaviours in the learning teaching process (Saavedra & Opfer, 2012). In the literature, it is seen that it is important for teachers to be able to select and implement measurement and evaluation activities in a way that can support the needs of their students (Stanford & Reeves 2005; Welsh & D'Agostino 2009). However, inexperienced teachers are inadequate in giving feedback and making evaluations (Artzt & Armour-Thomas, 2001; Fernandez & Ritchie, 1992). Pre-service teachers with low 21st century teaching skills present similar characteristics in this regard. These pre-service teachers mostly did not do any measurement and evaluation to monitor the learning, and when they did measurement and evaluation, they only used traditional assessment tools and utilised the activities in the book. They did not use alternative measurement tools at all. This may be due to their low level of technopedagogical, flexible and generative skills. Because developing alternative assessment tools to be applied in online education requires the effective use of generative and technopedagogical skills, including ICT literacy skills. However, these tools have superior features compared to traditional ones in terms of ensuring that students are active out of the lesson as well as in the lesson, making a more realistic evaluation by spreading the evaluation to the process, ensuring permanence in learning and preventing rote learning, allowing students to learn by doing and encouraging them to do research (Kumru, 2021). With these features, it covers the steps that 21st century teachers are expected to apply in the learning and teaching process (Saavedra & Opfer, 2012). Although pre-service teachers with high 21st century teaching skills were inadequate in terms of professional experience, they were successful in realising the assessments of this nature. In this context, it can be said that providing pre-service teachers with 21st century teaching skills contributes to overcoming some of the limitations of professional experience.

When the findings of pre-service teachers with high and low 21st century teaching skills regarding the communication skills they used in the learning teaching process were examined, it was determined that both groups of pre-service teachers exhibited similar characteristics in behaviours such as dialogue with students, asking questions to students, listening to students and making necessary explanations, and giving instructions. However, it was determined that behaviours such as paying attention to emphasis while speaking and using verbal language effectively were exhibited more by pre-service teachers with high 21st century teaching skills. The teacher's creating a democratic learning environment in the classroom, listening to students as individuals, caring about their ideas and giving importance to communication contribute to students feeling valuable in their future lives (Gordon, 1974). Qualified teachers should be good communication experts as well as good education experts. Teachers should use their communication skills in facilitating problem solving, making democratic decisions, explanations and instructions for the teaching process (Güçlü, 1998). In addition, the teacher's asking questions that will initiate students' thinking about the subject in the educational environment increases

dialogue and interaction in the learning process (Moyles, 1987). In the teaching process, the teacher's use of verbal language shows his/her goodwill, trust, interest and listening to the student, and he/she should speak in a simple language that the student will understand. Otherwise, the student who cannot be involved in the lesson will lose interest towards the lesson (Arslantaş, 1998, p. 7). When the results obtained from the studies examining similar skills are evaluated, it is seen that one of the factors that increase the quality of the learning teaching process is communication. When the findings obtained from the research are evaluated, it can be said that both groups of pre-service teachers have high communication skills, but pre-service teachers with high 21st century teaching skills are more successful in communication skills.

In summary, when all the findings obtained from the research are analysed, it is seen that the development of pre-service teachers' 21st century teaching skills leads to results towards increasing the quality of education in all processes from planning to implementation of the learning teaching process. There are also suggestions in the literature that support the results of this study. According to Urbani et al. (2017), preservice teachers require continuous support to develop their 21st century skills, which will help them feel confident in integrating these skills into their teaching. Similarly, Voogt & Roblin (2012) suggest that teacher education programs should provide opportunities for teachers to enhance their own 21st century skills and abilities, enabling them to bring these skills into their future classrooms. In summary, high competencies in implementing teaching based on 21st century skills have empowered teachers to explore and generate more ideas, leading to more effective translation of learning outcomes (Lee, 2015; Laar et al., 2017; Sulaiman & Ismail, 2020). In light of these findings and the results of this research, it is recommended to enhance the 21st century teaching skills of preservice teachers through teacher training programs.

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The authors worked collaboratively at all stages of the article, taking equal responsibility and responsibility in the process.

Conflicts of Interest

There is no conflict of interest arising from a financial, commercial, legal or professional relationship with any person, institution or organisation that may affect the research.

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Higher Education in Asia: The Changing World Rankings of Asian Higher Education Institutions (2015-2025)

Asya'da Yükseköğretim: Asya Yükseköğretim Kurumlarının Değişen Dünya Sıralamaları (2015-2025)

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ABSTRACT: This research aims to comparatively examine the changing appearance of world rankings of Asian HEIs among their global competitors from 2015 to 2025. The study group consists of the top five HEIs indexed in the 2024 Times Higher Education Asia University Rankings from the nine countries with the largest population in Asia and the top five HEIs indexed in the 2025 Times Higher Education World University Rankings from the Russian Federation. The study found that HEIs in China, Japan, and Russia were the most stable examples that performed positively regarding world rankings. Although there was no solid continuity, the rankings of Indian HEIs generally showed a positive momentum. HEIs in Vietnam and Bangladesh did not have ongoing success because they were in the ranking index only for the last couple of years. HEIs in the Philippines, Indonesia, Thailand, and Pakistan either performed in a neutral direction with slight fluctuations or showed decreasing ranking trends. The results revealed that the global rankings of HEIs in most Asian countries, except Japan, China, and Russia, lag behind their international competitors. Therefore, HEIs in most Asian countries could not establish a stable profile against their international competitors in global rankings.

Keywords: World rankings, Asian HEIs, higher education studies, international education.

ÖZ: Bu araştırma, 2015'ten 2025'e Asya yükseköğretim kurumlarının dünya sıralamalarının küresel rakipleri arasında değişen görünümünü karşılaştırmalı bir şekilde incelemeyi amaçlamaktadır. Çalışma grubu içerisinde Asya'da en fazla nüfusa sahip dokuz ülkenin 2024 Times Yükseköğretim Asya Üniversite Sıralamalarında indekslenen en iyi beş yükseköğretim kurumu ile Rusya Federasyonu'nun 2025 Times Yükseköğretim Dünya Sıralamalarında indekslenen en iyi beş yükseköğretim kurumu yer almaktadır. Çalışma; Çin, Japonya ve Rusya'daki yükseköğretim kurumlarının dünya sıralamalarında olumlu performans gösteren en istikrarlı örnekler olduğunu bulmuştur. Sağlam bir devamlılık olmamasına rağmen Hint yükseköğretim kurumlarının sıralamaları genel olarak olumlu bir ivme göstermiştir. Vietnam ve Bangladeş'teki yükseköğretim kurumları, yalnızca birkaç yıldır sıralama indeksinde yer aldıkları için devam eden bir başarıya sahip değildir. Filipinler, Endonezya, Tayland ve Pakistan'daki yükseköğretim kurumları, hafif dalgalanmalarla nötr veya azalan yönde sıralama eğilimleri göstermiştir. Sonuçlar; Japonya, Çin ve Rusya hariç çoğu Asya ülkesindeki yükseköğretim kurumlarının yükseköğretim sıralamaları bakımından uluslararası rakiplerinin gerisinde kaldığını ortaya koymuştur. Dolayısıyla Asya ülkelerinin çoğunda yükseköğretim kurumları, küresel sıralamalarda uluslararası rakipleri karşısında istikrarlı bir profil çizememiştir.

Anahtar kelimeler: Dünya sıralamaları, Asya yükseköğretim kurumları, yükseköğretim çalışmaları, uluslararası eğitim.

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The ongoing effects of globalization on countries and its various effects on higher education have always made the rankings of higher education institutions (HEIs) a hot topic. Different academic ranking indexes that aim to evaluate HEIs each other through various factors have been becoming more popular among world countries due to globalization and its inevitable economic consequences (Hazelkorn & Gibson, 2017). Rankings have been seen as an essential indicator that reflects the current positions of HEIs from a comparative perspective (van der Wende, 2008). Although the current literature always contains major criticism regarding inconsistent ranking results of different ranking indexes due to several factors, such as objectivity and credibility issues, methodological concerns, or overall validity problems (Fauzi et al., 2020; Harvey, 2008; Huang, 2012; Liu & Cheng, 2005; Pandiella-Dominique et al., 2018; Sayed, 2019; Soh, 2017; Ying & Jingao, 2009), HEIs still believe in the power and significance of global ranking indexes. In well-known ranking indexes, such as the Times Higher Education World University Rankings (THE WUR), the Academic Ranking of World Universities (ARWU), and the QS World University Rankings, HEIs from different continents fiercely compete to be at the top positions for possible future benefits. By becoming leaders of eminent ranking indexes worldwide, HEIs aim to attract prospective students to consider choosing and enrolling them thanks to their enhanced reputation among the other alternatives (Altbach, 2012; Joseph et al., 2012; Koenings et al., 2020). Because being ranked low among stakeholders may negatively affect students' preferences and cause HEIs in question not to be among their first choices for application (Broecke, 2015; Meyer et al., 2017). From a broader perspective, governments pay attention to the positions of HEIs in ranking indexes to design creative and innovative pathways for their future policies in higher education area (Castro & Tomàs-Folch, 2015; Lim & Williams Øerberg, 2017). For these reasons, the role of global ranking indexes and being ranked in high positions of HEIs by these indexes are critical for each HEI in world countries. That is because occupying the top positions not only contributes to the cumulative growth and reputation of HEIs but also provides feedback for governments or countries to examine whether they follow an effective track to support and develop national higher education.

Nowadays, HEIs are evaluated and ranked by global ranking indexes to obtain top-ranking positions worldwide and gain global prestige as a vital part of global competition. However, some of them, such as the QS, THE, or ARWU, are most widely taken into account by the global arena to be ranked HEIs. Different global ranking indexes rank HEIs through their unique evaluation standards. The Times Higher Education World University Rankings (THE WUR) employs numerous factors within five focal points (teaching, research quality, research environment, industry, and international outlook) to determine performances and general ranks of HEIs from a comparative perspective (Times Higher Education, 2024). Based on these solid standards, the ranking index aims to rank each HEI by appointing values up to 100 points and publishes a global ranking list each year. Beyond this mission, the ranking index also offers a comprehensive dataset for HEIs that each HEI can interpret their global appearance by analyzing unique data, such as their global brand power or what fields they are best among the other HEIs, to improve their current reputations or shape their future actions in different areas (Times Higher Education, n.d.). At this point, benefits and potential future developments of being ranked by a ranking index may

offer HEIs remarkable outcomes in terms of not only being among the top choices of prospective students but also aiming to design and implement the best marketing campaigns to make their names more visible through their successes in different fields.

To comprehensively understand the role of global ranking indexes in higher education, it is notable to emphasize the interactive relationship between the concepts of internationalization and competitiveness within the framework of HEIs. As a complex term, internationalization has been a core and enduring element of higher education for a long time. Although the emergence of internationalization began to gain attention through the increasing visibility of the global capitalism movement in the late 20th century (Bamberger & Morris, 2024), its effects and reflections on higher education have become more comprehensive over the last three decades (Knight & de Wit, 2018).

The nature of internationalization in higher education mainly included the evolving processes of institutional and national actions from local and regional to the global world, spreading education worldwide, adopting a more decentralized and specific understanding in creating policies by always considering the role of economic welfare, and the roles of rankings in different scales (de Wit, 2019). These key features have intensified competition among HEIs, prompting them to take comprehensive and inclusive steps in the field of higher education. In this context, expanding HEIs all over the world through branch campuses and establishing new academic programs conducted in English (Altbach & Knight, 2007), increasing the number of international students and academics (de Wit & Deca, 2020) are among the crucial steps taken by HEIs and countries.

Global ranking indexes are another influential factor in the reputation race among world HEIs (Hazelkorn, 2008). These indexes prioritize the role of institutional quality as HEIs consistently aim to improve their academic excellence through various innovations to be steadily ranked by these indexes. The institutional quality efforts of HEIs to be at first rankings in global ranking indexes can be linked to the resource dependence theory. This theory argues that organizations are not completely independent in terms of managing their resources, as they are affected by their environments, and this dual interactive relationship creates a dependency between organizations and environmental actors (Pfeffer & Salancik, 2003).

The resource dependence theory explains the institutional quality efforts of HEIs to be ranked in global rankings from several points. Ranking indexes are considered critical indicators that governments attach importance to in their decision-making processes regarding financial support or funding allocation to HEIs (Harvey, 2008; Ordorika & Lloyd, 2015; Thakur, 2007). Therefore, this fact forms a multidimensional dependency among HEIs, ranking indexes, and governments by enriching the efforts of HEIs to provide institutional quality. Secondly, being at the top of prestigious ranking indexes is important for HEIs to attract qualified international students and expand their institutional brand images through overseas campuses as a result of increasing global demand. Global rankings play a leading role for HEIs as they have the potential to attract the best international students from around the world for educational purposes (Katsumoto et al., 2024; Rust & Kim, 2015; Souto-Otero & Enders, 2017). Global rankings also shape academics' future careers by influencing their desire to work at prestigious HEIs. Having the best-talented students and renowned academicians directly improved the academic excellence of HEIs and indirectly provided a high-level

contribution to the cumulative growth of countries. Therefore, these positive results that may arise depending on the dependency between HEIs and their global ranking success further increase the importance of being included in these indexes.

Literature Review

Although HEIs in Asia demonstrate high-level efforts to boost their global rankings through higher education initiatives (Guo et al. 2023), they still do not appear to be as competitive as their American counterparts in world rankings (Balatsky & Ekimova, 2020; Kaba, 2012). Research in the literature investigated possible roles of rankings that might affect global appearances of HEIs and shape future policy-related actions of countries regarding higher education (Ahlers & Christmann-Budian, 2023; Erkkilä, 2014; Poelmans et al., 2024; Taylor & Braddock, 2007). Furthermore, numerous research activities focused on the features of ranking indexes or compared different global ranking indexes with each other to understand whether there is consistency or similarities among the results presented in the scope of the HEI rankings (Aguillo et al., 2010; Chen & Liao, 2012; Khosrowjerdi & Kashani, 2013; Selten et al., 2020; Shehatta & Mahmood, 2016).

However, there is a lack of research emphasizing the overall ranking positions of Asian HEIs in various regions or areas of the continent through different types of ranking indexes. As an example of this limited number of studies, Soh (2012) compared the global rankings of selected top ten Asian HEIs located in East Asia with the top ten other international HEIs through the THE World University Rankings 2011-2012 and concluded that HEIs in the East Asia region were behind among world HEIs in different aspects. Emphasizing the effects of global rankings on higher education policies based on a cross-national comparative analysis, Lee et al. (2020) revealed that China and Korea performed a rising ranking pattern against their Japanese and American counterparts in the scope of global rankings. In their study, Reddy et al. (2016) aimed to thoroughly examine the rankings of HEIs in China and India as well as their research performances, and found that many Chinese universities were among the top HEIs according to the 2015-2016 THE World University Rankings (n=20) and the 2015 Academic Ranking of World Universities (n=110). However, their study indicated that only one Indian university was among the top 400 in the 2015 Academic Ranking of World Universities and was among the top 300 in the 2015-2016 THE World University Rankings (Reddy et al., 2016). Based on the 2014 THE rankings, Postiglione and Arimoto (2015) emphasized the rise of Chinese HEIs among their global counterparts and paid attention to the competitive challenge among some Asian HEIs to fulfill first places. Liu (2016) evaluated the rankings of East Asian HEIs through the ARWU 2015 ranking data. Her study found that Japanese HEIs (n=4) were in the top 100 and many Chinese HEIs (n=44) were in the top 500, while American HEIs led the ranking index (Liu, 2016).

Based on the data provided by various leading global ranking indexes, Puzatykh (2023) found that Russian HEIs lagged behind other international HEIs due to their low success indicators in different areas, such as academic publications-related problems, inadequate knowledge about HEIs, low level of integration with world or internationalization issues. Examining Indian HEIs, Tilak (2016) suggested that higher education policies in India need to be improved to move HEIs to better positions in

rankings. In his study, he mentioned that Indian HEIs lagged behind other Asian HEIs in the QS University Rankings: Asia 2014 and the 2014 THE Asia University Rankings (Tilak, 2016). By paying attention to the methodological differences among some of the eminent global ranking indexes through Indian HEIs, Chowdhury and Rahman (2021) emphasized that two Indian HEIs separately succeeded in being ranked in the top 500 lists of ARWU, THE, QS, and Webometrics indexes. In their study, Chowdhury and Rahman (2021) also noted that these methodological differences in global ranking indexes directly influenced the rankings of Indian HEIs. Through the case of Indonesia, Pramana et al. (2021) shed light the low-level performance of Indonesian HEIs in both regional and global rankings. Highlighting various problems affecting Indonesian education, they suggested different institutional and governmental actions that could enhance the quality of the higher education system nationwide (Pramana et al., 2021). In another study, Fernandes and Singh (2022) compared the evaluation metrics between domestic ranking indexes in India and the THE global ranking index. Their study found that Indian HEIs suffered a lack of research and citation scores, which are among the core elements in THE WUR, and this was the main reason that caused them to lag in global ranking indexes, even though they seem more successful in domestic rankings (Fernandes & Singh, 2022). Different research in the literature can be considered as a clear indication that the importance given to the issue of global rankings is important not only for HEIs but also for governments or countries to compete worldwide in higher education.

Although not quantitatively intensive and not directly related to the success or failure of Asian HEIs in global ranking indexes, some policy papers and research reports mostly prepared by NGOs worldwide also draw attention to the current view of higher education in different regions of Asia. For example, a policy paper published by UNESCO noted that the main problems with internationalization in higher education in some selected Central Asia countries were low levels of cooperation efforts with other countries and varying quality standards (UNESCO, 2021). Similarly, another global report by UNESCO highlighted that South and West Asia (1.2%) and Central Asia (1.2%) hosted the fewest international students compared to the rest of the world in 2019 (UNESCO, 2022). However, according to the same report, Eastern and South-Eastern Asia regions have succeeded in placing at the top worldwide in terms of gross enrollment rates in higher education between 2000-2020 years (UNESCO, 2022). The report prepared by Ambasz et al. (2023) also pointed out that the lack of funding, quality issues, inequality in reaching higher education, academic programs that did not directly cover the workforce needs, the low level of cooperation between industry and HEIs, and inadequate importance given to research and innovation activities were some of the key problems faced by higher education in Central Asia. These recent global reports address key issues regarding the reasons for the unsatisfactory or inconsistent performance of Asian higher education institutions in global rankings in the international arena.

As seen in the current literature, most research focused on a single or a combination of a few Asian HEI cases to examine their global rankings among world counterparts. Therefore, there is a gap in the current literature in terms of understanding the ranking positions of Asian HEIs from past to present. Based on this gap, this research evaluates the overall global rankings of five HEIs in 10 different Asian

countries from a longitudinal perspective between 2015 and 2025. This study aims to understand whether there are rising or decreasing trends regarding the global rankings of Asian HEIs. Thus, this study is critical for Asian HEIs and governments to gain awareness about the global ranking positions of their national HEIs. This study is also noteworthy because it offers Asian HEIs and governments innovative higher education policies and initiatives to enhance the reputation and visibility of their HEIs worldwide. This study seeks to answer the two research questions below:

- What is the overall success pattern of global rankings of HEIs in selected Asian countries between 2015 and 2025 based on the Times Higher Education World University Rankings (THE WUR)?
- What types of comprehensive higher education policies can be designed and implemented to improve the overall rankings of HEIs in selected Asian countries?

Method

Research Design

As an example of qualitative research, this study is a multiple case study since it created a general understanding of the changing ranking patterns of Asian HEIs based on examples from many countries. The multiple case study is a sub-dimension of the case study research design, and thanks to its nature, it mainly examines situations from a comprehensive perspective. There are several positive aspects to consider employing this design while focusing on an issue or issues. This research design inherently allows researchers to analyze problems/situations from similar or different perspectives (Baxter & Jack, 2008). According to Eisenhardt and Graebner (2007), “Multiple cases also enable broader exploration of research questions and theoretical elaboration” (p. 27). Therefore, conducting this study under a multiple case study design is appropriate to make better explorations and create better connections among the cases in the scope of the research questions.

Study Group

The study group purposefully selected consists of the top five HEIs indexed in the 2024 THE Asia University Rankings from the nine Asian countries (Bangladesh, China, India, Indonesia, Japan, Pakistan, Philippines, Thailand, and Vietnam) and the top five HEIs indexed in the 2025 THE WUR from the Russian Federation. The determination and selection of the top ten Asian countries with the largest populations in the continent is configured in light of the data obtained from the *World Factbook* prepared and presented by the CIA (CIA, 2024). Besides, the 2024 THE Asia University Rankings and the 2025 THE WUR were used to determine the top five HEIs in these country examples. Although it is a country with most of its territory located within the Asia continent, HEIs in the Russian Federation are not included in the 2024 THE Asia University Rankings. Therefore, the 2025 THE WUR was used as a reference to identify and select the top five HEIs in the Russian Federation.

Data Collection Procedure

The data used in this study is based on the THE WUR between 2015 (included) and 2025 (included). The required datasets regarding the global ranking positions of

HEIs were gathered from the THE World University Rankings website from 2015 to 2025 through the open-published ranking indexes of each year (Times Higher Education, 2024; Times Higher Education, 2023; Times Higher Education, 2022; Times Higher Education, 2021; Times Higher Education, 2020; Times Higher Education, 2019; Times Higher Education, 2018; Times Higher Education, 2017; Times Higher Education, 2016; Times Higher Education, 2015; Times Higher Education, 2015a).

Data Analysis

The method used in the data analysis process of this study is document analysis. As Bowen (2009) noted, “Document analysis involves skimming (superficial examination), reading (thorough examination), and interpretation” (p. 32). Therefore, this method mainly focuses on examining data through a source or a combination of different sources and reaching outcomes by deeply analyzing them. The data analysis process began with gathering the relevant data from the THE WUR datasets for 2015-2025 based on the research questions.

In the following phase, individual univariate tables were created to present the year-based ranking appearances of each HEI for each of the ten Asian countries. The ranking positions and overall ranking trends of HEIs through the selected cases were analyzed. Based on the data analyzed, the researcher made interpretations regarding increasing or decreasing ranking trends for each case. The existence of a quantitatively large number of HEIs and year-based intense fluctuations observed among those prevented the researcher from selecting a concrete numerical unit to evaluate the increasing or decreasing trend of global institution rankings. In cases where HEIs improved (e.g., from 251-300 to 201-250) their rankings every two-year period (e.g., 2018-2019) and had an overall positive trend over ten years, the researcher considered that the HEIs had a successful momentum in the global rankings. Conversely, in cases where HEIs decreased (e.g., from 201-250 to 251-300) their rankings every two-year period and performed an overall negative trend over ten years, the HEIs reviewed had an unsuccessful momentum in the global rankings. In the final phase of the analysis process, the researcher suggested potential higher education policies that might boost the current rankings for each case.

Validity and Reliability

There are different strategies or approaches to ensure or increase validity in qualitative research. One of these strategies, called analyst triangulation, focuses on subjecting the data to a meticulous and comparative evaluation and analysis process by two or more people other than the researcher (Patton, 2002, p. 560). Following the characteristics of this strategy, the analyses carried out by the researcher were carefully examined by two external evaluators. Then, the researcher completed the necessary revisions by considering the feedback from the external evaluators. This process aimed to increase the validity level of the research.

Ethics Procedure

This study does not require ethics committee approval since it does not involve human participants or animal research objects at any stage of the research process. Additionally, the open-access nature of the THE WUR website ensures a high level of

transparency and accuracy in the data collection and interpretation processes throughout the study. The availability of the dataset used in the research in an unalterable form also prevents potential biases and improves the overall accountability and fairness levels.

Results

This section presents the overall ranking positions of each HEI in selected Asian countries from 2015 to 2025 through tables based on the THE WUR dataset.

China

The top five Chinese HEIs in the 2024 THE Asia University Rankings were examined for their world rankings between 2015 and 2025. These HEIs are Tsinghua University, Peking University, Fudan University, Zhejiang University, and Shanghai Jiao Tong University. The current rankings of the selected Chinese HEIs are shown in Table 1 below.

Table 1

Global Rankings of Chinese HEIs Year-by-Year

HEIs	Years										
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Tsinghua University	49	=47	35	30	22	23	=20	=16	16	12	12
Peking University	48	42	29	=27	31	24	23	=16	17	14	13
Fudan University	193	201-250	155	116	104	109	=70	60	51	44	=36
Zhejiang University	301-350	251-300	201-250	=177	101	=107	=94	=75	67	=55	=47
Shanghai Jiao Tong University	276-300	301-350	201-250	=188	189	=157	100	84	52	43	52

Note. This table was created based on the *THE World University Rankings* for the period 2015-2025. <https://www.timeshighereducation.com/world-university-rankings>

Table 1 shows that Tsinghua University was ranked 49th in 2015 and increased to 12th place among world universities in 2025. This HEI had a static ranking performance between 2022 (=16) and 2023 (16). Almost in the same way, Peking University gradually improved its ranking positions year by year. In 2015, this university obtained 48th place just before Tsinghua University and reached 13th place in 2025. Even though they were not among the top 50 HEIs in 2015, Fudan University and Shanghai Jiao Tong University performed well in advance by being among the top 50 HEIs worldwide in 2024. However, Shanghai Jiao Tong University could not protect its position in the top 50 by decreasing its ranking to 52 in 2025. Lastly, in 2025, Zhejiang University obtained 47th place and succeeded in being ranked in the top 50 HEIs worldwide, just like other Chinese HEIs, except Shanghai Jiao Tong University.

Table 1 indicates that Tsinghua University and Peking University, which have the highest ranks (Tsinghua University =12 and Peking University =13) in the 2025 THE WUR, consistently enhanced their academic rankings from 2015 to 2025 with minimal fluctuations except for a few year periods. In the same direction, the other three Chinese HEIs, including Fudan, Zhejiang, and Shanghai Jiao Tong, also had an increasing achievement momentum year by year even though they did not have a clear and continuous positive direction in terms of their ranking success compared to Tsinghua and Peking Universities.

India

The top five Indian HEIs in the 2024 THE Asia University Rankings were examined for their global world rankings between 2015 and 2025. These HEIs are the Indian Institute of Science, Anna University, Mahatma Gandhi University, Jamia Millia Islamia, and Shoolini University of Biotechnology and Management Sciences. The current rankings of selected Indian HEIs are shown in Table 2 below.

Table 2

Global Rankings of Indian HEIs Year-by-Year

HEIs	Years										
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Indian Institute of Science	276-300	251-300	201-250	251-300	251-300	301-350	301-350	301-350	251-300	201-250	201-250
Anna University	-	-	-	-	-	1001+	1001+	801-1000	801-1000	501-600	401-500
Mahatma Gandhi University	-	-	-	-	-	-	601-800	601-800	401-500	501-600	401-500
Jamia Millia Islamia	-	-	-	801-1000	801-1000	601-800	601-800	601-800	501-600	501-600	501-600
Shoolini University of Biotechnology and Management Sciences	-	-	-	-	-	-	-	Reporter	351-400	501-600	401-500

Note. This table was created based on the *THE World University Rankings* for the period 2015-2025. <https://www.timeshighereducation.com/world-university-rankings>

According to Table 2, only one Indian HEI, the Indian Institute of Science, consistently featured in the THE WUR from 2015 to 2025. This HEI found a ranking spot mostly between 251 and 300. Anna, Mahatma Gandhi, and Jamia Millia Islamia HEIs have been performing positively with ongoing momentum regarding global rankings although they were not on the ranking lists in 2015, 2016, and 2017. However, one of the HEIs examined, Shoolini University of Biotechnology and Management

Sciences, showed an inconsistent ranking performance as its rankings in 2023 (=351-400), 2024 (=501-600), and 2025 (=401-500) had highly fluctuated patterns.

Table 2 reflects that only one HEI in India, the Indian Institute of Science, seeks almost a linear path regarding its global rankings. Although this HEI did not obtain the top 50 or 100 ranks in all the years analyzed, it usually managed to find a place within the 251-300 ranking range. Secondly, the general ranking momentum observed in Anna and Jamia Millia Islamia HEIs was positive, and these HEIs improved their global ranks year by year among their stakeholders' positions in the ranking datasets analyzed. Even if the rankings of Mahatma Gandhi University and Shoolini University of Biotechnology and Management Sciences drew mostly an increasing ranking pattern, the global ranks of both HEIs decreased in 2024 compared to the previous year.

Indonesia

The top five Indonesian HEIs in the 2024 THE Asia University Rankings were examined for their global world rankings between 2015 and 2025. These HEIs are the University of Indonesia, Bandung Institute of Technology (ITB), BINUS University, Universitas Sebelas Maret, and Universitas Gadjah Mada. The current rankings of selected Indonesian HEIs are shown in Table 3 below.

Table 3

Global Rankings of Indonesian HEIs Year-by-Year

HEIs	Years										
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
University of Indonesia	-	601-800	801+	801-1000	601-800	601-800	801-1000	801-1000	1001-1200	801-1000	801-1000
Bandung Institute of Technology (ITB)	-	-	801+	801-1000	801-1000	1001+	1001+	1001-1200	1201-1500	1201-1500	1201-1500
BINUS University	-	-	-	-	-	-	-	1201+	1201-1500	1201-1500	1201-1500
Universitas Sebelas Maret	-	-	-	-	-	-	-	1201+	1201-1500	1201-1500	1201-1500
Universitas Gadjah Mada	-	-	-	801-1000	1001+	1001+	1001+	1201+	1201-1500	1201-1500	1201-1500

Note. This table was created based on the *THE World University Rankings* for the period 2015-2025. <https://www.timeshighereducation.com/world-university-rankings>

Table 3 revealed that no Indonesian HEIs had a place in the 2015 THE WUR. The University of Indonesia was in the ranking index for the first time in 2016, whereas the Bandung Institute of Technology (ITB) was in the index for the first time in 2017. Then, the Universitas Gadjah Mada followed the Bandung Institute of Technology (ITB) and found a place in the index for the first time in 2018. BINUS University and

Universitas Sebelas Maret have been in the THE WUR since 2022. *Table 3* indicates that the Indian HEI examples examined either performed a negative performance in terms of their ranking statuses year by year or had a neutral direction regarding their global rankings. For example, the year-based rankings of the University of Indonesia constantly fluctuated, and its rankings were generally within 801-1000. Bandung Institute of Technology (ITB) and the Universitas Gadjah Mada achieved a rank between 801-1000 or 801+ in all years as the highest achievement rate. However, their rankings gradually decreased and reached the 1201-1500 rank range by the recent ranking datasets.

Table 3 also reflects that the University of Indonesia had the most fluctuating rankings throughout the years analyzed. Unlike the University of Indonesia and its fluctuating ranking status, all Indian HEIs (Bandung Institute of Technology (ITB), BINUS University, Universitas Sebelas Maret, Universitas Gadjah Mada) had a low level of performance pattern regarding their global positions due to their decreasing rankings during the ten years.

Pakistan

The top five Pakistani HEIs in the 2024 THE Asia University Rankings were examined for their global world rankings between 2015 and 2025. These HEIs are Quaid-i-Azam University, Air University, National University of Sciences and Technology, COMSATS University Islamabad, and Government College University Faisalabad. The current rankings of selected Pakistani HEIs are shown in Table 4 below.

Table 4

Global Rankings of Pakistani HEIs Year-by-Year

HEIs	Years										
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Quaid-i-Azam University	-	501-600	601-800	401-500	-	401-500	501-600	501-600	401-500	401-500	401-500
Air University	-	-	-	-	-	-	-	-	Reporter	601-800	601-800
National University of Sciences and Technology	-	601-800	601-800	601-800	801-1000	801-1000	801-1000	801-1000	801-1000	601-800	601-800
COMSATS University Islamabad	-	-	601-800	601-800	601-800	601-800	601-800	801-1000	601-800	601-800	601-800
Government College University Faisalabad	-	-	-	-	-	-	801-1000	601-800	501-600	601-800	601-800

Note. This table was created based on the *THE World University Rankings* for the period 2015-2025. <https://www.timeshighereducation.com/world-university-rankings>

Similar to Indonesian HEI examples, Table 4 shows that no Pakistani HEIs were in the THE World University Rankings 2015. On the one hand, Quaid-i-Azam University had the most successful global rankings among the other Pakistani HEIs in all years by obtaining a rank between 401-500 in 2025. On the other hand, Air University was included only for 2024 (=601-800) and 2025 (=601-800) in THE World University Rankings, except for its reporter status in 2023. All other Pakistani HEIs were in the 601-800 or 801-1000 ranking range in all years examined, except for the 2023 ranking performance of Government College University Faisalabad (=501-600).

According to Table 4, there is no static or positive/negative pattern in terms of global ranking statuses of Pakistani HEIs in the light of the THE WUR datasets between 2015 and 2025. Since 2016, all Pakistani HEIs performed an inconsistent ranking momentum. This situation means all HEIs had completely uncorrelated and random ranking patterns among their stakeholders worldwide, without giving any weight to any direction in the context of increasing and decreasing ranking situations. For instance, in 2019, Quaid-i-Azam University could not find a place for itself worldwide, even though it seems that it had the most successful rankings among Pakistani counterparts since 2015. Moreover, except for Air University and Government College University Faisalabad, other Pakistani HEIs (Quaid-i-Azam University, National University of Science and Technology, and COMSATS University Islamabad) appeared together in the ranking datasets from 2017 onwards, but there was no change in their performance, either positively or negatively.

Bangladesh

The top five Bangladesh HEIs in the 2024 THE Asia University Rankings were examined for their global world rankings between 2015 and 2025. These HEIs are Bangladesh University of Engineering and Technology, Bangladesh Agricultural University (BAU), Jahangirnagar University, BRAC University, and North South University. The current rankings of selected Bangladesh HEIs are shown in Table 5 below.

Table 5 reflects that Bangladesh University of Engineering and Technology has found itself in the 1001+ ranking position of the global ranking index as of 2021. In the latest ranking dataset, this HEI maintained its ranking status (=1001-1200). Similarly, Bangladesh Agricultural University (BAU), which entered the global ranking competition in 2022 with a rank range of 1001-1200, remained in the same position in the 2025 THE WUR. In 2024, two other Bangladesh HEIs, Jahangirnagar and BRAC universities, are included in the index with the same rankings (=801-1000). Jahangirnagar University maintained its global ranking in 2025 (=801-1000), while BRAC University downgraded its global ranking in the same year (=1001-1200). Finally, North South University, which was first indexed with a rank of 601-800 in the 2023 THE WUR, downgraded its ranking in 2024 and 2025, giving it a rank of 801-1000.

Table 5
Global Rankings of Bangladesh HEIs Year-by-Year

HEIs	Years										
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Bangladesh University of Engineering and Technology	-	-	-	-	-	-	1001+	1201+	1201-1500	1001-1200	1001-1200
Bangladesh Agricultural University (BAU)	-	-	-	-	-	-	-	1001-1200	1201-1500	1001-1200	1001-1200
Jahangirnagar University	-	-	-	-	-	-	-	-	-	801-1000	801-1000
BRAC University	-	-	-	-	-	-	-	-	-	801-1000	1001-1200
North South University	-	-	-	-	-	-	-	-	601-800	801-1000	801-1000

Note. This table was created based on the *THE World University Rankings* for the period 2015-2025. <https://www.timeshighereducation.com/world-university-rankings>

Table 5 also shows that most Bangladesh HEIs examined had a neutral tendency regarding their global ranking positions. Jahangirnagar University, which was in the world rankings for only two years, retained its place in the 2024 and 2025 indexes. However, Bangladesh HEIs examined in this study were not as successful as their international counterparts in the THE WUR. These HEIs did not find places for themselves between 2015 and 2020. The absence of a comprehensive dataset on the global ranking positions of Bangladeshi HEIs has prevented a thorough analysis of their global academic success. This situation has caused the failure to draw a positive or negative pattern of ranking fluctuations from year to year.

Russian Federation

The top five Russian HEIs in the 2025 THE WUR were examined for their global world rankings between 2015 and 2025. These HEIs are Lomonosov Moscow State University, Moscow Institute of Physics and Technology (MIPT), Bauman Moscow State Technical University, HSE University, and National Research Nuclear University MEPhI. The current rankings of selected Russian HEIs are shown in Table 6 below.

Table 6

Global Rankings of Russian HEIs year-by-year

HEIs	Years										
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Lomonosov Moscow State University	196	=161	=188	194	=199	=189	=174	=158	=163	=95	=107
Moscow Institute of Physics and Technology (MIPT)	-	501-600	301-350	251-300	251-300	201-250	201-250	201-250	201-250	201-250	251-300
Bauman Moscow State Technical University	-	501-600	601-800	801-1000	801-1000	801-1000	401-500	801-1000	501-600	401-500	351-400
HSE University	-	-	401-500	351-400	301-350	251-300	251-300	301-350	401-500	401-500	401-500
National Research Nuclear University MEPhI	-	251-300	401-500	401-500	351-400	401-500	401-500	401-500	401-500	401-500	501-600

Note. This table was created based on the *THE World University Rankings* for the period 2015-2025. <https://www.timeshighereducation.com/world-university-rankings>

As the most successful HEI among the other Russian HEIs examined, Lomonosov Moscow State University obtained =107th place in the 2025 THE WUR. This HEI also succeeds in being ranked among the top 200 HEIs worldwide in all the years between 2015 and 2025. The second most successful Russian HEI in the global academic rankings, the Moscow Institute of Physics and Technology (MIPT), had the worst ranking performance in 2016 but was ranked between 251 and 300 in the 2025 ranking index. HSE University was not in the ranking index in 2015 and 2016. However, it appeared all the other years and was among the top 500 HEIs worldwide, even at its worst ranking performance. National Research Nuclear University MEPhI put forward similar performance and was among the top 500 HEIs in all the years examined, except for 2025 THE WUR. According to the 2025 rankings, this HEI had a 501-600 ranking range among global partners. The least successful Russian HEI in the ranking indexes, Bauman Moscow State Technical University, obtained a 351-400

ranking range in the most recent index. This university has been among the top 1000 HEIs since 2016, despite being the least successful university in Russia among its national peers.

Table 6 shows that all Russian HEIs examined, excluding HSE University, were in the THE Rankings between 2016 and 2025. These HEIs drew a stable and ongoing pattern regarding their year-based rankings with minor fluctuations. In some years, these HEIs either performed decreasing or increasing ranking patterns, whereas they mostly maintained their ranking ranges in the ranking index of each new year. However, Bauman Moscow State Technical University could not provide stability regarding its year-based rankings, and the ranking range of this HEI significantly fluctuated each year. For example, according to the 2021 THE WUR, this HEI had a 401-500 ranking range. Then, this appearance suddenly changed in the 2022 ranking index negatively. However, in 2023, this HEI increased its ranking from 801-1000 to 501-600 through a sharp shift. This fluctuation followed the next years or was observed in previous years.

Japan

The top five Japanese HEIs in the 2024 THE Asia University Rankings were examined for their global world rankings between 2015 and 2025. These HEIs are the University of Tokyo, Kyoto University, Tohoku University, the University of Osaka, and Tokyo Institute of Technology. The current rankings of selected Japanese HEIs are shown in Table 7 below.

Table 7

Global Rankings of Japanese HEIs Year-by-Year

HEIs	Years										
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
The University of Tokyo	23	43	39	46	42	=36	=36	=35	39	29	28
Kyoto University	59	=88	=91	=74	65	65	=54	61	68	=55	55
Tohoku University	165	201-250	201-250	201-250	251-300	251-300	201-250	201-250	201-250	=130	120
The University of Osaka	157	251-300	251-300	201-250	251-300	301-350	351-400	301-350	251-300	=175	162
Tokyo Institute of Technology	141	201-250	251-300	251-300	251-300	251-300	301-350	301-350	301-350	=191	195

Note. This table was created based on the *THE World University Rankings* for the period 2015-2025. <https://www.timeshighereducation.com/world-university-rankings>

Table 7 demonstrates that Japanese HEIs have always been in the global competition among their international counterparts since 2015. The five Japanese HEIs analyzed in this research were at the top of global ranking indexes every year. Although

all five Japanese HEIs were in the indexes, the University of Tokyo and Kyoto University were more successful than the other Japanese HEIs. These HEIs found places in the top 100 HEIs between 2015 and 2025. The University of Tokyo reached its peak ranking point in 2015 with its 23rd rank and made 28th rank in the most recent index. Kyoto University achieved the 54th rank in 2021 and showed a similar performance in 2024 and 2025 by having 55th place worldwide. Three Japanese HEIs did not enter the top 100 in any of the years. One of them, Tohoku University, performed its worst ranking performance in 2019 and 2020 as it was between the 251-300 ranking range. However, this HEI reached the 120th rank in 2025. The University of Osaka ranked 157th in 2015 and found a similar point in the 2025 THE WUR index, where it was ranked 162nd. Tokyo Institute of Technology showed its best ranking performance in 2015, ranking 141st worldwide. Over the years under review, this HEI achieved the second and third-best ranking positions in 2024 (=191) and 2025 (195).

Table 7 also shows that two Japanese HEIs, the University of Tokyo and Kyoto University, follow an almost stable success pattern in a positive direction over the 10 years. In contrast, the other three Japanese HEIs had significant fluctuations in their rankings over the years. The pattern in the global academic rankings over the years analyzed in the context of Tohoku University, the University of Osaka, and Tokyo University of Technology is that all three HEIs experienced maximum fluctuations between 2016 and 2023. Between these years, they have not been able to maintain a stable position among their global stakeholders compared to other years. Similarly, since 2024, all three HEIs managed to recapture the success they achieved in 2015 by being among the top 200 world universities. This stability ensured that the fluctuation between 2016 and 2023 changed in 2024 and gained more regular status.

Philippines

The top five Philippine HEIs in the 2024 THE Asia University Rankings were examined for their global world rankings between 2015 and 2025. These HEIs are Ateneo de Manila University, the University of the Philippines, De La Salle University, Mapúa University, and the University of Santo Tomas. The current rankings of selected Philippines HEIs are shown in Table 8 below.

Table 8 highlighted that the most successful Philippine HEI ranked among international HEIs since 2017 was the University of the Philippines. This HEI had its best global rank in 2020 and 2021, with its 401-500 rank range among its national counterparts. One of the other Philippine HEIs, De La Salle University entered the ranking index in 2019 and also made its best global rank that year with 801-1000 rank range. Ateneo de Manila University has been in the international ranking index since 2022 but started occupying a global rank in 2023 with its 351-400 rank range. Similarly, in 2023, the University of Santo Tomas was in reporter position and made its first ranks in 2024 (=1501+) and 2025 (=1501+). Mapúa University, one of the other Philippine HEI examined, entered the index in 2023 and maintained its position (1501+) through three consequent years between 2023 and 2025.

Table 8
Global Rankings of Philippine HEIs Year-by-Year

HEIs	Years										
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Ateneo de Manila University	-	-	-	-	-	-	-	Reporter	351-400	1001-1200	1001-1200
University of the Philippines	-	-	801+	601-800	501-600	401-500	401-500	601-800	801-1000	1201-1500	1201-1500
De La Salle University	-	-	-	-	801-1000	1001+	1001+	1201+	1201-1500	1501+	1501+
Mapúa University	-	-	-	-	-	-	-	-	1501+	1501+	1501+
University of Santo Tomas	-	-	-	-	-	-	-	-	Reporter	1501+	1501+

Note. This table was created based on the *THE World University Rankings* for the period 2015-2025. <https://www.timeshighereducation.com/world-university-rankings>

According to Table 8, only Mapúa University and the University of Santo Tomas performed a regular and stable ranking performance since their ranking positions were always the same as different from the other Philippine HEIs in the list. Ateneo de Manila University showed a decreasing success trend in terms of its global rank worldwide. Similarly, De La Salle University has shown a decreasing trend in terms of global ranking success since 2019, whereas it protected its position between 2020-2021 and 2024-2025. However, that did not change its overall negative ranking tendency during the then years analyzed. Unlike the four Philippine HEIs mentioned above, the University of the Philippines had the most stable and regular global rank pattern among its national counterparts in the list. This HEI performed an increasing trend in terms of its global rank from 2018 to 2021. Afterward, its rankings began to decline, although it is still among the top 1500 HEIs worldwide as of 2025.

Vietnam

The top five Vietnamese HEIs in the 2024 THE Asia University Rankings were examined for their global world rankings between 2015 and 2025. These HEIs are Hanoi University of Science and Technology, Duy Tan University, Ton Duc Thang University, Vietnam National University, Hanoi, and Hue University. The current rankings of selected Vietnamese HEIs are shown in Table 9 below.

Table 9

Global Rankings of Vietnamese HEIs Year-by-Year

HEIs	Years										
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Hanoi University of Science and Technology	-	-	-	-	-	801-1000	1001+	1201+	1501+	1501+	1501+
Duy Tan University	-	-	-	-	-	-	-	401-500	401-500	601-800	601-800
Ton Duc Thang University	-	-	-	-	-	-	-	401-500	401-500	601-800	601-800
Vietnam National University, Hanoi	-	-	-	-	-	801-1000	801-1000	1001-1200	1001-1200	1201-1500	1201-1500
Hue University	-	-	-	-	-	-	-	-	1501+	1501+	1501+

Note. This table was created based on the *THE World University Rankings* for the period 2015-2025. <https://www.timeshighereducation.com/world-university-rankings>

Table 9 highlighted that the two most successful Vietnamese HEIs among national and international HEIs were Duy Tan and Ton Duc Thang Universities. These HEIs were in the index as of 2022. Besides, by the end of 2023, they were among the top 500 HEIs worldwide. Even though these HEIs declined their global academic ranking positions after 2023, they continued to be the best HEIs in Vietnam and to be in the top 800 HEIs worldwide in the 2024 and 2025 THE WUR. Since 2020, Hanoi University of Science and Technology and Vietnam National University, Hanoi were the two Vietnamese HEIs in the ranking index. Hanoi University of Science and Technology achieved its best global ranking in 2020 by entering the 801-1000 ranking range, while Vietnam National University, Hanoi achieved its best global ranking by having the same ranking range (801-1000) in 2020 and 2021. The other Vietnamese HEI, Hue University, was the youngest member of the global ranking index among its national counterparts. This HEI has been included in the ranking index in 2023 and succeeded in maintaining the same ranking (1501+) in 2023, 2024, and 2025.

Table 9 also indicates an ongoing downgrade in global achievement trends for all Vietnamese HEIs except HUE University. Compared to the 2020 ranking statuses, Hanoi University of Science and Technology and Vietnam National University, Hanoi performed declining global rankings in the following years until 2025. After two years, Duy Tan University and Ton Duc Thang University put forward similar ranking outcomes. Compared to 2022, when they first appeared in the THE WUR, these HEIs could not maintain their best ranking positions in subsequent years and demonstrated a declining ranking trend among their international counterparts.

Thailand

The top five Thai HEIs in the 2024 THE Asia University Rankings were examined for their global world rankings between 2015 and 2025. These HEIs are Chulalongkorn University, Mahidol University, King Mongkut's University of Technology Thonburi, Chiang Mai University, and Khon Kaen University. The current rankings of selected Thai HEIs are shown in Table 10 below.

Table 10

Global Rankings of Thai HEIs Year-by-Year

HEIs	Years										
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Chulalongkorn University	-	601-800	601-800	601-800	801-1000	801-1000	601-800	801-1000	801-1000	601-800	601-800
Mahidol University	-	501-600	501-600	501-600	601-800	601-800	601-800	601-800	801-1000	601-800	601-800
King Mongkut's University of Technology Thonburi	351-400	601-800	601-800	601-800	801-1000	1001+	801-1000	801-1000	801-1000	801-1000	801-1000
Chiang Mai University	-	601-800	601-800	801-1000	801-1000	1001+	1001+	1001-1200	1001-1200	801-1000	1001-1200
Khon Kaen University	-	601-800	801+	801-1000	1001+	1001+	1001+	1201+	1201-1500	1201-1500	1001-1200

Note. This table was created based on the *THE World University Rankings* for the period 2015-2025. <https://www.timeshighereducation.com/world-university-rankings>

Table 10 reveals the success of Thai HEIs in the global arena as they have been a part of the THE WUR since 2015 and 2016. Among the other Thai HEIs on the list, King Mongkut's University of Technology Thonburi was the best one because it was in the top 400 HEIs worldwide in 2015. Then, this HEI obtained the worst ranking range position (=1001+) in 2020. The second-best ranking position belonged to Mahidol University. This HEI was placed within the 501-600 ranking range in three subsequent years (2016-2017-2018), whereas it showed its worst ranking performance in 2023

(=801-1000). The third best-performing Thai HEI in global ranking positions was Chulalongkorn University through its 601-800 ranking range in six years between 2015-2025. Although the other two Thai HEIs, Chiang Mai University, and Khon Kaen University, showed similar ranking performance to Chulalongkorn University, their worst ranking positions were far behind Chulalongkorn University in most of the years examined (for Chiang Mai University, =1001-1200, in 2022, 2023, and 2025; for Khon Kaen University, =1201-1500, in 2023 and 2024).

According to Table 10, most Thai HEIs maintained their global ranking positions with only minor fluctuations, but these fluctuations are generally negative. The general momentum observed since the 2015 THE WUR was that most Thai HEIs declined their global rankings in most of the years examined. For instance, one Thai HEI, King Mongkut's University of Technology Thonburi, performed a negative achievement pattern due to its decreasing global rankings between 2015-2016, 2018-2019, and 2019-2020. Khon Kaen University has also been a part of this declining ranking trend similar to King Mongkut's University of Technology Thonburi, and its global rankings decreased between 2016-2017, 2018-2019, and 2021-2022. Chiang Mai University showed parallel ranking performances similar to King Mongkut's University of Technology Thonburi and Khon Kaen University. Unlike these HEIs, Chulalongkorn University was the most consistent and stable Thai HEI examined in terms of its global rankings since it mostly found a 601-800 ranking range for itself, except for the 2019, 2020, 2022, and 2023 indexes.

Discussion and Conclusion

The dynamic and multidimensional structure of globalization and its comprehensive effects on HEIs push them to be a part of ongoing global competition in higher education. For this reason, HEIs try to keep pace with this fierce competition. They aim to enhance their academic quality by hiring reputable academics worldwide and publishing much more research in education, health sciences, engineering, and social sciences in eminent journals or publishing houses than their stakeholders. HEIs also try to design and implement innovations to appeal to students of different ages or interests in scientific areas worldwide. All these efforts, which deeply affect the current and future policy movements and priorities of HEIs, serve various purposes, such as making HEIs more preferred and recognized among their competitors worldwide.

While the domination of American and European HEIs in various global ranking indexes, such as QS, THE, or ARWU, is clear, there are several reasons why having a large number of HEIs at the top of international rankings is also crucial for Asian countries. One of the main reasons behind this fact is that Asian countries may expand and stabilize their global growth, visibility, and reputation through globally top-ranked national HEIs. This situation may positively affect the perception and preferences of successful students to study in Asian HEIs as a solid alternative to certain countries that are at the forefront of higher education worldwide (e.g., the US, the UK, or Canada). Globally visible and successful Asian HEIs may also motivate and attract respected international academics to work in these countries. Moreover, the increasing interest in HEIs in Asia may lead Asian countries to prioritize designing and implementing new higher education policies that support HEIs, international students and academics, and general teaching and learning processes. By embracing the role and power of

contemporary higher education policies and reforms, Asian governments can provide HEIs with more flexibility to maintain their successful positions on a global scale. For these reasons, global ranking indexes have macro-level significance in making Asian HEIs the main attraction hubs in higher education and contributing to the socioeconomic and cultural development of Asian countries.

By examining the global rankings of selected Asian HEIs between 2015 and 2025 through the THE WUR, this study revealed that the global rankings of HEIs in most Asian countries, except Japan, China, and Russia, lag behind their international competitors. Moreover, HEIs in most countries did not have a stable profile regarding their rankings since they could not follow a balanced or positive pattern among their global competitors. This study indicated that China and Japan were the most successful Asian countries in their HEIs, and these countries always placed first in the global ranking competition. In almost every year analyzed, Chinese HEIs improved their academic ranks globally and ranked in the top 100 HEIs among their international counterparts. Thus, Chinese HEIs had a more visible and successful global ranking trend year-by-year in the world higher education arena. These outcomes supported the current literature that put forward the academic success of Chinese HEIs in different types of global ranking indexes as eminent Asian cases (Lee et al., 2020; Liu, 2016). The rising global ranking trend of Chinese HEIs worldwide can be explained by the outcomes of higher education policy initiatives in China. The reason was that one of the key higher education policy initiatives in China was to establish well-qualified universities that could compete with Western HEIs (Allen, 2017). By updating the existing research that highlights the decline in global rankings of HEIs in Japan (Ishikawa, 2021), this study also found that Japanese HEIs recovered from low global rankings and achieved a sharp and positive momentum in terms of their global rankings over the past two years. The current literature vitally criticizes the lack of internationalization movements as the cause of Japanese HEIs' low global rankings (Yonezawa, 2010). For this reason, these outcomes can be evaluated as the result of improving the level of internationalization for Japanese HEIs in the higher education arena. For the Russian Federation case, this study revealed that Russian HEIs were among the best performers in all the other Asian HEIs examined. These HEIs performed in a stable and positive direction regarding their global rankings from 2015 to 2025. Considering the effects and outcomes of multidimensional variables such as military conflicts or political issues in Russia, these stable global rankings of Russian HEIs are an indicator of how this country gives importance to being at the forefront of higher education.

This study revealed that Indian HEIs advanced well in their rankings compared to other Asian countries except China, Japan, and Russia. Even though previous studies paid attention to the fact that the rankings of Indian universities lagged among their global counterparts (Altbach, 2006; Basu, 2013), this study showed that Indian HEIs analyzed performed a positive trend in terms of their global academic rankings based on the THE WUR dataset between 2015 and 2025. Unlike the countries that increased their global rankings consistently or caught a positive ranking trend by the ranking indexes examined (i.e., China, Japan, Russia, and India), this study revealed that HEIs in the Philippines, Indonesia, Thailand, and Pakistan either performed in a neutral direction with slight fluctuations or showed decreasing ranking trends. For the Indonesian HEIs,

these decreasing global rankings can be related to the inadequate level of autonomy for HEIs or lack of support for research and innovation practices in higher education (Gaus, 2024). Even though Thai HEIs performed minor fluctuations regarding their global rankings, the direction of these fluctuations was generally negative. Therefore, in most of the years analyzed, Thai HEIs experienced decreased global rankings among their international stakeholders. The focal points that may change the current negative ranking pattern in favor of Thai HEIs can depend on providing quality in different parts of higher education through various actions (Chaemchoy et al., 2021; Hemthong et al., 2023). Similar to the case of Thailand, the overall rankings of Pakistani and Philippine HEIs between 2015 and 2025 either followed a stable pattern or showed a downward trend.

Unlike Asian HEIs performing rising global ranking trends in the international context or having downward ranking patterns, Bangladesh HEIs were newcomers to the THE WUR as they have been indexing only for a few years. However, their ranking trends were neutral. The HEIs in this country mostly tend to maintain their ranking with minimal fluctuations in a negative direction since 2021. Even though their global ranking history goes back a bit further, compared to Bangladesh HEIs, Vietnamese HEIs started to appear in the ranking index as of 2020. More clearly than Bangladeshi HEIs, the global rankings of Vietnamese HEIs showed a downward trend from year to year among world countries. At this point, this country was one of the examples of countries that showed the most pronounced negative decline pattern in global academic rankings among the Asian countries examined.

This research had two limitations. The first limitation of this research was to examine only the top five HEIs in selected ten Asian countries, which had the largest populations in the continent and indexed by the 2024 THE Asia University Rankings and the THE WUR 2025 (for the Russian Federation case). Therefore, this research did not examine the other Asian countries or Asian HEIs that succeeded in being indexed in the ranking index. The second limitation of this research was that it did not discuss the changing ranking patterns of Asian HEIs through other eminent ranking systems, such as QS World University Rankings or Webometrics Rankings of Web Universities. Given these limitations, future researchers should ensure diversity across Asian countries and their HEIs and consider examining country and HEI samples through different global and recognized ranking indexes.

Implications

This research discovered that the rankings of most Asian HEIs were generally behind their counterparts in other continents except for Japan, China, and Russia. Moreover, HEIs in most Asian countries did not have a stable profile regarding their rankings as they could not follow a balanced or positive ranking pattern among their global competitors. Based on these outcomes, this research offers some higher education policy recommendations for Asian countries to increase the global academic ranking positions of HEIs:

- The globalization efforts to establish solid networks with global stakeholders for research, teaching, and academic exchange opportunities should be diversified and adopted as a key government policy in higher education to increase the visibility of Asian HEIs worldwide.

- HEIs in Asia should be aware of the importance of global marketing activities through effective public relations to attract domestic and international students who are interested and eager to be accepted by elite HEIs in Europe or North America.
- Asian governments should expand the content of funding opportunities to make their HEIs more competitive and better qualified in terms of the benefits they offer to prospective students.
- Asian HEIs should consider opening overseas offices or bureaus to expand the scope of their global campaigns and become more visible worldwide, especially in developed European countries and the United States. At this point, Asian governments should create required financial legal regulations as a permanent policy action to facilitate Asian HEIs to move in this direction.

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Statement of Responsibility

This research was carried out by a single author.

Conflicts of Interest

There is no conflict of interest in this research.

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The Impact of Interactive Videos on English Language Learning: Achievement and Attitudinal Outcomes in Turkish Fifth-Grade Classrooms*

Etkileşimli Videoların İngilizce Öğrenimine Etkisi: Beşinci Sınıflarda Başarı ve Tutumsal Sonuçlar

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ABSTRACT: This study investigated the effectiveness of interactive videos on English language achievement and attitudes among Turkish secondary school students. While interactive videos have shown promise in language education, empirical evidence regarding their impact on secondary school students' achievement and attitudes remains limited. Using a quasi-experimental design, 80 fifth-grade students were divided into experimental ($n=42$) and control ($n=38$) groups. The experimental group received instruction through interactive videos incorporating multiple-choice, fill-in-the-blank, drag-and-drop, true/false, and open-ended questions, while the control group received traditional instruction. Data were collected using pre- and post-tests for academic achievement and an attitude scale for English language learning. Results revealed a significant improvement in academic achievement for the experimental group compared to the control group, with a large effect size. However, no significant changes were observed in students' attitudes toward English language learning within or between groups. These findings highlight the cognitive benefits of interactive videos in fostering listening comprehension, vocabulary acquisition, and overall language proficiency, while suggesting that affective outcomes may require longer interventions or additional instructional strategies. This study contributes to the growing body of literature on technology-enhanced language learning and offers practical implications for integrating interactive videos into English language instruction.

Keywords: Academic achievement, English language learning, interactive videos, secondary school, student attitudes.

ÖZ: Bu çalışma, etkileşimli videoların Türkiye'deki ortaokul öğrencilerinin İngilizce dil başarıları ve tutumları üzerinde etkililiğini incelemiştir. Etkileşimli videolar dil eğitiminde umut vaat etse de, ortaokul öğrencilerinin başarıları ve tutumları üzerindeki etkilerine dair deneysel kanıtlar sınırlıdır. Yarı deneysel bir desen kullanılarak 80 beşinci sınıf öğrencisi deney ($n=42$) ve kontrol ($n=38$) gruplara ayrılmıştır. Deney grubu, çoktan seçmeli, boşluk doldurma, sürükle-bırak, doğru/yanlış ve açık uçlu sorular içeren etkileşimli videolarla öğretim almış; kontrol grubu ise geleneksel öğretim yöntemleriyle eğitim görmüştür. Veriler, akademik başarı için ön-test ve son-test ile İngilizce öğrenmeye yönelik tutum ölçeği kullanılarak toplanmıştır. Sonuçlar, deney grubunun kontrol grubuna kıyasla akademik başarıda istatistiksel olarak anlamlı bir artış gösterdiğini ortaya koymuştur. Bununla birlikte, gruplar içinde veya arasında İngilizce öğrenmeye yönelik tutumlarda anlamlı bir değişiklik gözlemlenmemiştir. Bu bulgular, etkileşimli videoların dinleme becerisi, kelime edinimi ve genel dil yeterliliğini desteklemedeki bilişsel faydalarını vurgularken; duyuşsal sonuçlar için daha uzun süreli müdahaleler veya ek öğretim stratejileri gerektirebileceğine işaret etmektedir. Bu çalışma, teknoloji destekli dil öğrenimi alanyazınına katkı sunmakta ve etkileşimli videoların İngilizce öğretimine entegrasyonu için pratik çıkarımlar sağlamaktadır.

Anahtar kelimeler: Akademik başarı, etkileşimli videolar, İngilizce öğrenme, ortaokul, öğrenci tutumları.

* This study is based on the first author's MSc thesis research conducted under the supervision of the second author.

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The integration of digital technologies in education has transformed traditional teaching and learning practices, particularly in language education where interactive engagement is crucial to develop proficiency (Cao et al., 2023). Among various educational technologies, interactive videos have emerged as a promising tool that combines multimedia learning with active student participation, offering enhanced opportunities for student engagement and achievement (Wachtler et al., 2016).

Interactive videos differ from traditional educational videos by incorporating elements that require student response and engagement, such as embedded questions, clickable hotspots, and branching scenarios (Akram et al., 2023; Chatti et al., 2016). These features align with cognitive learning theories that emphasize the importance of active processing in knowledge construction (Clark & Mayer, 2016). In language education specifically, interactive videos can provide authentic contexts for language use while maintaining student engagement through structured interactions, offering various benefits including embedded quizzes, annotations, monitoring of student responses, and instant feedback (Bakla, 2017).

In the context of English language teaching, traditional instructional methods often struggle to maintain student engagement and provide authentic language exposure (Bakla & Demiröz, 2024). While video sharing platforms house countless videos on any topic, they do not guarantee learning and engagement (Chen, 2013). Interactive videos offer a potential solution by combining visual and auditory input with opportunities for active participation, enabling learners to progress at their own pace while receiving immediate feedback (Lin & Yu, 2023). However, despite their theoretical benefits, empirical evidence specifically addressing their effectiveness in secondary school English language instruction and their impact on learners' attitudes toward language learning remains limited (Polat & Taslibeyaz, 2024). The few existing studies have primarily focused on achievement outcomes, leaving a significant gap in our understanding of how interactive videos influence learners' attitudes and engagement with language learning materials.

The Turkish educational context presents a particularly interesting case to explore the effectiveness of interactive videos in English language instruction, particularly given the recent emphasis on technology integration and improving English language proficiency in national education reforms. As Turkish students often have limited exposure to English outside the classroom, innovative teaching tools like interactive videos may provide valuable support for enhancing both academic achievement and engagement (Bakla, 2017). However, while the cognitive benefits of interactive videos are well-documented, their impact on learners' attitudes toward English language learning remains underexplored. This study seeks to address these gaps by examining the role of interactive videos in improving English language achievement and investigating their potential influence on students' attitudes toward learning English in a secondary school context.

Literature Review

Interactive Videos in Education

Interactive videos have emerged as a transformative educational tool that extends beyond traditional passive viewing by incorporating elements such as

embedded quizzes, annotations, hyperlinks, and discussion prompts (Lin & Yu, 2023). These features align with Mayer's Cognitive Theory of Multimedia Learning, which emphasizes dual-channel processing and the importance of reducing extraneous cognitive load to optimize learning outcomes (Mayer & Pilegard, 2014). The interactive elements encourage active participation and self-regulated learning while supporting differentiated instruction by allowing learners to progress at their own pace (Bakla, 2017; Palaigeorgiou et al., 2019).

Recent studies have demonstrated various pedagogical affordances of interactive videos. Features such as "jump feedback," which redirects learners to relevant sections after incorrect responses, and embedded quizzes enhance learner comprehension and engagement (Bakla & Demiröz, 2024). These tools facilitate real-time feedback and formative assessment while enabling personalized learning experiences (Cummins et al., 2016; Nyland, 2017). Additionally, learning analytics derived from viewing patterns and quiz performance provide valuable insights for instructional decision-making processes (Kleftodimos & Evangelidis, 2016).

However, the design of interactive videos plays a critical role in their effectiveness. Research highlights the importance of carefully balancing the frequency and placement of interactive elements to prevent cognitive overload, as excessive interactivity can hinder learning rather than enhance it (Bakla & Demiröz, 2024; Polat & Taslibeyaz, 2024). For instance, frequent interruptions caused by interactive components may disrupt the natural flow of the video, creating what has been described as a "Christmas tree effect," where an overload of stimuli overwhelms learners (François, 2004, as cited in Bakla & Demiröz, 2024). This situation suggests the need for thoughtful instructional design that prioritizes both engagement and comprehension. By achieving an optimal balance of interactive elements, educators can maximize the instructional value of interactive videos while maintaining learner focus and motivation.

Impact on Language Learning Achievement

The use of interactive videos in language education has demonstrated significant potential for improving learning outcomes, particularly in areas such as listening comprehension, vocabulary acquisition, and overall language proficiency. The integration of interactive features transforms passive viewing into active learning, fostering deeper cognitive processing essential for language acquisition (Bakla, 2017; Bakla & Demiröz, 2024).

Studies have consistently demonstrated the positive impact of interactive videos on listening comprehension. Tweissi (2016) found that learners using interactive videos with embedded questions outperformed those using traditional videos, while Vural (2013) showed increased engagement time leading to improved listening outcomes. These findings align with Krashen's (1985) Input Hypothesis, as interactive videos allow learners to control their learning pace and ensure input remains comprehensible.

In addition to listening comprehension, interactive videos play a crucial role in vocabulary acquisition. By integrating activities such as vocabulary guesswork, writing definitions, and using words in sentences, interactive videos promote higher levels of cognitive engagement and retention. For example, (Bakla & Demiröz, 2024) found that these activities, combined with features like the "replay" function, encouraged deeper involvement with the material and improved vocabulary retention. This is consistent

with the Levels of Processing model proposed by Craik and Lockhart (1972), which posits that deeper cognitive engagement leads to better memory retention. Furthermore, the multimodal nature of interactive videos—incorporating visual and contextual cues such as images, subtitles, and annotations—helps learners infer the meaning of unfamiliar words and enhances their ability to recall and use new vocabulary in context (Smithwick et al., 2018). Zou and Xie (2019) also reported significant vocabulary gains among learners who used interactive videos created with EdPuzzle, which provided immediate feedback and contextualized vocabulary practice.

The integration of interactive videos into language instruction has also been linked to improvements in overall language proficiency. By combining listening, vocabulary, and critical thinking activities, interactive videos provide a holistic learning experience that supports multiple aspects of language development. For instance, Kolås (2015) found that interactive videos in MOOCs helped learners become active viewers, which improved their retention of content and overall language skills. Similarly, İpek, Kalay, and Ertaş (2021) reported that teacher candidates who engaged in peer learning through interactive videos in a blended learning environment demonstrated improvements in their language proficiency and critical thinking skills. These findings highlight the potential of interactive videos to foster not only linguistic competence but also higher-order thinking skills.

Moreover, interactive videos support self-regulated learning, which is a critical factor in language acquisition. Self-regulated learning strategies, such as planning, monitoring, and evaluating one's progress, can be effectively fostered through interactive video activities. Xu and Luo (2024) conducted a quasi-experimental study that revealed learners who received self-regulated learning training alongside interactive video instruction outperformed their peers in post-listening proficiency tests. This suggests that interactive videos not only enhance specific language skills but also promote the development of metacognitive strategies that are essential for long-term language learning success.

Impact on Learner Attitudes and Engagement

While the cognitive benefits of interactive videos are well-documented, their influence on learners' attitudes and engagement presents a more complex picture. Studies have shown that interactive videos can increase motivation and enjoyment by turning passive viewing into an active learning process (Lawson et al., 2006; Vural, 2013). For example, learners have reported that features like immediate feedback and discussion prompts make the learning experience more engaging and meaningful (Cummins et al., 2016).

However, some research has highlighted challenges related to the use of interactive videos. For instance, Polat and Taşlıbeyaz (2024) found that while interactive videos improved learning performance and reduced cognitive load, they had no significant impact on learners' long-term engagement or emotional satisfaction. Similarly, Bakla and Mehdiyev (2022) reported that learners preferred YouTube videos for their entertainment value but found teacher-created interactive videos more instructive due to their interactive components.

Cultural and contextual factors also play a role in shaping learners' attitudes toward interactive videos. For example, Turkish EFL learners often prioritize "correct

answers" over open-ended discussions, which can limit the effectiveness of interactive elements like discussion questions (Bakla & Demiröz, 2024). This highlights the need for culturally sensitive instructional design that aligns with learners' expectations and preferences.

The Present Study

Despite the growing body of literature on interactive videos, several gaps remain. First, most studies have focused on higher education or adult learners, with limited research on secondary school students. Second, while the cognitive and academic benefits of interactive videos are well-documented, their impact on learners' attitudes and engagement requires further exploration. Finally, there is a lack of research examining the use of interactive videos in the Turkish educational context, where unique challenges and opportunities exist (Bakla, 2017; Polat & Taslibeyaz, 2024).

This study aims to address these gaps by investigating the effectiveness of interactive videos in improving English language achievement and examining their influence on students' attitudes and engagement with language learning materials. The research questions guiding this study are as follows:

1. To what extent do interactive videos improve the English language achievement of fifth-grade secondary school students, as measured by pre- and post-test performance?
2. How do interactive videos influence students' attitudes toward English language learning?

Method

Participants

The study was conducted during the 2023–2024 academic year in a public secondary school located in Kilis, Turkey. The participants consisted of 80 fifth-grade students, with 42 female (52.5%) and 38 male (47.5%) students. These students were divided into two groups: an experimental group with 42 students and a control group with 38 students. Each group was taught by the same teacher to ensure consistency in instructional delivery in classrooms equipped with comparable technological infrastructure, including smartboards.

The experimental group received instruction supported by interactive videos, while the control group was taught using traditional teaching methods. Ethical approval for this study was obtained from the Scientific Research and Publication Ethics Committee for Science and Engineering at Afyon Kocatepe University dated 19.03.2024 and numbered 258742. Additionally, permission to conduct the research was granted by the Kilis Provincial Directorate of National Education. Informed consent was obtained from all participants and their parents prior to the study. The research adhered to ethical guidelines, ensuring the confidentiality and anonymity of participants, voluntary participation, and the right to withdraw from the study at any time without any consequences.

Treatment

The experimental group participated in an instructional program that incorporated interactive videos designed to align with the fifth-grade English curriculum. These interactive videos were developed to cover two curriculum units: "My Daily Routine" and "Health", with the "Telling the Time" topic from the "My Daily Routine" unit prepared as a separate section. As a result, the interactive video content was organized into three main sections: "Telling the Time", "My Daily Routine", and "Health", with a total of three interactive videos for each section.

The videos were designed with the goal of improving students' academic achievement and were tailored to meet the learning outcomes outlined in the Ministry of National Education's English Curriculum for the fifth grade. The interactive videos were designed and refined based on Mayer's Cognitive Theory of Multimedia Learning, which emphasizes reducing extraneous cognitive load and fostering active engagement (Mayer & Pilegard, 2014). This approach aligns with Sweller's Cognitive Load Theory (Sweller, 2020), which distinguishes between intrinsic, extraneous, and germane cognitive load. The interactive elements were strategically placed to manage intrinsic load (the inherent complexity of language learning), reduce extraneous load (through clear instructions and intuitive interfaces), and optimize germane load (by encouraging meaningful processing through varied question types).

Furthermore, the design incorporated principles of self-regulated learning (SRL) as conceptualized by Zimmerman (2000), enabling students to engage in the cyclical process of forethought, performance, and self-reflection. The interactive videos supported the forethought phase by establishing clear learning goals for each section; facilitated the performance phase through active engagement with embedded questions; and enabled self-reflection through immediate feedback mechanisms. This approach is particularly relevant for language learning contexts where learners must monitor their comprehension and adjust their strategies accordingly (Tseng et al., 2006). The varied question types (multiple-choice, fill-in-the-blank, drag-and-drop, true/false, and open-ended) were designed to scaffold different levels of self-regulation, from basic recognition to more complex application and evaluation of language knowledge.

The videos included five different question types to actively engage students and assess their understanding, such as multiple-choice questions to reinforce comprehension and test knowledge, fill-in-the-blank exercises to encourage active recall and application of vocabulary and grammar, drag-and-drop activities to promote hands-on interaction and reinforce key concepts, true/false questions to check understanding of specific content and open-ended questions to encourage critical thinking and allow students to express their understanding in their own words. The interactive videos were carefully structured to include a balanced distribution of question types across the three main sections. Table 1 below present the breakdown of the question types across the three sections.

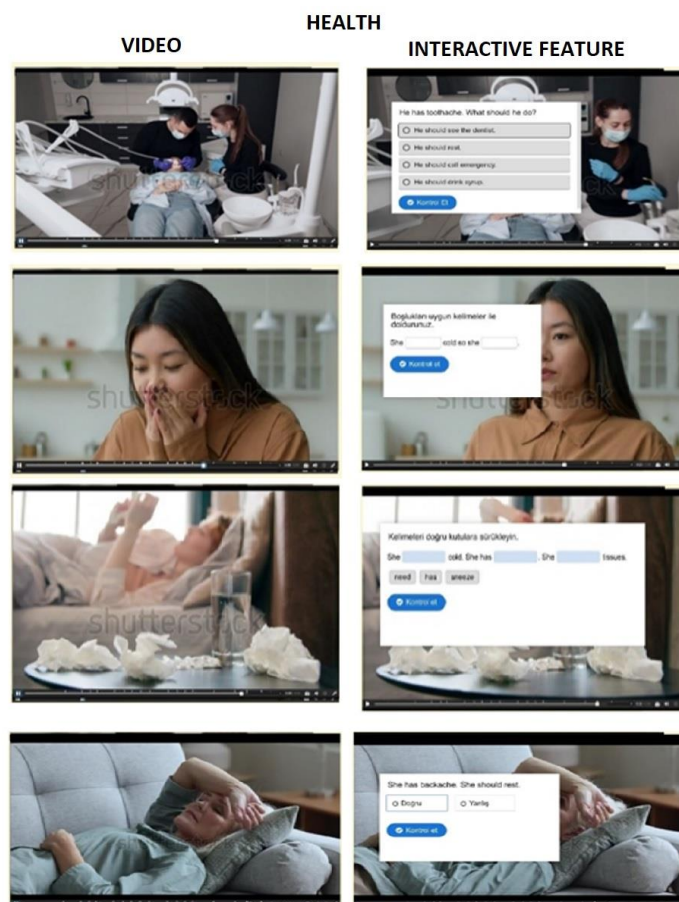
Table 1
The Breakdown of Questions in the Interactive Videos

Sections	Number of Interactions	Types of Questions				
		Multiple-choice	Fill-in-the-blank	Drag-and-drop	Open-ended	True/False
Telling the Time	12	6	2	2	1	1
My Daily Routine	23	14	4	4	1	0
Health	16	6	5	2	0	3

This distribution ensured that the interactive elements were varied and aligned with the specific learning objectives of each section, providing students with opportunities to engage with the material in multiple ways. Figure I below illustrates the different interactive features incorporated into the "Health" unit, including multiple-choice questions, fill-in-the-blank exercises, drag-and-drop activities and true/false questions. These features were designed to promote active engagement, reinforce key concepts, and provide immediate feedback to support student learning.

Figure 1

Illustrations of Sample Videos and Interactive Features Designed for Health Unit



At the beginning of the academic year, the English teacher incorporated the use of interactive videos into the annual and daily lesson plans for the classes where the study was conducted. The study followed a structured timeline to ensure consistency in data collection and instructional delivery. One week before the treatment began, all participants (both experimental and control groups) completed a pretest and an attitude scale to assess their baseline academic achievement and attitudes toward English. The treatment began in the following week and lasted for a total of three 40-minute lessons. This schedule ensured that students in both groups received the same amount of instructional time, with the primary difference being the mode of delivery. After the treatment concluded, all participants completed a posttest and the attitude scale again to measure the impact of the intervention.

The interactive videos were integrated into the experimental group's lessons during class time through a dedicated website (www.etkilesimlivideo.com.tr) for additional practice. The website was designed to provide a user-friendly and interactive learning environment. The teacher monitored students' progress and provided feedback during lessons to ensure effective use of the videos. The lessons were conducted in classrooms equipped with smartboards, which facilitated the integration of the videos into the teaching process. The teacher guided students through the videos, provided additional explanations when necessary, and facilitated discussions based on the interactive tasks.

In contrast, the control group followed the same curriculum content but was taught using traditional methods, such as teacher-led instruction, printed materials, and classroom discussions. The control group did not have access to the interactive videos or any digital tools, ensuring that the primary difference between the groups was the mode of instruction.

Data Collection Tools

Two primary instruments were used to collect data: Academic Achievement Tests and an English Course Attitude Scale. The Academic Achievement Tests were developed specifically for the two curriculum units, "My Daily Routines" and "Health". Each unit-specific test consisted of 20 multiple-choice questions, with four options per question. To ensure comprehensive assessment, the final test included a total of 40 questions, combining items from both units. The questions were presented in a random order to minimize the potential for response patterns and ensure a more accurate measurement of students' knowledge across the two units.

The test items were reviewed by two subject matter experts and one language expert to ensure validity. The reliability of the tests was calculated using the Kuder-Richardson Formula 20 (KR-20), yielding acceptable reliability coefficients of 0.78 for the "My Daily Routines" test and 0.87 for the "Health" test. The difficulty index for the tests was also calculated by dividing the number of students who answered each item correctly by the total number of students who attempted the item, then averaging these values across all items. This calculation resulted in difficulty index values of 0.527 for the "My Daily Routines" test and 0.542 for the "Health" test, indicating moderate difficulty levels where approximately half of the students answered items correctly.

The scoring of the achievement tests was straightforward: each correct answer was awarded 1 point, while incorrect answers received 0 points. The total raw score for

the combined test ranged from 0 to 40. To facilitate interpretation and comparison, the raw scores were converted to a scale of 0 to 100 by multiplying the raw score by 2.5. This conversion ensured consistency in reporting and allowed for easier comparison of results across different groups.

The English Course Attitude Scale, developed by Aydoğmuş and Kurnaz (2017), was used to assess students' attitudes toward English language learning. The scale consisted of 14 items equally divided between positive and negative statements. It employed a three-point rating system: Yes (3 points), Partially (2 points), and No (1 point) for positive statements, and the reverse scoring was applied for negative statements (No = 3 points, Partially = 2 points, Yes = 1 point).

The construct validity of the scale was established through Kaiser-Meyer-Olkin (KMO) and Bartlett's tests. The KMO value of 0.90 indicated excellent sampling adequacy, and Bartlett's test of sphericity ($\chi^2 = 1801.421$, $p < .01$) confirmed the scale's suitability for use with secondary school students. The scale demonstrated high reliability, explaining approximately 58% of the variance in students' attitudes toward English language learning, with a Cronbach's alpha reliability coefficient of 0.87.

Data Analysis

Data analysis was conducted using the Statistical Package for Social Sciences (SPSS). The analysis included both descriptive and inferential statistics. Descriptive statistics entailing means, standard deviations, and frequency distributions were calculated to summarize demographic characteristics of the participants and their pretest and posttest scores.

For inferential statistics, paired-samples t-tests were conducted to compare the pretest and posttest scores within each group (experimental and control) to determine the effectiveness of the instructional methods. Independent-samples t-tests were used to compare the posttest scores between the experimental and control groups to evaluate the impact of the interactive video intervention on academic achievement and attitudes.

To assess the practical significance of the findings and quantify the magnitude of the intervention's effect, effect size calculations were performed. Cohen's d was calculated for all t-test comparisons, with values of 0.2, 0.5, and 0.8 representing small, medium, and large effect sizes, respectively (Cohen, 1988). Additionally, eta squared (η^2) was computed to determine the proportion of variance in the dependent variables (achievement and attitudes) that could be attributed to the interactive video intervention. Following Cohen's guidelines, η^2 values of .01, .06, and .14 were interpreted as small, medium, and large effect sizes, respectively. These effect size measures provided complementary information about the practical significance of the statistical findings and facilitated comparisons with similar studies in the literature.

Results

Preliminary Analyses

Prior to conducting the main analyses, the assumptions of normality were tested. The Shapiro-Wilk test was performed to assess the distribution of scores for both achievement and attitude measures. For the achievement test scores, results indicated normal distribution in both experimental and control groups ($p > .05$). However, the

attitude scale data violated the assumptions of normal distribution ($p < .05$), necessitating the use of non-parametric tests for attitude-related analyses.

Academic Achievement

Pretest Comparisons Between Groups

An independent-samples t-test was conducted to compare the pretest scores of the experimental and control groups to ensure equivalence at the beginning of the study. The results indicated no statistically significant difference between the groups, $t(78) = 0.45$, $p = .619$, suggesting that both groups were comparable in terms of their initial English language achievement.

Within-Group Comparisons

Paired-samples t-tests were conducted to examine the differences between pretest and posttest scores within each group. For the experimental group, the mean pretest score was $M = 33.75$ ($SD = 9.55$), which increased to $M = 57.30$ ($SD = 15.73$) on the posttest. The paired-samples t-test revealed a statistically significant improvement, $t(41) = 5.38$, $p < .001$, with a large effect size ($d = .83$), indicating a substantial impact of the interactive video intervention on academic achievement. As for the control group, the mean pretest score was $M = 34.35$ ($SD = 10.58$), which increased slightly to $M = 36.43$ ($SD = 16.18$) on the posttest. However, the paired-samples t-test did not show a statistically significant improvement, $t(37) = .96$, $p = .34$, with a negligible effect size ($d = .15$). These results suggest that traditional teaching methods did not lead to significant changes in academic achievement.

Posttest Comparisons Between Groups

An independent-samples t-test was conducted to compare the posttest scores of the experimental and control groups. The results indicated a statistically significant difference, $t(78) = 3.62$, $p < .001$, with the experimental group ($M = 57.30$, $SD = 15.73$) outperforming the control group ($M = 36.43$, $SD = 16.18$). The effect size was large ($d = .81$, $\eta^2 = .14$), indicating that the interactive video intervention had a substantial impact on students' academic achievement compared to traditional teaching methods.

Attitudes Toward English Language Learning

Pretest Comparisons Between Groups

Since the data for the attitudes scale did not meet the assumption of normality, the Mann-Whitney U test was used to compare the pretest scores of the experimental and control groups. The results indicated no statistically significant difference between the groups, $U = 748.10$, $p = .612$, $r = 0.03$ suggesting a small effect size and that both groups had similar attitudes toward English language learning at the beginning of the study.

Within-Group Comparisons

To examine changes in attitude scores within each group, the Wilcoxon signed-rank test was used. For the experimental group, the mean pretest attitude score for the experimental group was $M = 2.01$ ($SD = 0.13$), which remained relatively stable at $M =$

2.02 (SD = 0.07) on the posttest. However, the Wilcoxon signed-rank test revealed no statistically significant difference, $Z = -0.360$, $p = .719$, $r = 0.06$ suggesting a negligible effect size and that the interactive video intervention did not significantly influence students' attitudes toward English language learning.

As for the control group, the mean pretest attitude score for the control group was $M = 2.01$ (SD = 0.12), which slightly improved to $M = 2.04$ (SD = 0.15), on the posttest. The Wilcoxon signed-rank test also showed no statistically significant difference, $Z = -1.027$, $p = .305$, $r = 0.17$ indicating a small effect size and that traditional teaching methods did not significantly affect students' attitudes.

Posttest Comparisons Between Groups

The Mann-Whitney U test was used to compare the posttest attitude scores of the experimental and control groups. The results indicated no statistically significant difference, $U = 765.00$, $p = .578$, $r = 0.04$ suggesting a small effect size and that the interactive video intervention did not lead to a measurable change in students' attitudes toward English language learning compared to traditional teaching methods.

Summary of Results

The findings of the study indicate that the use of interactive videos significantly improved the academic achievement of fifth-grade students in the experimental group compared to the control group, as evidenced by both within-group and between-group comparisons. The effect size calculations further highlight the substantial impact of the intervention on learning outcomes. However, the results also suggest that the interactive video intervention did not significantly influence students' attitudes toward English language learning during the treatment period, as no significant differences were observed within or between groups in the pretest and posttest attitude scores.

Discussion

The findings of the study provide valuable insights into the effectiveness of interactive video in English language instruction for secondary school students, particularly in the Turkish context. The results revealed that the use of interactive videos significantly improved students' academic achievement in English, as evidenced by the substantial increase in the posttest scores for the experimental group compared to the control group. However, the intervention did not yield significant changes in students' attitudes toward English language learning. These findings align with and extend the existing literature on the pedagogical affordances of interactive videos, while also highlighting some limitations and contextual considerations.

The significant improvement in academic achievement corroborates earlier studies that emphasize the cognitive benefits of interactive videos in language learning. For instance, Bakla (2017) and Bakla and Demiröz (2024) highlighted how interactive videos transform passive viewing into active learning by incorporating features such as embedded quizzes, immediate feedback and "jump feedback." These features not only enhance comprehension but also promote deeper cognitive engagement, as supported by Mayer's Cognitive Theory of Multimedia Learning (Mayer & Pilegard, 2014). The present study's findings are consistent with Tweissi (2016) and Vural (2013), who reported that learners using interactive videos outperformed those using traditional

methods in listening comprehension and vocabulary acquisition. The large effect size observed in this study further underscores the potential of interactive videos to foster meaningful learning outcomes.

The interactive videos used in this study incorporated a variety of question types, such as multiple-choice, fill-in-the-blank, and open-ended questions, which likely contributed to the observed improvements in academic achievement. These activities align with the Levels of Processing model (Craik & Lockhart, 1972), which posits that deeper cognitive engagement leads to better retention and understanding. The inclusion of vocabulary-focused activities which requires working with the target vocabulary items as discrete units also aligns with findings from Bakla and Demiröz (2024), who noted that such activities encourage higher-order thinking and improve vocabulary retention. Additionally, the multimodal nature of interactive videos—combining visual, auditory, and textual input—likely supported learners in inferring the meaning of unfamiliar language and contextualizing their learning, as suggested by Guichon & Cohen (2016).

Despite the cognitive benefits, the lack of significant changes in students' attitudes toward English language learning warrants further discussion. This finding aligns with Polat and Taşlibeyaz (2024), who reported that while interactive videos improved learning performance, they did not significantly impact learners' long-term engagement or emotional satisfaction. One possible explanation is that the novelty of the interactive videos may not have been sufficient to overcome pre-existing attitudes toward English learning, which are often shaped by broader cultural and educational factors. For example, Turkish learners' preference for correct answers over open-ended discussions, as noted by Bakla and Demiröz (2024), may have limited their engagement with certain interactive elements, such as discussion questions. This cultural tendency could explain why the interactive videos did not significantly influence attitudes, despite their potential to foster active participation and enjoyment.

An important methodological consideration concerns the duration of the intervention. The three-week treatment period, while sufficient to demonstrate cognitive gains in academic achievement, may have been insufficient to produce measurable changes in learners' attitudes toward English language learning. Attitudinal shifts typically require sustained exposure and habituation to new instructional methods, as evidenced by studies such as Xu and Luo's (2024) six-month longitudinal investigation of technology-enhanced language learning, which documented gradual attitude improvements over time. This temporal constraint aligns with Krathwohl's (2002) taxonomy of affective domain development, where attitude formation progresses through stages of receptivity, valuation, and internalization – processes unlikely to occur within a brief intervention window. Consequently, our null findings regarding attitudinal outcomes should be interpreted as reflecting temporal limitations rather than inherent shortcomings of interactive video pedagogy. This duration-related constraint also interacts with cultural factors; Turkish students' established preferences for structured learning environments (Bakla & Demiröz, 2024) may require extended adaptation periods for new technologies to influence affective dispositions. Future research should investigate whether implementations spanning 8-12 weeks yield different affective outcomes while maintaining the cognitive benefits observed here.

Additionally, the quantitative nature of our attitude assessment may have limited our ability to detect subtle changes in students' perceptions. Future studies would benefit from incorporating qualitative methods such as student interviews, reflective journals, or focus groups to capture nuanced shifts in motivation, confidence, and engagement that may not be evident in Likert-scale responses. Such mixed-methods approaches could provide valuable insights into how students experience interactive videos and how these experiences might gradually reshape their attitudes toward language learning over time.

From a practical implementation perspective, educators seeking to integrate interactive videos into language instruction should consider several key recommendations. First, interactive elements should be strategically distributed throughout videos to maintain engagement without causing cognitive overload, with approximately 15-20 interactions per 40-minute lesson as demonstrated effective in this study. Second, a variety of question types should be incorporated to address different learning preferences and cognitive processes. Third, to potentially influence attitudinal outcomes, interactive videos might be complemented with additional motivational strategies such as gamification elements (points, badges, leaderboards), collaborative viewing and discussion activities, or personalized learning paths that respond to individual student performance. Fourth, cultural considerations should inform implementation; for instance, in contexts like Turkey where structured learning environments are preferred, a gradual transition from more guided to more open-ended interactive elements may be beneficial. Finally, sustained implementation over longer periods (8-12 weeks minimum) is recommended to potentially influence affective outcomes while maintaining the cognitive benefits observed in this study.

Conclusion

This study demonstrates the significant potential of interactive videos to enhance academic achievement in English language instruction for secondary school students. By transforming passive viewing into an active learning process, interactive videos provide a powerful tool for fostering listening comprehension, vocabulary acquisition, and overall language proficiency. The findings align with existing research, such as Bakla (2017), Bakla and Demiröz (2024) and Polat and Taslibeyaz (2024) and contribute to the growing body of evidence supporting the use of interactive videos in educational settings.

However, the study also highlights some limitations and areas for improvement. The lack of significant changes in students' attitudes toward English language learning suggests that interactive videos alone may not be sufficient to address affective outcomes. Future research should explore how interactive videos can be combined with other instructional strategies, such as self-regulated learning and culturally sensitive design, to foster both cognitive and affective engagement. Additionally, while the study demonstrates interactive videos' efficacy for short-term academic gains, the three-week intervention period precludes definitive conclusions about their capacity to influence learner attitudes. The absence of attitudinal change should therefore be contextualized within these temporal constraints rather than interpreted as evidence against interactive videos' affective potential. Future investigations should employ intervention durations

spanning over a longer period of time to allow for potential attitude formation processes while maintaining the observed cognitive benefits.

From a practical perspective, educators should consider integrating interactive videos into their teaching practices to enhance learning outcomes. However, they must carefully design and implement these tools to ensure that the interactive elements are appropriately balanced and aligned with learners' needs. By doing so, interactive videos can serve as a valuable addition to the language teacher's toolbox, offering a dynamic and engaging approach to language instruction.

To sum up, while interactive videos hold great promise for improving academic achievement in language learning, their full potential can only be realized through thoughtful design, sustained implementation, and a deeper understanding of their impact on learners' attitudes and engagement. This study provides a significant contribution to the current literature by offering empirical evidence on the effectiveness of interactive videos in enhancing academic achievement and highlighting the need for further exploration of their influence on learner attitudes and engagement.

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Statement of Responsibility

Both authors confirm that they have made substantial contributions to the research and preparation of this manuscript. Specifically, the first author was responsible for the conceptualization and design of the study, the development of the interactive videos, data collection, and the drafting of the manuscript. The second author provided methodological guidance and validation, contributed to the data analysis, interpretation of the results, and critical revision of the manuscript for important intellectual content. Both authors have reviewed and approved the final version of the manuscript and take full responsibility for its content.

Conflicts of Interest

The authors have no competing interests to declare that are relevant to the content of this article.

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Appendix

Sample Questions from the Achievement Test:

1. What does he do in the mornings?

- a) He combs his hair. b) He wakes up early.
c) He gets dressed. d) He brushes his teeth.



2. What does he do in the mornings?

- a) He runs in the mornings.
b) He plays tennis in the mornings.
c) He does exercises in the mornings.
d) He has a breakfast in the mornings.



3. What time is it?

- a) It is twenty to twelve. b) It is twenty four past twelve.
c) It is twenty past twelve. d) It is half past twelve.



4. What time is it?

- a) It is half past one. b) It is twenty past two.
c) It is half past three. d) It is quarter to three.



5. You have You shouldn't carry heavy things.

- a) a headache b) a backache
c) the flu d) a toothache

6. You shouldn't all day. Go out play in the garden

- a) drink milk b) do sports
c) eat fruit and vegetables d) play computer

Attitude Scale for English Lesson:

Adınız-Soyadınız	
Sınıfınız	
Bir Önceki Yılda İngilizce Karne Notunuz	
Cinsiyetiniz	Kız() Erkek()
Annenizin Eğitim Durumu	İlkokul() Ortaokul() Lise() Üniversite() Lisansüstü()
Babanızın Eğitim Durumu	İlkokul() Ortaokul() Lise() Üniversite() Lisansüstü()
Geçen Yıla Ait Not Ortalamanızı Yüzlük Sisteme Göre Belirtiniz	
İngilizce Öğrenmeye Ne Zaman Başladınız	Anaokul() İlkokul() Ortaokul()

Tutum İfadeleri	Evet	Kısmen	Hayır
1.İngilizce dersinin önemli olduğunu düşünüyorum	()	()	()
2. İngilizce dersini seviyorum	()	()	()
3.Okulda İngilizce dersi kaldırılrsa iyi olur	()	()	()
4.İngilizce dersinde genellikle çok sıkılıyorum	()	()	()
5.İngilizce derslerini dört gözle bekliyorum	()	()	()
6.İngilizce derslerinden nefret ederim	()	()	()
7.İngilizce dersleri beni strese sokar	()	()	()
8.İngilizceyi öğrenmek bana çoğu zaman zor gelir	()	()	()
9.İngilizce dersini zevkli buluyorum	()	()	()
10.İngilizce çalışmaktan sıkılıyorum	()	()	()
11.İngilizce öğrenmenin gereksiz olduğunu düşünüyorum	()	()	()
12.İngilizcenin yaşamda önemli olduğunu düşünüyorum	()	()	()
13.İngilizce dersinin ödevlerini zevkle yaparım	()	()	()
14.İngilizce dersinde başarılı olacağımdan eminim.	()	()	()

Katılımınız için teşekkürler.



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Do Intelligence Games Improve Problem Posing Skill?

Zekâ Oyunları Problem Kurma Becerisini Geliştirir Mi?

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ABSTRACT: The aim of this study was to examine the potential effect of intelligence games on the problem-posing skills of mathematics teachers. The research, in which case study, one of the qualitative research methods, was preferred, was conducted with two mathematics teachers enrolled in the Mathematics Education Master's Program with Thesis at a state university. Criterion sampling method was used to determine the participants. The criterion was that the teachers did not have any interventions for intelligence games and problem posing. A problem posing test consisting of four tasks was used as a data collection tool. In the test, a visual of each task was included and teachers were asked to pose a problem of each degree of difficulty by giving easy, moderately difficult and difficult prompts for each visual before and after the application. The cognitive complexity analysis framework proposed by Kwek (2015) was used to analyze the mathematical complexity of the problems constructed by the teachers. In the study, it was found that the prompt given in problem posing tasks contributed to the construction of more complex problems. However, high level complex problems were generally posed in the final determination. It was determined that the problems posed by the teachers, especially after the intervention for intelligence games, were high level complex and they associated them with intelligence games. Therefore, in this study, it was concluded that intelligence games cause the problems to be more complex and intelligence games improve problem posing skills.

Keywords: Intelligence games, problem posing, problem posing prompts.

ÖZ: Bu araştırmada, zekâ oyunlarının matematik öğretmenlerinin problem kurma becerileri üzerindeki potansiyel etkisini ortaya koymak amaçlanmıştır. Nitel araştırma yönteminden biri olan durum çalışmasının tercih edildiği araştırma, bir devlet üniversitesinin Matematik Eğitimi Tezli Yüksek Lisans programına kayıtlı iki matematik öğretmeni ile gerçekleştirilmiştir. Katılımcılarının belirlenmesinde ölçüt örnekleme yöntemi kullanılmıştır. Ölçüt olarak öğretmenlerin zekâ oyunları ve problem kurmaya yönelik müdahalelerinin olmamasıdır. Veri toplama aracı olarak dört görevden oluşan problem kurma testi kullanılmıştır. Testte her bir göreve ait bir görsel yer verilmiş ve öğretmenlerden uygulama öncesi ve sonrası her bir görsel ilişkin kolay, orta ve zor derecede birer problem kurmaları istenmiştir. Öğretmenlerin kurdukları problemlerin matematiksel karmaşıklığını analiz etmek için Kwek (2015) tarafından önerilen bilişsel karmaşıklık analiz çerçevesi kullanılmıştır. Araştırmada problem kurma görevlerinde verilen talimatın daha karmaşık problemlerin kurulmasına katkı sağladığı tespit edilmiştir. Ancak yüksek seviyede karmaşık problemler genellikle son tespit aşamasında kurulmuştur. Öğretmenlerin özellikle zekâ oyunlarına yönelik müdahaleden sonra kurdukları problemlerin yüksek seviyede karmaşık olduğu ve zekâ oyunları ile ilişkilendirdikleri belirlenmiştir. Dolayısıyla bu çalışmada zekâ oyunlarının kurulan problemlerin daha karmaşık olmasına neden olduğu ve zekâ oyunlarının problem kurma becerisini geliştirdiği sonucuna varılmıştır.

Anahtar kelimeler: Zekâ oyunları, problem kurma, problem kurma talimatları.

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Games are important tools for learning and behavior change (Burgers et al., 2015). Games play a crucial role in children's brain development and are an effective teaching strategy used both in and out of school (Goldstein, 2003). It has been used as a learning tool in educational settings for centuries. It helps students to focus on the subject matter and significantly enhances their learning experience (Dahalan et al., 2024). Almost everything a child needs to learn is developed through play, including concrete skills such as motor coordination, counting, and speaking, and abstract skills such as imagination, problem solving, planning, and learning to learn (Goldstein, 2003). Games support the development of a wide range of skills such as problem solving, sequencing, deductive reasoning, which are necessary for autonomous learners. In this case, games can be used in educational settings to help create an environment in which children can increase their cognitive maturity levels (McFarlane et al., 2002).

Games have been the subject of research in various fields such as education, physics, psychology, computer science, media and cultural studies. Therefore, there are various game classifications in the literature (Kirriemuir & McFarlane, 2004). Intelligence games, which are one of the game types, can also be called mind games or puzzles (Bottino et al., 2010; Kirriemuir & McFarlane, 2004). An intelligence game is a problem designed for fun (Moursund, 2006). It is a gamified version of all kinds of problems, including real problems (Ministry of National Education [MoNE], 2013). Intelligence games should not depend on a single problem solving domain. They should be easy to express and remember. It should initially frustrate the problem solver, but promise a solution. It should be fun and engaging (Michalewicz et al., 2011). The aim of these games is to solve a specific mentally challenging problem or accomplish a specific task (Moursund, 2006).

Intelligence games develop imagination, combination, memory, logic and strategic judgment, relaxation and development, original and constructive, creative thinking. They also strengthen thinking about possibilities, determination and patience (Příhonská, 2008). According to Alessi and Trollip (2001), intelligence games teach general problem solving skills such as formulating solutions, gathering information careful observation, and testing them. Kiili (2007) stated that games are an appropriate strategy for developing students' problem solving skills. According to Michalewicz et al. (2011), teaching with intelligence games can be used to teach problem solving skills.

When the literature was examined, it was seen that there were studies (Bayramin, 2020; Chen et al., 2021; Çağan, 2022; Kurbal, 2015; Lin et al., 2011; Reiter et al., 2014; Şanlıdağ & Aykaç, 2021; Şişman, 2022; Yıldırım, 2023; Terzi, 2024; Zengin-Kılavuz, 2024) that revealed the positive effect of intelligence games on the development of students' problem solving skills. For example, in the study conducted by Terzi (2024), it was shown that intelligence games-based teaching practices were effective on the non-routine problem solving skills of 4th grade students. In a study conducted by Yıldırım (2023) with 7th grade students, it was revealed that intelligence games positively changed students' skills towards mathematics problem solving. In a study conducted by Bayramin (2020), it was revealed that 6th grade students used Polya's problem solving strategies while solving problems included in intelligence games and that intelligence games improved problem solving skills. In a study conducted by Kurbal (2015) with 6th grade middle school students, it was found that students who played intelligence games were successful in a problem solving test

involving open-ended real life problems. Lin et al. (2011) designed a collaborative Chinese Tangram activity that incorporated problem-solving learning strategies to promote peer interactions and encourage students' higher-order thinking and creativity in geometric problem solving. The study revealed that 6th grade students' proficiency in rotation and area of shapes increased, and the score gap between lower and higher achievers narrowed.

Problem posing is a fundamental step in the problem solving process and directly affects the entire solution process. There are also studies in the literature (Kopparla et al., 2019; Örnek & Soylu, 2021) indicating that problem posing skills positively affect problem solving skills. Because problem posing is an integral part of problem solving (Kilpatrick, 1987; Leung, 2016). Problem posing has an important place in mathematics education because it can be used as a learning, teaching, and assessment tool in mathematics classrooms (Baumanss & Rott, 2024; Chen & Cai, 2020; Kinach, 2002; Lowrie, 1999; Silver, 1994). Despite the importance of problem posing, studies have shown that teachers' and pre-service teachers' problem posing skills are not at an adequate level (Crespo & Sinclair, 2008; Doğan-Coşkun, 2019; Ellerton, 2013; Kar, 2014; Tichá & Hošpesová, 2009); even if teachers and pre-service teachers can pose problems, they lack problem posing skills (Cai et al., 2020; Çomarlı, 2018; Leavy & Hourigan, 2019; Leung & Silver, 1997). At the same time, most of these studies were conducted with pre-service teachers. In this context, there is a limited number of studies examining teachers' problem posing skills in the literature. However, the deficiencies seen in the problems posed by teachers negatively affect the quality of teaching and thus student achievement (Kar, 2014; Kar & Işık, 2015). Therefore, it can be said that it is important to improve teachers' problem posing skills.

In the literature, there are various approaches to improve problem posing skills. One of these approaches is to examine the effect of a variable on problem posing. Studies (Abu-Elwan, 1999; Grundmeier, 2003; Kopparla et al., 2019; Örnek & Soylu, 2021) generally examined the effect of problem posing and problem solving intervention on problem posing. However, Kalmpourtzis (2019) conducted an experimental study with children aged 5-6 years and found that game design activities had a positive effect on the development of students' problem posing skills. Candiasa, Santiyadnya and Sunu (2018) used puzzles as a tool to increase problem posing skills in mathematics education. The problem posing learning model supported by puzzles significantly increased middle school students' interest in problem posing and improved their ability to construct meaningful mathematical problems. However, there is no research in the literature on whether the variable of intelligence games improves teachers' problem posing skills. However, it is very important for teachers to develop problem posing skills in order to provide an effective and meaningful learning environment by guiding students to develop different perspectives, produce creative solutions and develop learning processes related to real life. Therefore, in this study, it was aimed to determine whether intelligence games improve mathematics teachers' problem posing skills with a qualitative approach. It is thought that this study will make a significant contribution to the literature in terms of giving an idea about whether intelligence games can be preferred as a potential tool for developing problem posing skills.

In the literature, it is seen that there are different approaches to develop problem

posing skills. These approaches include direct teaching methods as well as experience-based practices that encourage students' active participation and cognitive processes. In this context, studies examining the effects of certain variables on problem posing skills draw attention. In the studies conducted in the literature (Abu-Elwan, 1999; Grundmeier, 2003; Kopparla et al., 2019; Örnek & Soylu, 2021), the effects of problem solving and problem posing intervention on problem posing were generally examined. These studies show that the interventions applied to the participants provide a significant improvement in problem posing skills. However, there are findings that play-based approaches can also be effective on the development of problem-posing skills. For example, Kalmpourtzis (2019), in his experimental study conducted with children aged 5-6 years, revealed that game design activities had positive effects on students' problem-posing skills. Similarly, Candiasa, Santiyadnya, and Sunu (2018), in their research with secondary school students, developed a learning model that includes the use of puzzles in mathematics teaching and reported that this model increased students' interest in problem posing and improved their ability to construct more meaningful mathematical problems. Such studies are important in that game-based approaches support cognitive development and creative thinking. However, when the literature was analysed, no study was found to examine the effect of intelligence games on teachers' problem posing skills. However, teachers' problem posing skills play a critical role not only in terms of their own professional competences but also in supporting the development of students' higher order thinking skills. Problem posing provides an effective learning process for students to develop different perspectives, generate creative solutions and explore mathematical situations related to real life. Therefore, teachers' ability to develop these skills contributes to their ability to create richer and more meaningful learning environments in their classroom practices.

In this context, the main purpose of the present study is to reveal the potential effect of intelligence games on mathematics teachers' problem posing skills. The study aims to examine how such games contribute to teachers' problem posing process and how they affect the cognitive level of the problems. In this context, the research question of the study was: 'What is the potential effect of intelligence games on problem posing skills?'. It is thought that the findings obtained from the study will provide information about the usability of intelligence games as a potential tool in teacher education processes; therefore, it will contribute to the pedagogical and cognitive development of teachers. In addition, this study will make an important contribution in terms of filling the gap in the literature on the use of game-based applications in the development of teachers' problem posing skills.

Method

Research Design

This study adopted a qualitative research method, which involves collecting data through techniques such as observation, interviews, and document analysis to explore perceptions and events in their natural contexts in a comprehensive and realistic way (Yıldırım & Şimşek, 2018). In this study, a case study, which is one of the qualitative research methods, was preferred because it allows for a detailed examination and comparison of the problems that the participants posed in the predetermination and final determination. As it is known, the aim of this type of studies is to draw conclusions about a specific situation.

Participants

The participants of this study were two secondary school mathematics teachers enrolled in a state university's Mathematics Education Master's Program with Thesis who took the course of Intelligence Games in Mathematics Education. The participants were selected using the criterion sampling method, which is a type of purposeful sampling technique. In the criterion sampling method, all situations where predetermined criteria or criteria are met are studied (Creswell & Poth, 2018; Yıldırım & Şimşek, 2018). In this study, the criterion was the absence of teachers' interventions for intelligence games and problem posing. Initially, five teachers participated voluntarily in the study and one teacher left the study without giving a reason after the fifth week. The study was completed with four teachers. Due to the intensive findings of the study, two teachers were randomly selected among the four teachers and their findings were presented. Therefore, the findings of this study are based on the data of two teachers. The randomly selected teachers were given the pseudonyms Ela and Aysun.

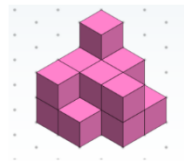
Data Collection Tool

The “Problem Posing Test” prepared by the researchers was used as a data collection tool in the study. Initially, six tasks were included in the problem posing test. After receiving two expert opinions, two tasks were removed from the test on the grounds that they were not suitable for the purpose of the study. In the final test, which consisted of four tasks, a visual was included for each task and teachers were asked to construct a problem for each visual in easy, moderately difficult and difficult degrees before and after the application. The tasks of the problem posing test are given in Figure 1.

Figure 1

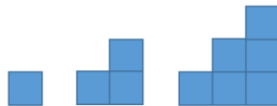
Tasks of the Problem Posing Test

Task 1: A tangram board is shown in the next figure. Pose one easy, one moderately difficult and one difficult problem related to this figure.



Task 2: Pose one easy, one moderately difficult and one difficult problem related to the figure given on the left.

Easy:	Easy:
Moderately difficult:	Moderately difficult:
Difficult:	Difficult:



Task 3: Pose one easy, one moderately difficult and one difficult problem related to the figure given on the left.



Task 4: Pose one easy, one moderately difficult and one difficult problem related to the figure given on the left.

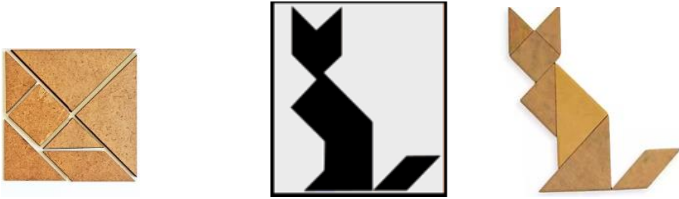
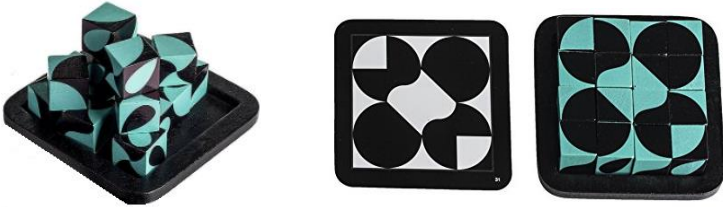
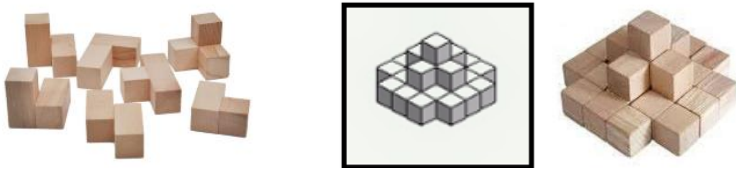
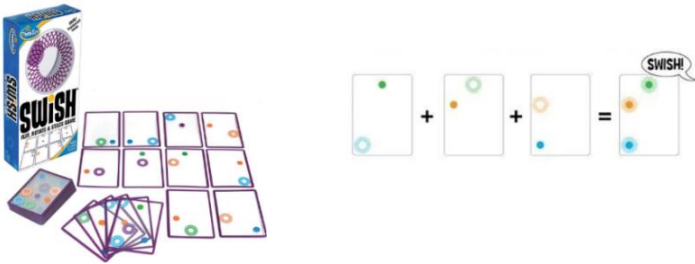
Easy:	Easy:
Moderately difficult:	Moderately difficult:
Difficult:	Difficult:

Implementation Process

The implementation, conducted by the first author of this study, lasted for a total of eight weeks, two hours per week. Before the implementation, teachers were given a problem posing test for two class hours. In the first week of the implementation, a presentation was given on what intelligence games are, their benefits, categories of intelligence games, sample games for each category and the basic rules of these games. In the following weeks, Katamino, Tangram, Q.bitz Extreme, Soma Cube, Architecto, Perspecto and Swish games were practiced in two class hours for each game. The tasks in the games were presented to the teachers at beginner, intermediate, and advanced levels. The beginner level involves understanding the rules of the games, developing fundamental knowledge and skills, and participating in beginner-level gameplay. The intermediate level involves making logical inferences, starting from the correct point, and playing intermediate-level games. The advanced level emphasizes mastering advanced-level knowledge and skills while engaging in complex and challenging gameplay (MoNE, 2013). After the implementation, the problem posing test was administered to the teachers during two class hours. Table 1 shows the visuals of the games played during the implementation process.

Table 1

Visuals of the Games Played During the Implementation Process

Katamino	
Tangram	
Qbitz Extreme	
Soma Cube	
Architecto	
Perspecto	
Swish	

Data Analysis

In this study, the mathematical complexity of the problems posed by teachers was evaluated. The cognitive complexity analysis framework proposed by Kwek (2015) was used to analyze the complexity of teachers' problems. According to this framework, cognitive complexity is analyzed at three levels: low, moderate and high. Problems with low cognitive complexity are usually solved in one or a few steps by remembering mathematical rules and knowledge. Problems with moderate cognitive complexity go one click beyond recall and require more thought and decision-making processes. Problems with high cognitive complexity require the use of metacognitive skills such as reasoning, analyzing and generalizing. Since cognitive complexity refers to the cognitive effort required to solve a problem (Ulusoy, 2024), the features required to solve the problem were listed to determine which level the problems in the current study corresponded to. Sample coding for each level is presented in Table 2. In addition, the problems posed by the teachers were also analyzed in terms of their subjects and their relationship with intelligence games.

Table 2
Sample Coding for Each Level

Task number/ Degree of difficulty	The posed problem	Features required to solve the problem	Cognitive load	Explanation
First task/ Easy	If the perimeter of the large square shape is 24 cm and the red and yellow triangles are right triangles, what is the perimeter of the red triangle?	*Tangram board (large square) perimeter *Length of side of large square/hypotenuse of red triangle *Red triangle side lengths *Perimeter of red triangle	Low	This problem, posed by teacher Aysun in the predetermination, was evaluated as a problem with low cognitive complexity because it required remembering the perimeter formula and the properties of the Pythagorean relation.
Third task/ Moderately difficult	The first three steps of a pattern consisting of unit squares are given above. What is the perimeter of the shape in the sixth step?	*Creating step 6 of the pattern *Each square's side length *Calculating the perimeter of the shape in step 6 of the pattern	Moderate	This problem, posed by teacher Ela in the final determination, was evaluated as a problem with moderate cognitive complexity because it required the pattern to be expanded to the 6th step.
Fourth task/ Difficult	The top view of a shape made up of unit cubes is as in the figure above. The numbers written on the shape show how many unit cubes are on top of each other. Draw the side view of this shape given from the top.	*Top view of the shape made of unit cubes *Creating a three-dimensional shape based on the numbers on the shape *Drawing a side view of the created shape	High	This problem, posed by teacher Ela in the final determination, was evaluated as a problem with high cognitive complexity because it required thinking of a two-dimensional shape as three-dimensional, that is, it carried out a process with multiple decision points.

Validity and Reliability

In this study, various strategies were utilised to ensure the validity and reliability of qualitative data. Validity and reliability measures for the qualitative process of the study were structured in line with the recommendations of Yıldırım and Şimşek (2018).

Within the scope of internal validity (credibility), the first author of the current study had a continuous and intensive interaction with the teachers during the eight-week implementation process. The stages of data analysis and interpretation of the findings were carried out with the cooperation of two authors in order to minimise subjective biases in the interpretation of the data. In addition, the problem posing test used as a data collection tool was presented to the opinions of two experts and necessary arrangements were made. In terms of external validity (transferability), the whole process of the research was described in detail; contextual adequacy was ensured by explaining the necessary features of the solutions of the problems. Criterion sampling method, one of the purposeful sampling methods, was preferred in determining the participants. This supports the transferability of the findings to similar contexts. Within the scope of internal reliability (consistency), the data analysis process was carried out in line with a pre-structured and detailed conceptual framework. This approach made it possible to analyse the data in a systematic and holistic manner. In terms of external reliability (confirmability), the data collection tool, the data obtained and the coding made during the analysis process were archived by the researchers. This practice ensures that the study can be examined and verified by other researchers when necessary.

Ethics Statements

All procedures performed in studies involving human participants were in accordance with the ethical standards. The ethical committee approval for this study was obtained from the Social Sciences Ethics Committee at Dicle University. (Registration Number is E-14679147-663.05-730577).

Findings

In this section, the findings obtained from the research are presented for teacher Ela and teacher Aysun respectively.

Findings for Teacher Ela

The analysis of the problems Ela teacher posed for the first task in the predetermination and final determination is given in Table 3.

Table 3

Analysis of Ela Teacher's Posed Problems for the First Task in the Predetermination and Final Determination

Degree of difficulty	Predetermination				Final determination			
	Features required to solve the problem	Topic	Relationship with intelligence games	Cognitive load	Features required to solve the problem	Topic	Relationship with intelligence games	Cognitive load
Easy	*Diagonal length of the tangram board (large square) *Side length of the large square *Area of the red and yellow triangles / half of the area of the large square	Area	Not related	Low	*Hypotenuse of the red triangle *Side lengths of the yellow triangle *Area of the yellow triangle	Area	Not related	Low
Moderately Difficult	*Hypotenuse of the yellow triangle *Side lengths of the yellow triangle *Side length of the purple square *Area of the trapezoid formed by the purple square and the blue triangle	Area	Not related	Low	*Side lengths of the pink triangle *Length of the short side of the parallelogram *Length of the long side of the parallelogram / hypotenuse of the green triangle *Side lengths of the green triangle *Perimeter of the trapezoid formed by the green triangle and the parallelogram	Perimeter	Not related	Low
Difficult	The data is inconsistent (The data in the problem statement is inconsistent because the properties of the tangram are not correctly known).	Perimeter	Not related	None	*Perimeter of the tangram board *Side length of the tangram board *Tangram pieces start 1 cm inside each edge *Hypotenuse of the yellow triangle *Side lengths of the yellow triangle *Side length of the purple square *Side lengths of the green triangle *Hypotenuse of the green triangle *Perimeter of the yellow triangle, purple square, and green triangle	Perimeter	Related	Moderate

When Table 3 is analyzed, it is seen that teacher Ela posed easy and moderately difficult problems requiring area calculation and difficult problems requiring perimeter

calculation in the predetermination for the first task. In the final determination, the problem posed by teacher Ela at the easy degree required area calculation, while the problems posed by teacher Ela at the moderately difficult and difficult degrees required perimeter calculation. In the predetermination and final determination, problems with easy and moderately difficult degrees are at a low level in terms of cognitive load. In the predetermination, in the problem posed for the difficult degree, since the properties of the tangram were not known correctly, the data were inconsistent and there was no solution to the problem. Therefore, the cognitive load could not be determined. In the final determination, the problem posed for the difficult degree was at the moderate level in terms of cognitive load. Accordingly, only in the final determination, the problem posed for the difficult degree was at the moderate level in terms of cognitive load, and this finding can be interpreted as that the given prompt directed Ela teacher to pose a more cognitively complex problem. At the same time, the problem that teacher Ela posed for the difficult degree only in the final determination was related to intelligence games. The fact that this problem, which teacher Ela posed by associating it with intelligence games, was cognitively more complex than the other problems, can be said that intelligence games contribute to the posing of more complex problems. The analysis of the problems Ela teacher posed for the second task in the predetermination and final determination is given in Table 4.

Table 4

Analysis of Ela Teacher's Posed Problems for the Second Task in the Predetermination and Final Determination

Degree of difficulty	Predetermination				Final determination			
	Features required to solve the problem	Topic	Relationship with intelligence games	Cognitive load	Features required to solve the problem	Topic	Relationship with intelligence games	Cognitive load
Easy	*Unit cubes to consider when looking at the figure from top *Number of unit cubes in top view	Appearance	Related	Moderate	*Number of unit cubes in the figure *Number of unit cubes used for new cubes that can be created	Decomposition Combination	Related	High
Moderately Difficult	*Considering all of the unit cubes in the figure *Number of unit cubes in the figure	Counting	Not related	Moderate	*Coloring the outer surfaces of unit cubes *Identifying colored unit cubes *Number of painted exterior surfaces	Exterior surface painting	Related	High
Difficult	*One side length of unit cubes *Completing the shape into the smallest possible volume cube *Volume of the newly formed cube	Shape completion Volume	Not related	High	*Coloring the outer surfaces of unit cubes *Identify painted and unpainted unit cubes *Number of painted outer surfaces of painted cubes and number of unpainted unit cubes	Exterior surface painting	Related	High

According to Table 5, for the third task, teacher Ela posed problems requiring easy and moderately difficult degrees pattern extension, difficult degree pattern extension and generalization in the predetermination. In the final determination, she posed problems requiring easy degree combination, moderately difficult degree pattern extension and perimeter calculation, and difficult degree pattern extension, generalization, combination and distance calculation. Teacher Ela posed problems at a moderate level in terms of cognitive load for moderately difficult degree and at a high level in terms of cognitive load for difficult degree. In other words, for the third task, the cognitive complexity of the problems posed by teacher Ela in the predetermination and final determination for moderately difficult and difficult degrees did not change. However, while teacher Ela posed a moderate level problem in terms of cognitive load for easy degree in the predetermination, she posed a high level problem in terms of cognitive load in the final determination. The fact that the problem posed by teacher Ela for easy degree in the final determination was cognitively more complex than the problem in the predetermination can be said that intelligence games contribute to the

posing of more complex problems. The analysis of the problems Ela teacher posed for the fourth task in the predetermination and final determination is given in Table 6.

Table 5

Analysis of Ela Teacher's Posed Problems for the Third Task in the Predetermination and Final Determination

Degree of difficulty	Predetermination				Final determination			
	Features required to solve the problem	Topic	Relationship with intelligence games	Cognitive load	Features required to solve the problem	Topic	Relationship with intelligence games	Cognitive load
Easy	*Creating the 4th step of the pattern *Calculating the number of squares in the 4th step of the pattern	Pattern extension	Not related	Moderate	*Choosing two different shapes that can form squares *Creating the square with the smallest area	Combination	Not related	High
Moderately Difficult	*Pattern rule /Creating the 4th, 5th, and 6th steps of the pattern *Calculating the number of squares in the 4th, 5th, and 6th steps of the pattern	Pattern extension	Not related	Moderate	*Creating the 6th step of the pattern *The side length of each square *Calculating the perimeter of the shape in the 6th step of the pattern	Pattern extension Perimeter	Not related	Moderate
Difficult	*Discovering the relationship between the steps of the pattern *Finding a general rule for this relationship *Using the general rule to calculate the number of squares in the 10th step	Pattern extension Generalization	Not related	High	*Creating a square region by combining two consecutive steps in the first 10 steps *Arranging the square regions from largest to smallest side by side *Creating a right triangle assuming the distance between two points as the hypotenuse *Calculating the hypotenuse based on the lengths of the perpendicular sides of a right triangle	Pattern extension Generalization Combination Distance	Not related	High

Table 6

Analysis of Ela Teacher's Posed Problems for the Fourth Task in the Predetermination and Final Determination

Degree of difficulty	Predetermination				Final determination			
	Features required to solve the problem	Topic	Relationship with intelligence games	Cognitive load	Features required to solve the problem	Topic	Relationship with intelligence games	Cognitive load
Easy	*Dividing the shape into 8 unit squares *Each square having a side length of 1 unit *Calculating the perimeter of the shape	Perimeter	Not related	Low	*Dividing the shape into 8 unit squares *Dividing the shape into two parts, each consisting of 4 unit squares *Drawing the appearance of the two parts	Decomposition	Related	Low
Moderately Difficult	*Dividing the shape into 8 unit squares *Adding new unit squares to create the smallest area rectangle *Determining the number of added square	Completion	Not related	Moderate	*Drawing new parts consisting of no more than four unit squares *Determining the parts that can be used to create the shape	Combination	Related	High
Difficult	*Considering the given shape as Step 1 *Drawing Step 2 by rotating Step 1 90° clockwise once *Drawing Step 3 by rotating Step 2 90° clockwise once	Rotation	Related	Moderate	*Top view of the shape made of unit cubes *Creating the three-dimensional shape based on the numbers on the shape *Drawing the side view of the created shape	Appearance	Related	High

According to Table 6, in the predetermination for the fourth task, teacher Ela posed problems requiring easy degree of perimeter calculation, moderately difficult degree of completion, and difficult degree of rotation. In the final determination, she posed a problem requiring easy degree of decomposition, moderately difficult degree of combination, and difficult degree of appearance. Teacher Ela posed problems at a low level in terms of cognitive load for easy degree in the predetermination and final determination. In other words, the cognitive complexity of the problems that teacher Ela posed for easy degree in the predetermination and final determination did not change. The given easy prompt may be the reason why the cognitive complexity of the problems posed by teacher Ela did not change in the predetermination and final determination. While teacher Ela posed problems at a moderate level in terms of cognitive load for both moderately difficult and difficult degrees in the predetermination, she posed problems at a high level in terms of cognitive load for both degrees of difficulty in the final determination.

In other words, teacher Ela posed more complex problems for moderately difficult and difficult degree in the final determination. At the same time, in the predetermination, only the difficult degree problem was related to intelligence games,

whereas in the final determination, all three degree problems were related to intelligence games. The fact that Ela generally posed problems at a higher level in terms of cognitive load in the final determination compared to the predetermination and that all three degree problems in the final determination were related to intelligence games can be interpreted as the fact that intelligence games improve problem posing skills.

Findings Related to Teacher Aysun

The analysis of the problems Aysun teacher posed for the first task in the predetermination and final determination is given in Table 7.

Table 7

Analysis of Aysun Teacher's Posed Problems for the First Task in the Predetermination and Final Determination

Degree of difficulty	Predetermination				Final determination			
	Features required to solve the problem	Topic	Relationship with intelligence games	Cognitive load	Features required to solve the problem	Topic	Relationship with intelligence games	Cognitive load
Easy	*Perimeter of the tangram board (large square) *Side length of the large square / Hypotenuse of the red triangle *The lengths of the perpendicular sides of the red triangle *Perimeter of the red triangle	Perimeter	Not related	Low	*Selecting the shapes with the smallest area from the tangram board *Creating a rectangle with the selected shapes *Drawing the rectangle created	Decomposition Combination Area	Related	Moderate
Moderately Difficult	*Area of the large square *Side length of the large square *The length of the perpendicular sides of the pink triangle *Area of the pink triangle	Area	Not related	Low	*Selecting shapes from the tangram board *Creating at least three models with the same perimeter length using the selected shapes	Decomposition Combination Perimeter	Related	Moderate
Difficult	It is not clear and understandable.	Perimeter	Not related	None	*Selecting shapes from the tangram board *Creating square shapes with the selected shapes *Comparing the areas of the squares	Decomposition Combination Area	Related	Moderate

When Table 7 is analyzed, it is seen that teacher Aysun posed easy and difficult degrees problems requiring perimeter calculation and moderately difficult degree problems requiring area calculation in the predetermination for the first task. In the final determination, the easy and difficult degrees problems posed by Aysun require decomposition, combination and area calculation, while the moderately difficult degree problem requires decomposition, combination and perimeter calculation. In the predetermination, the problems with easy and moderately difficult degrees were at low level in terms of cognitive load, while in the final determination, the problems with easy and moderately difficult degrees were at moderate level in terms of cognitive load. In the predetermination, the cognitive load could not be determined because the problem posed for the difficult degree was not clear and understandable, while the problem posed for the difficult degree in the final determination was at the moderate level in terms of cognitive load. In addition, the problems for all three difficulty degrees in the final determination were related to intelligence games. In other words, teacher Aysun posed more complex problems in the final determination and associated the problems with intelligence games. The fact that the problems at all three degrees that teacher Aysun posed in the final determination by associating them with intelligence games were cognitively more complex than the problems posed in the predetermination can be said that intelligence games contributed to the posing of more complex problems. The analysis of the problems Aysun teacher posed for the second task in the predetermination and final determination is given in Table 8.

According to Table 8, in the predetermination for the second task, teacher Aysun posed problems requiring perimeter calculation at an easy degree, volume calculation at a moderately difficult degree, and proportioning at a difficult degree. In the final determination, she posed easy and moderate degrees problems related to appearance and perimeter calculation, and difficult degree problems related to appearance, combination and quantity. Since the perimeter of a three-dimensional shape could not be calculated in the problem posed at the easy degree in the predetermination, the data were illogical and the cognitive load of the problem could not be determined. At the same time, the cognitive load of the problem could not be determined because the problem posed for the difficult degree was not clear and understandable. In the final determination, the problem posed at the easy degree was moderate in terms of cognitive load, and the problem posed at the difficult degree was high in terms of cognitive load. The problem posed by teacher Aysun for the moderately difficult degree in the predetermination was at a low level in terms of cognitive load and at a moderate level in the final determination. In addition, the problems posed by teacher Aysun for all three difficulty degrees in the final determination were related to intelligence games. These findings can be interpreted as intelligence games improve problem posing skills. The analysis of the problems Aysun teacher posed for the third task in the predetermination and final determination is given in Table 9.

Table 8

Analysis of Aysun Teacher's Posed Problems for the Second Task in the Predetermination and Final Determination

Degree of difficulty	Predetermination				Final determination			
	Features required to solve the problem	Topic	Relationship with intelligence games	Cognitive load	Features required to solve the problem	Topic	Relationship with intelligence games	Cognitive load
Easy	*Since the perimeter of a three-dimensional shape cannot be calculated, the data is illogical.	Perimeter	Not related	None	*Edge length of the unit cubes in the shape *Drawing the right-side view of the shape *Perimeter of the right-side view	Appearance Perimeter	Related	Moderate
Moderately Difficult	*Number of unit cubes in the shape *Calculating the volume of the shape	Volume	Not related	Low	*Volume of each cube in the shape *Edge length of each cube *Front and back views of the shape *Perimeter of the front and back views	Appearance Perimeter	Related	Moderate
Difficult	It is not clear and understandable.	Ratio	Not related	None	*Back view of the shape *Creating models using soma cube pieces that match the back view of the shape *Calculating the total cost of the created model considering the cost of each soma cube piece used	Appearance Combination Quantity	Related	High

Table 9

Analysis of Aysun Teacher's Posed Problems for the Third Task in the Predetermination and Final Determination

Degree of difficulty	Predetermination				Final determination			
	Features required to solve the problem	Topic	Relationship with intelligence games	Cognitive load	Features required to solve the problem	Topic	Relationship with intelligence games	Cognitive load
Easy	*Creating the 5th step of the pattern	Pattern extension	Not related	Moderate	*Creating the 4th, 5th, 6th, and 7th steps of the pattern *Calculating the number of squares in the 4th, 5th, 6th, and 7th steps of the pattern	Pattern extension	Not related	Moderate
Moderately Difficult	*The side length of each square *Creating the shapes in the 7th and 5th steps of the pattern *The difference in the perimeter lengths of the shapes in the 7th and 5th steps	Pattern extension Perimeter	Not related	Moderate	*Expanding the pattern up to the 5th step at most *The total area of the shapes up to the 5th step	Pattern extension Area	Not related	Moderate
Difficult	*Expanding the pattern up to the 7th step at most *Calculating how many steps can be progressed with 70 additional squares at most	Pattern extension Analysis	Not related	High	*Creating the 4th step of the pattern *Selecting the appropriate pieces from the Katamino game *Creating the image of the 4th step of the pattern with the selected shapes	Pattern extension Decomposition Combination	Related	High

According to Table 9, in the predetermination for the third task, teacher Aysun posed problems related to pattern extension for easy degree, pattern extension and perimeter calculation for moderately difficult degree, pattern extension and analysis for difficult degree. In the final determination, the problems posed by teacher Aysun require pattern extension at easy degree, pattern extension and area calculation at moderately difficult degree, pattern extension, decomposition and combination at difficult degree. In the predetermination and final determination, it is seen that the easy and moderately difficult degrees problems posed by teacher Aysun are at moderate level in terms of cognitive load, while the difficult degree problems are at high level. In other words, the cognitive complexity of the problems posed by teacher Aysun in the predetermination and final determination did not change for all three difficulty degrees. Nevertheless, the problem posed at the difficult degree in the final determination was related to intelligence games. This finding can be interpreted as the positive effect of intelligence games on problem posing skills. The fact that the problem-posing activity used in the

third task evoked patterns may have caused this situation. The analysis of the problems Aysun teacher posed for the fourth task in the predetermination and final determination is given in Table 10.

Table 10

Analysis of Aysun Teacher's Posed Problems for the Fourth Task in the Predetermination and Final Determination

Degree of difficulty	Predetermination				Final determination			
	Features required to solve the problem	Topic	Relationship with intelligence games	Cognitive load	Features required to solve the problem	Topic	Relationship with intelligence games	Cognitive load
Easy	*One side length of unit squares *Perimeter of the shape	Perimeter	Not related	Low	* Perimeter of the shape * The side length of each unit square in the shape * Completing the shape into a rectangle * The lengths of the short and long sides of the rectangle * Area of the rectangle	Perimeter Completion Area	Not related	Low
Moderately Difficult	*One side length of unit squares *Area of the shape	Area	Not related	Low	*Selecting the appropriate pieces from the soma cube game *Assembling the selected soma cube pieces to match the front view of the shape *Explaining the steps followed	Appearance Combination	Related	High
Difficult	*Top view of the shape composed of unit cubes *Creating a three-dimensional shape based on the numbers on the shape *Edge length of each unit cube in the formed shape *Volume of the created shape	Appearance Volume	Related	High	*Top view of the shape composed of unit cubes *Creating a three-dimensional shape based on the numbers on the shape using soma cube pieces	Appearance Combination	Related	High

According to Table 10, in the predetermination for the fourth task, teacher Aysun posed problems requiring perimeter calculation at an easy degree, area calculation at a moderately difficult degree, and appearance and volume calculation at a

difficult degree. In the final determination, she posed easy degree problems related to perimeter, completion and area calculation, and moderately difficult and difficult degrees problems related to appearance and combination. However, the problem that teacher Aysun posed at the easy degree in the predetermination and final determination was low level in terms of cognitive load, while the problems she posed at the difficult degree were high level complex. While the problem posed by teacher Aysun for moderately difficult degree in the predetermination was low level in terms of cognitive load, it was high level complex in the final determination. In addition, when the relationship between the posed problems and intelligence games is examined, the problem posed for moderately difficult degree in the final determination and the problems for difficult degree in the predetermination and final determinations have a relationship with intelligence games. The fact that the problem posed by teacher Aysun at the moderately difficult degree by associating it with the intelligence games was more cognitively complex in the final determination than the problem posed in the predetermination can be said that the intelligence games contributed to the posing of more complex problems.

When the problems posed by Ela teacher for four tasks are analyzed, it is seen that she posed problems with higher cognitive load and more associated with intelligence games, especially in the final determination, compared to the predetermination. In the first task, the problem posed at the difficult degree was transformed from a problem with no solution to a problem with a moderate cognitive load. In the second task, the cognitive load of the easy and moderately difficult degree problems increased, and the use of more features in the difficult degree problem drew attention. In the third task, while the cognitive complexity increased in the easy degree problem, the complexity was maintained in the moderately difficult and difficult degree problems. In the fourth task, the cognitive complexity of the moderately difficult and difficult degree problems increased, and the relationship with intelligence games spread to all degrees of difficulty. In general, it was concluded that teacher Ela posed problems requiring higher level thinking skills at the final determination and that this development was supported by the intelligence games-based process.

When the problems posed by teacher Aysun in the four tasks are analyzed, it is seen that she posed problems that were cognitively more complex and more associated with intelligence games in the final determination than in the predetermination. In the first task, while the cognitive load of the easy and moderately difficult degree problems increased, the difficult degree problem, which was not clear and understandable in the predetermination, gained a meaningful structure in the final determination and reached a moderate cognitive load. In the second task, while some of the problems in the predetermination were not valid and logical, in the final determination, valid and more complex problems were posed at all three degrees; cognitive load increased especially at the difficult degree. In the third task, although the cognitive load levels remained constant, it is noteworthy that the difficult degree problem in the final determination was associated with intelligence games. In the fourth task, cognitive complexity increased especially at the moderately difficult degree, while the relationship with intelligence games became evident at both the moderately difficult and difficult degrees. In general, it was concluded that teacher Aysun posed more structured, valid and

complex problems at the final determination and that this development was supported by the intelligence games-based process.

Discussion and Conclusion

In this study, the complexity of the problems posed by both teachers generally increased as the degree of difficulty increased. Especially when teachers were asked to pose difficult problems, they generally posed more complex problems. Therefore, it can be said that the prompts given in the problem posing tasks contributed to the teachers to construct more complex problems. Similarly, Cai et al. (2023) found that when students were asked to pose difficult problems, the posed problems were much more complex linguistically and semantically and the solutions of the posed problems involved more relations or steps. The possible reason for this result from this study is that asking students to pose problems of varying difficulty prompts them to think more (Cai & Hwang, 2002; Cai et al., 2023). That is, since being prompted to pose a problem with more specific requirements leads to a tendency to think more about the solvability and complexity of problems (Cai et al. 2023; Silber & Cai, 2017), the teachers in this study generally posed more complex problems when asked to pose difficult problems. At the same time, this finding confirms the results of studies (e.g., Cai et al., 2023) that provide evidence that problem posing tasks can provide a better understanding of the mathematical thinking of problem posers if they require different levels of difficulty. On the other hand, this result contradicts the results presented by Baumanns and Rott (2024) who found that similar prompts did not significantly affect creative problem posing performance. The same contradiction is also present in the study conducted by Christou et al. (2024). The researchers found that the level of complexity did not affect teachers' performance in problem posing for the fraction part-whole concept. The results of such studies may vary depending on the type of problem posing activity used and the concept or topic to be problem posed.

The prompts given in the problem posing tasks contributed to the posing of cognitively more complex problems. However, highly complex problems were generally posed in the final determination. It was determined that the problems posed by the teachers, especially after the intervention for intelligence games, were highly complex and associated with intelligence games. Therefore, in this study, it was concluded that intelligence games cause the problems to be more complex and that intelligence games improve problem posing skills. This result is also supported by the topic preferences of the teachers in the problems they constructed. The problems posed by the teachers at low levels in terms of cognitive load are generally related to topics that require measurement such as perimeter and area. Topics such as decomposition, combination, and appearance, which are related to intelligence games, triggered teachers to pose high level complex problems. Therefore, the results of the current study show that learning environments based on intelligence games can be supported with problem posing activities.

The intelligence games used in this study can encourage teachers to think visually and spatially and to understand abstract and concrete relationships. Since these games involve the reconstruction of shapes, parts or spatial arrangements according to a problem or goal to be solved, they encourage the processes of problem identification and the development of creative solutions. Teachers who engage in these types of games

can gain the ability to better convey the problem posing process to their students. For example, intelligence games such as three-dimensional puzzles, jigsaw puzzles, and various block structures can strengthen individuals' ability to analyze problem situations, think of solutions, and create and present their own problems to others. This can improve teachers' problem identification and construction skills as well as their problem solving skills, especially in areas such as mathematics and science. Candiasa, Santiyadnya and Sunu (2018) found that the problem posing learning model supported by puzzles improved middle school students' ability to construct meaningful mathematical problems. Kalmpourtzis (2019) found that game design activities had a positive effect on the development of problem-solving skills of students aged 5-6 years. On the other hand, there are studies (Bayramin, 2020; Chen et al., 2021; Çağan, 2022; Kurbal, 2015; Lin et al., 2011; Reiter et al., 2013; Şanlıdağ & Aykaç, 2021; Şişman, 2022; Yıldırım, 2023; Terzi, 2024; Zengin-Kılavuz, 2024) that reveal the positive effect of intelligence games on the development of students' problem solving skills. Considering that problem solving improves problem posing skills (Örnek & Soylu, 2021; Silver & Cai, 1996), it can be said that the fact that intelligence games improve problem posing skills confirms the results of this study.

One limitation of this study is that the findings are based on the written responses of two teachers. For this reason, in the current study, it was qualitatively determined that intelligence games caused the problems to be more complex and therefore intelligence games improved problem posing skills. In future studies, whether intelligence games improve problem posing skills can be examined experimentally.

Another limitation of this study is that the data were collected only with paper and pencil. Therefore, teachers' understanding of the cognitive processes and interpretations of the tasks could not be identified, even if the products of the problem posing tasks were available. Consequently, even if the authors of this study think that posing a difficult or complex problem is a superior outcome, they have no real understanding of how teachers interpret these prompts and how they relate them to intelligence games. More specifically, this study did not identify teachers' understanding of an easy problem, a moderately difficult problem, and a difficult problem. It also did not examine in detail how the intelligence games intervention was reflected in the complexity measures used in this study.

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Statement of Responsibility

All authors contributed to the study. The first author was involved in conceptualization, literature review, design, data collection, writing, review, editing and supervision. The second author contributed to literature review, design, methodology, analysis, writing, review, editing, and supervision.

Conflicts of Interest

The authors declare no conflict interests.

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Pre-Service English as a Foreign Language Teachers' Attitudes toward Artificial Intelligence*

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ABSTRACT: Artificial Intelligence (AI) is actively involved in many areas of contemporary society. As in many other fields, it has pioneered a significant transformation in language education. As today's preservice teachers will shape the future, it is crucial to understand their attitudes toward using AI in language classrooms. Hence, this study aims to examine the attitudes towards AI of pre-service English as a Foreign Language (EFL) teachers studying at a state university in Türkiye. An explanatory sequential mixed method research design was adopted. Data was collected via a scale with the participation of 193 pre-service EFL teachers and analyzed in line with various descriptive variables. Qualitative data were collected through in-depth interviews with 10 participants and analyzed via reflexive thematic analysis. Quantitative findings show that male participants have more positive attitudes towards AI. In addition, third-year students were found to have higher behavioral attitude scores compared to first-year students. The results of the qualitative analysis revealed that themes such as the challenges faced in the integration of AI into educational processes, the potential benefits it provides, participants' preferences for these technologies, and predictions about the future of AI in education came to the fore.

Keywords: Artificial Intelligence, attitudes, benefits of AIED, challenges of AIED, ELT.

ÖZ: Yapay Zeka (YZ), çağdaş toplumun birçok alanında aktif olarak yer almaktadır. Diğer birçok alanda olduğu gibi, dil eğitiminde de önemli bir dönüşüme öncülük etmiştir. Bugünün öğretmen adayları geleceği şekillendireceğinden, dil sınıflarında YZ kullanımına yönelik tutumlarını anlamak çok önemlidir. Bu nedenle, bu çalışma Türkiye'deki bir devlet üniversitesinde öğrenim gören İngilizce öğretmen adaylarının YZ'ye yönelik tutumlarını incelemeyi amaçlamaktadır. Bu çalışmada, açıklayıcı sıralı karma yöntemli bir araştırma tasarımı benimsenmiştir. Nicel veriler, 193 Yabancı Dil Olarak İngilizce öğretmen adayının katılımıyla bir ölçek aracılığıyla toplanmış ve çeşitli betimsel değişkenler doğrultusunda analiz edilmiştir. Nitel veriler ise 10 katılımcı ile derinlemesine görüşmeler yoluyla toplanmış ve tematik analiz yoluyla analiz edilmiştir. Nicel bulgular, erkek katılımcıların YZ'ye karşı daha olumlu tutumlara sahip olduğunu göstermektedir. Ayrıca, üçüncü sınıf öğrencilerinin birinci sınıf öğrencilerine kıyasla daha yüksek davranışsal tutum puanlarına sahip olduğu bulunmuştur. Nitel analiz sonuçları, YZ'nin eğitim süreçlerine entegrasyonunda karşılaşılan zorluklar, sağladığı potansiyel faydalar, katılımcıların bu teknolojilere yönelik tercihleri ve eğitimde YZ'nin geleceğine ilişkin öngörüler gibi temaların öne çıktığını ortaya koymuştur.

Anahtar kelimeler: Yapay zeka, tutum, yapay zeka destekli eğitimin faydaları, yapay zeka destekli eğitimin zorlukları, İngilizcenin yabancı dil olarak öğretilmesi.

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The birth of artificial intelligence (AI) is recognized as one of the most important turning points in human history (Copeland, 1998). This rapidly developing field of technology is leading to radical changes not only in the labor market or industrial production processes but also in areas that require cognitive skills, such as education and language teaching. In particular, the literature has shown that in the context of educational technologies, AI has the potential to bring many innovations such as reducing teachers' workload by assisting with administrative tasks (Ahmad et al., 2022; Salas-Pilco et al., 2022), lesson planning and content development (Hashem et al., 2023), individualizing students' learning processes (Hasibuan & Azizah, 2023; Hashem et al., 2022; Tapalova et al., 2022) and enhancing assessment processes (Tomić et al., 2023; Vittorini et al., 2020).

As in other educational fields, in recent years, it has been observed that AI-based applications have come to the forefront in the field of English as a Foreign Language (EFL) teaching and have started to be used in increasingly different ways. In particular, innovations such as personalised and automated feedback systems, speech recognition technologies and online translation tools (Kasimi & Fidan, 2023; Zhou & Hou, 2025) directly affect teaching processes in EFL instruction and transform classroom practices. These technological developments necessitate language teachers to interact with AI from the early stages of their professional lives and reshape their pedagogical decisions. However, these impacts of AI raise questions about how it will be integrated into educational processes and how teachers' attitudes towards these technologies will be shaped. As pre-service teachers will shape the educational environments of the future, their attitudes towards AI are of great importance. Pre-service teachers' perceptions and attitudes have the potential to reveal not only technological adaptation at the individual level but also the extent to which the education system is prepared for this transformation. These attitudes can be decisive in how AI will be used in classroom applications, how effectively technological innovations in education will be integrated, and how teaching processes will develop. Hence, this study aims to contribute to the current debates on the role of AI in EFL and to understand pre-service EFL teachers' attitudes towards these new technologies.

Literature Review

AI, defined as a field of study that endows computer systems with human-like cognitive capabilities, enabling them to learn, analyze, and make decisions in a manner akin to human reasoning (Derinalp, 2024; Derinalp & Özyurt, 2024), has rapidly penetrated many fields, notably language education. The use of AI in language education has become increasingly widespread in recent years, and this has transformed educational environments radically. Research shows that AI offers significant benefits in language education, ranging from personalizing learning processes and increasing student motivation to reducing teachers' workload and speeding up assessment processes (Derinalp, 2024; Darwin et al., 2024; Özkan et al., 2024; Taşçı & Tunaz, 2024; Yılmaz-Virlan & Tomak, 2024). It has overcome the limits of traditional teaching methods and created an innovative language learning environment by combining modern technology and pedagogical principles. The approach adopted by AI has increased students' motivation to learn by enabling the language learning process to be

more accessible, effective, and interactive. As a result of this innovative approach, the language learning process has become more efficient and effective.

Attitude can be defined as a psychological tendency to respond positively or negatively to a particular object or situation (Eagly & Chaiken, 1993). Traditionally, attitude consists of three components that interact with each other and are not mutually exclusive: cognitive, affective, and behavioral (Bagozzi, 1978; Metsärinne & Kallio, 2016; Suh & Ahn, 2022). The cognitive component denotes the set of beliefs, thoughts, and evaluations that an individual has toward an object or situation. This component reflects the individual's level of knowledge and experiences. In an educational context, a teacher's knowledge and beliefs about technology use, for example, may determine the extent to which the teacher can effectively integrate these tools. The affective component delineates feelings or emotions towards a particular object, situation, or person. Such responses encompass both positive and negative emotions and are crucial in developing one's attitude. An example can be a teacher's positive attitude toward the use of technology might increase their willingness to adopt it in their lessons. The behavioral component, in turn, represents the individual's actions and reactions based on their attitude. This represents a concrete reflection of an individual's attitude and shows the link between attitudes and behaviors. Thus, teachers with a positive attitude tend to use educational technologies more frequently, whereas teachers with a negative attitude might be expected to show reluctance to use these technologies.

Not only definitional explanations but also theoretical frameworks provide guidance in understanding individual attitudes towards the integration of technology into education. In this regard, the Technology Acceptance Model (TAM) and Technological Pedagogical Content Knowledge (TPACK) framework, which are among the theories widely used in the field of educational technologies, constitute the conceptual basis of this study. The Technology Acceptance Model (TAM), developed by Davis (1989), accounts for individuals' intentions to accept and use a technology through two basic elements: perceived usefulness and perceived ease of use. This model provides an important theoretical basis for understanding the basic cognitive judgments that shape pre-service teachers' positive or negative attitudes towards AI-based tools. The TPACK framework developed by Mishra and Koehler (2006), in turn, emphasizes that teachers need to holistically blend pedagogical, content, and technology knowledge in order to use technology effectively. This framework enables to evaluate practitioners' perceptions about integrating technology into teaching environments from a pedagogical perspective.

In line with these frameworks, the impact of teachers' attitudes towards educational technologies on their adoption and integration of innovative tools into classroom practices has been examined in many studies (Aljohani, 2021; Harakchiyska & Vassilev, 2024; Zhang et al., 2023). For example, Harakchiyska & Vassilev (2024) examined the attitude and readiness of Bulgarian pre-service teachers to use AI in EFL instruction. The participants were found to have a positive attitude and willingness to adopt AI. Moreover, they also found that pre-service EFL teachers considered AI technologies' positive impact on the development of learners' skills to engage in meaningful oral or written communication and comprehend the meaning of the provided texts audibly or visually. This finding is in line with Aljohani (2021) who observed the opinions and attitudes of EFL teachers and students in Saudi Arabia. The results showed

that teachers and students had positive attitudes towards using AI in learning the English language. Zhang, et al (2023), in turn, investigated the factors influencing pre-service teachers' acceptance of AI. Their findings revealed that the most important factors affecting pre-service teachers' intentions to use AI technology are perceived usefulness and ease of use, with perceived usefulness having a stronger effect, and that gender differences affect attitudes in this area by increasing female pre-service teachers' concerns about the use of AI. The study also emphasized the challenges and the weak link between theoretical, pedagogical, and ethical concerns.

The increasing importance of AI and educational technologies in teaching processes has attracted a certain amount of interest in Türkiye as in other contexts. For example, Hınız's (2024) one-year case study revealed the positive and negative perceptions of in-service teachers and learners towards generative AI tools such as ChatGPT, highlighting their potential to improve language skills and diversify learning materials. However, the study also pointed to risks such as plagiarism, decline in cognitive skills and lack of critical thinking. Özkan et al.'s (2024) systematic review, in turn, reported that both pre-service and in-service EFL teachers perceived AI as a tool that facilitates and personalizes teaching, but they raised concerns such as ethical issues and lack of adequate training. Arslan (2025) also drew attention to the lack of technical and pedagogical knowledge of EFL instructors at the university level and emphasized the need for professional development in this area.

In addition to studies covering in-service teachers and both in-service and pre-service teachers, studies focusing entirely on pre-service teachers also have an important place in the literature. Although the number of studies examining pre-service teachers' perceptions of AI is increasing in Turkey, these findings are generally fragmented and independent. For example, while Yetkin and Özer-Altınkaya's (2024) qualitative study reveals that pre-service teachers have both positive and negative, complex and contradictory attitudes towards AI, Eyüp and Kayhan's (2023) quantitative study shows that pre-service teachers' anxiety towards AI affects their attitudes towards technology. Similarly, Taşçı and Tunaz's (2024) study revealed that while pre-service EFL teachers embraced the advantages of AI tools such as time saving and access to information, they had concerns about job security, data privacy, and possible negative effects on critical thinking skills. When these studies are evaluated together, it is seen that pre-service EFL teachers develop multi-layered and dynamic perceptions towards AI technologies not only positively or negatively but also emotionally (anxiety, uncertainty) and pedagogically (usefulness, ease of use). This calls for a more in-depth analysis of pre-service EFL teachers' positions in AI-supported learning environments and their reflections on future classroom practice. The current study aims not only to measure pre-service EFL teachers' perceptions of AI, but also to understand more holistically the pedagogical and affective dynamics underlying these perceptions. In this line, the research questions of the current study are articulated as:

RQ1. What are the attitudes of pre-service EFL teachers in Türkiye toward the use of AI?

RQ2. How do pre-service teachers perceive the benefits, challenges, and future implications of AI integration in language teaching?

Method

A total of 193 pre-service EFL teachers (134 females, 59 males) from a state university in the Southeast region of Turkey participated in the study. The participants consisted of students in the 1st, 2nd, 3rd, and 4th grades of the university and the inclusion criterion was to be studying in the English Language Teaching program. Participation was voluntary and the data collection process was carried out by the second researcher, who was an undergraduate student, to ensure that the students did not feel any pressure to participate in the study.

The integration of quantitative and qualitative methods in the study was carried out according to the explanatory sequential mixed method design (Creswell & Poth, 2018). In the first stage, quantitative data were collected and analyzed. Then, qualitative interviews were conducted by selecting specific participants through purposive sampling to elaborate and explain the quantitative findings. In this process, quantitative and qualitative data were integrated in the sample selection, interpretation of findings and reporting stages. Considering the role and position of the researchers in the data collection and analysis process, researcher subjectivity contributed to the interpretation of the data and was evaluated with a reflexive approach.

In the first phase of the study, the Student Attitudes towards Artificial Intelligence Scale (SATAI) developed by Suh and Ahn (2022) was used to measure the participants' attitudes towards AI. This 26-item 5-point Likert scale consists of three dimensions: cognitive, affective, and behavioral and its validity was supported by good fit indicators, with RMSEA of 0.075, SRMR of 0.047, TLI of 0.928 and CFI of 0.937. These values indicate that the model provides a good fit and is valid. The reliability of the scale was ensured by internal consistency tests (i.e., Cronbach's Alpha) and high reliability levels were obtained. The internal consistency of the scale in the current sample was high (Cronbach's $\alpha = .96$). The results of the Shapiro-Wilk test ($W = 0.98608$, $p = .1157$) and the Q-Q plot show that the total scores are normally distributed (see Appendix A for Q-Q plot). Hence, it can be said that the parametric test assumptions are met. T-tests and One-way Analysis of Variance (ANOVA) tests were applied to examine whether there were significant differences between the scale results across the study levels and genders. The data obtained were analyzed using descriptive statistics.

Quantitative data collection was carried out through an online questionnaire via Google Forms, which included demographic information and the items of the scale. Among the demographic data questions, a closed-ended question was used to determine the level of familiarity of the participants with AI. In this question, participants were asked to define themselves as familiar or unfamiliar. After the scale application, the highest and lowest ranked five students from each end were determined according to their total scores, and semi-structured interviews were conducted with these 10 students following purposive sampling method. In this context, the students with the highest and lowest total scores represent the most appropriate examples to understand how participants' attitudes towards AI are shaped across a wide range and extremes. By rendering the differences between the participants' attitudes more salient, this method provided more comprehensive and meaningful insights into attitudes towards AI. The demographic data and scale total scores of the interviewed participants are presented in Table 1 below.

Table 1

Demographic Data and Scale Total Scores of Interviewed Participants

Participant	Gender	Grade	Total Score
P1	Female	Fourth-grade	128
P2	Female	Fourth-grade	130
P3	Male	Third-grade	31
P4	Female	Third-grade	128
P5	Female	Third-grade	54
P6	Male	Third-grade	118
P7	Female	Second-grade	53
P8	Female	Second-grade	122
P9	Female	Third-grade	49
P10	Female	Third-grade	56

The interviews were conducted by the second researcher using questions prepared by the lead researcher. The purpose of administering the semi-structured interviews by the second researcher was to enable the participants to respond more honestly and openly without feeling any authority or academic pressure during the interview. While the scale was administered in English, participants could choose to be interviewed in Turkish or English, with the majority preferring Turkish. The interviews were audio recorded, and the transcription and analysis process was carried out by the first researcher.

For the qualitative data analysis, in this study, Braun and Clarke's (2019) reflexive thematic analysis approach was adopted. Reflexive thematic analysis focuses on discovering and interpreting patterns of meaning in the data with the active participation of the researcher, so that themes are not fixed and predetermined but dynamic constructs that emerge through interaction with the data. This approach recognizes the researcher's subjectivity as a resource and uses it consciously in the interpretation of the data. The analysis process consists of six stages: familiarizing with the data, coding, generating themes, reviewing themes, identifying themes and reporting. In the coding stage, both explicit (semantic) and implicit meanings were taken into account, thus aiming to gain an in-depth understanding of the participants' attitudes. The researcher ensured impartiality by constantly reviewing the presuppositions and maintaining transparency throughout the analysis. The analysis was rendered both descriptive and interpretive by using sample quotations during the coding process. In this way, not only the participants' statements were presented, but also the contextual and conceptual meanings underlying these statements were revealed. The analysis process was carried out on the MAXQDA software and the data were thematically classified and analyzed in depth.

Ethical Procedures

In the study, ethical principles were respected. Ethical approval of this study is obtained from Gaziantep University with approval number 456833. In this regard, data was collected only after obtaining ethical approval from the institutions where the participants were enrolled. Their informed consent was subsequently sought. Additionally, to ensure confidentiality, their names were anonymized to protect their identities.

Findings

The scale data obtained in this study was analyzed with descriptive statistics in the SPSS software. The interview data, in turn, was analyzed by the thematic analysis method in the MAXQDA software. Below, the findings related to both data sets are presented respectively.

Quantitative Results about EFL Teachers' Attitudes towards AI

The scale data was analyzed to investigate whether pre-service EFL teachers' attitudes towards AI differed according to several variables. The effect of gender, which is one of these variables, on attitudes towards AI was statistically evaluated in this regard. The results are presented below (Table 2).

Table 2

T-Test Results of SATAI Scale According to Gender

	Gender	n	$\bar{x}$	SD	t	p
Behavioral	Female	134	15.45	3.574	-1.105	.270
	Male	59	16.07	3.629		
Affective	Female	134	34.27	7.926	-1.337	.183
	Male	59	35.98	8.823		
Cognitive	Female	134	36.90	10.055	-2.654	.009*
	Male	59	41.14	10.548		
ScaleSum	Female	134	86.62	19.372	-2.114	.036*
	Male	59	93.19	20.995		

* $p < .05$

Upon examining Table 2, statistically significant differences were found in favor of male participants in the behavioral dimension ($t(191) = -2.65$, $p = .009$) and in the total scale scores ($t(191) = -2.11$, $p = .036$) of the SATAI scale. This finding suggests that the attitudes of males towards AI are significantly higher than those of females in the cognitive dimension and the total scale scores.

Pre-service teachers' familiarity with AI technologies may shape their attitudes toward these technologies and their perceptions of their use. Therefore, another variable

addressed in this study is pre-service teachers' familiarity levels with AI. The results of the analysis are tabulated below (Table 3).

Table 3
Descriptive Results of SATAI Scale According to Familiarity

	Familiarity	n	$\bar{x}$	SD
Behavioral	Not-familiar	4	10.25	5.560
	Familiar	189	15.75	3.473
Affective	Not-familiar	4	25.25	12.790
	Familiar	189	34.99	8.032
Cognitive	Not-familiar	4	32.00	14.629
	Familiar	189	38.33	10.271
Scale Sum	Not-familiar	4	67.50	32.634
	Familiar	189	89.07	19.600

* $p < .05$

When Table 3 is examined, it is seen that participants who are not familiar with AI exhibit lower attitudes in all sub-dimensions and total score of the scale. Especially in behavioral and affective dimensions, significant score differences are noteworthy. However, since the sample size of the unfamiliar group was quite limited ($n=4$), these differences were not statistically tested, but only interpreted at a descriptive level.

Another variable that was explored in this study was previous exposure or usage of AI. The participants were asked whether they used the AI technologies before or not. The analysis of self-reported data was presented in Table 4.

Table 4
T-Test Results of SATAI Acale According to Previous Use of AI or Not

	Previously used or not	n	$\bar{x}$	SD	t	p
Behavioral	Not-used	23	14.00	4.101	-2.356	.019*
	used	170	15.86	3.473		
Affective	Not-used	23	31.87	9.678	-1.827	.069
	used	170	35.19	7.959		
Cognitive	Not-used	23	32.57	11.878	-2.826	.005*

	used	170	38.96	9.941		
ScaleSum	Not-used	23	78.43	23.033	-2.637	.009*
	used	170	90.01	19.286		

* $p < .05$

When Table 4 is examined, it is seen that there are statistically significant differences in behavioural ($t(191) = -2.36, p = .019$) and cognitive ($t(191) = -2.83, p = .005$) dimensions of the SATAI scale and the total score ($t(191) = -2.64, p = .009$) in favor of those who have used AI before. No significant difference was observed in the affective dimension ($t(191) = -1.83, p = .069$). These results reveal that the attitudes of individuals who use AI are higher in behavioural and cognitive dimensions compared to those who do not use AI, but do not show a similar trend in the affective dimension.

In addition to these variables, One-way ANOVA was applied to determine the differences across grades according to the dimensions of the scale. This analysis was conducted to examine whether the attitudes of pre-service EFL teachers at different grade levels towards AI exhibit a statistically significant difference in terms of dimensions.

Table 5
The Results of One-Way ANOVA Test

	Grade	N	Mean	Std. Deviation	F	df	Sig.	Post-hoc
Behavioral	1	67	14.64	3.311	3.225	3	0.024*	3 > 1
	2	57	15.81	3.276				
	3	35	16.74	4.046				
	4	34	16.18	3.802				
	Total	193	15.64	3.593				
Affective	1	67	32.94	7.618	3.118	3	0.027*	4 > 1
	2	57	34.42	7.971				
	3	35	35.91	8.59				
	4	34	37.91	8.67				
	Total	193	34.79	8.225				
Cognitive	1	67	35.75	9.704	3.962	3	0.009*	4 > 1
	2	57	37.53	9.612				
	3	35	39.46	10.637				
	4	34	42.85	11.25				
	Total	193	38.2	10.366				
ScaleSum	1	67	83.33	18.033	3.962	3	0.009*	4 > 1

2	57	87.75	18.83
3	35	92.11	21.733
4	34	96.94	21.436
Total	193	88.63	20.058

*:p = 0.05

As can be seen from Table 5, the One-way ANOVA results revealed statistically significant differences in the behavioral ($F(3, 193) = 3.23, p = .024$), affective ($F(3, 193) = 3.12, p = .027$), cognitive ($F(3, 193) = 3.96, p = .009$), and total scale scores ($F(3, 193) = 3.96, p = .009$) based on participants' grade levels. Results of post-hoc analyses revealed that the mean behavioral score of third-grade students was significantly higher ($3 > 1$) than the mean behavioral score of first-grade students.

Similarly, in the affective dimension, the mean score of fourth-grade students ($\bar{X} = 37.91$) was significantly higher than the mean score of first-grade students ($\bar{X} = 32.94$). In the cognitive dimension, the mean score of the fourth-grade group ($\bar{X} = 42.85$) was significantly higher than that of the first-grade group ($\bar{X} = 35.75$). When the total scale scores were analyzed, the mean overall score of the fourth-grade students ($\bar{X} = 96.94$) was also significantly higher than the mean of the first-grade group ($\bar{X} = 83.33$). These findings indicate that the affective and cognitive attitudes of the participants at higher grade levels are more positive and this development is also evident in the overall scale.

Qualitative Results about EFL Teachers' Attitudes towards AI

The results of the qualitative analysis can be categorized under five main themes: challenges of artificial intelligence in education (AIEd), pedagogical benefits of AI, preferences for AIEd, the future of AIEd, and differences between AI-integrated classrooms and traditional classrooms. Below, these main themes and their sub-themes are presented in detail.

Challenges of AIEd

While addressing the challenges related to the use of AIEd, pre-service teachers highlighted a number of issues. For example, one of the participants stressed the uncertainty and fear created by the lack of knowledge about artificial intelligence as follows:

Actually, I am confused because I do not know much about AI and it is actually scaring me. So, it is an unusual thing for my life, and our life, the human life. So, because it is new, a kind of a new technology. I am scared (P5).

Although she could not articulate the reason behind her fear, she repeatedly emphasized her anxiety about the potential impact of AI usage in education. It is also worth noting that this participant had a low total scale score (See Appendix B for the joint-display table). Some other participants were more informed about the potential negative impacts of AIEd. Of two noted their concerns regarding AI leading to laziness among the students by stating:

I do not prefer to use AI but unfortunately, today's conditions encourage you to use AI. On the one hand, I think it is beneficial, but on the other hand, I have a negative view of excessive use. It makes students lazier (P10).

Here, it is observed that the participant exhibits a negative attitude towards the use of artificial intelligence. However, like P5, P10 also lacks an adequate explanation of the reasons underlying this negative attitude. The participant states that it might lead students to be lazy, but does not provide concrete information about why or how this could happen. On the other hand, P9 is more specific on this issue, stating that:

But negatively, I think that we would become very dependent on Artificial Intelligence and I think it would lead people to be lazy... I think we could lose our research skills. Because, when I was studying we relied on the dictionaries we had and our teachers, but now they [this generation's students] can access everything by typing. Even now, they will do a lot of homework or prepare slides [by using AI]. Yes, they trust too much. Whereas I think it can kill some creativity... (P9)

It was interesting to see that while highlighting the challenges of AIEd, some participants addressed the contextual challenges. In this regard, infrastructural challenges were noted. For example, one of the participants stated that “AI depends on the internet. So, electricity-related shortages may occur (P8).” In a similar vein, another participant stressed that “I do not believe that we currently can use artificial intelligence in every classroom. While access to technology is easy in some metropolitan areas, this may be impossible in remote areas (P9)”. Looking at the issue from a broader perspective, P6 drew attention to some underdeveloped regions and countries by stating “We are using technology here, but many countries cannot use technology”.

Concerns regarding cheating and plagiarism were also repeatedly stressed (P1, P3, P4, P6, P7, and P9). Although the participants used different phrases, in summary, they agreed that cheating is an important problem in the use of artificial intelligence. This was expressed by P1 as “[M]aybe cheating is the most common problem that we should handle because students are really likely to cheat on exams and texts and quizzes (P1).” This was not a surprising finding as such issues are commonly associated with AI use in educational settings, where students may be tempted to rely on AI-generated content rather than their own work.

Classroom management issues and teachers' technological pedagogical content knowledge and skills were also highlighted. To exemplify, in terms of classroom management, P8 pointed out the difficulty of maintaining classroom management in teaching with AI, while P1 argued that teaching with AI would not necessarily ease the teacher's job, that “teaching with AI would not be equivalent to coming to class unprepared”, and that “the teacher needs to be competent when teaching with AI”. It was also interesting to find that P1 strongly believed that “...you cannot use AI so much with the younger students ...because students might see AI as a tool for learning and might not care about the teacher at all”. This implies that for AI to be effective in teaching, the teacher must be competent in AI tools and have a support system that includes pedagogical content knowledge. This also brings into focus the necessity for teachers to undertake continued professional development and training to help them embrace AI use in their instructional activities.

Pedagogical benefits of AI usage

Learners' access to AI at home, independent from the teacher, to learn topics they do not understand or to continue their studies with reinforcing activities, and 24/7 accessibility of AI, providing an interactive and personalized experience, led to the

emergence of the sub-theme “AI as a supporting learning tool” in the study. For example, P1 expressed that

There are many positive impacts (of AI) because it really helps students understand. For example, some students may be too shy to ask questions to the teacher in the classroom. So, they might ask AI later on and they could get what they were expecting as an answer.

The possibility of providing instant and individualized feedback, increasing students' motivation, and learner autonomy were among the other sub-themes that emerged from data analysis. An interesting finding was the sub-theme of authentic materials (realia) in EFL classrooms. It is significant because pre-service teachers' awareness of this topic and their emphasis on the potential of AI to deliver authentic materials shows that they recognize the contextual learning opportunities that technology provides in language teaching. This awareness may indicate that future teachers will tend to use AI not only to improve language skills but also as a tool that enables students to connect with the real world.

Another valuable sub-theme was the potential of AI to streamline the teacher's work. In this context, P2 emphasized the time-saving aspect of AI by stating that "It allows me to have more time". P3, in turn, noted the ease of preparing lesson plans, and pointed out that "I think the process of planning will be easier while using AI... I will probably use some parts of planning in my lessons which could make my job easier." P6 emphasized its contributions to the material and content designing process. In addition, P7 and P9 stated that AI can render teaching-learning activities more interactive and enjoyable for students so that these activities can be performed more efficiently.

Preferences for AIEd

As per the preferences of AI usage in the classroom, the participants' views varied. P9 and P10 stated that they did not prefer the use of AI in their teaching-learning processes; however, they agreed that they would partially integrate it into their lessons considering the current necessities of today's conditions in terms of digitalization and the increasing importance of technological tools in education. On the other hand, one participant who stated that she was a tech-savvy person affirmed that she would definitely use AI in her classes. This indicates that some pre-service teachers are more open-minded and willing to incorporate AI into the educational process. yet, some other participants (P1, P3, P5, and P6) emphasized that only traditional methods are not enough and that they believe that the combination of these two approaches will create an effective education process. This indicates that the place of AI in education is still controversial and although some pre-service teachers may have some reservations about adopting this technology, some others are convinced that it is a beneficial tool. Indeed, it can be concluded that striking a balance between AI and traditional teaching methods will enrich the learning experiences of both teachers and students. This has the potential to create a more effective and interactive environment in teaching processes.

Future of AIEd

Another theme that emerged from the data analysis was the future of AIEd. In this regard, the way that the pre-service teachers envisioned the AIEd also varied. In this context, most of the pre-service teachers expressed their thoughts about the role of the

teacher. For example, P4 argued that the need for teachers will decrease for students using AI, while P6 stated that the authority of the teacher will weaken, but AI cannot replace the teacher by stating:

With the use of AI, the active role of the teacher is diminishing and this pushes the teacher into a more passive position ... This passivity leads to a decrease in the students' need for the teacher. However, this is not only about the learning process; teachers do not just impart knowledge in the classroom. They emotionally guide and mentor students. At this point, it is not possible for AI to replace the teacher. For example, while a teacher observes and analyzes students throughout a semester, AI cannot do this kind of continuous assessment; it can only offer temporary solutions.

This view is supported by P1, as well. She stated that:

I do not think it can ever replace a teacher because a teacher's role is not just simply giving information and teaching students. There are some classroom management roles, there are some monitoring roles. So, only AI cannot solely perform these roles by itself. So, a teacher is an essential part of the classroom, but it can help teachers in a way to improve the overall learning outcomes.

Although the participants' views differed, they generally believed that AI would change the role of the teacher in the future. This indicates that the role of AI in education will be shaped in a way that supports the functions of teachers, but the teacher will continue to be an indispensable part of the educational process.

Differences between AI-Integrated Classrooms and Traditional Classrooms

Another theme that emerged from the data is the comparison of teaching with AI and traditional methods. In this context, it can be inferred that in general, participants regard AI as a transformative tool in education. They emphasise that AI brings authentic materials into the classroom and provides a more interactive learning experience. P4 expressed this by stating:

I think AI is more beneficial. For many years, we were learning with traditional methods. I think they are not beneficial. They are not [a] good way for teaching English. We need some natural things like native speakers. We need video records, voice recordings from native speakers.

It was interesting to see that participants associated AI with authenticity. Although they did not articulate in detail why and how “with AI the teacher uses more authentic materials” (P1), they believed that AI “is one of the most important tools for teaching English because we can reach lots of real products. We can reach lots of native speakers with AI” (P4). In language learning particularly, they stated that AI provides access to resources similar to native speakers and offers engaging materials such as visuals and multimedia. Traditional methods, on the other hand, were perceived as more rigid and rote-based, lacking the interactive possibilities offered by AI.

Another difference noted in the comparison of AI-based and traditional teaching was that while traditional teaching requires physical resources such as books and infrastructure, AI-based learning is more flexible as it can be accessed with a device and an internet connection (P4). However, concerns regarding access to devices and the internet were also raised by P6 and P9 as noted under the challenges of AIEd theme.

Another aspect that arose was the lack of emotion in AI. For example, P9 articulated this difference between the AI-based and traditional teaching by stating:

The language taught will be the same. So, the language already has certain rules and meanings, and we teach it in the same way both through AI and the traditional way, but the way we teach and communicate with the student will be different. And, I think that the teacher is in the

foreground and will exhibit a better way than AI. Because, AI cannot understand the capacity of the student. It only answers the questions that are asked of it. However, a teacher understands the level of competence of the student.

Confusing AI-based teaching with AI taking the teacher's role, P9 believes that AI can provide support to students in the cognitive domain, but it may be insufficient in the affective dimension. According to this view, although AI is effective in transferring knowledge and providing conceptual skills to students, it lacks in understanding students' emotional needs and responding to them appropriately. Teachers, on the other hand, understand students' needs better, contribute more effectively to the learning process, and students communicate more easily with their teachers. This shows that the teacher is in a superior position in the teaching process in this regard compared to artificial intelligence.

Discussion

Examining the attitudes of pre-service EFL teachers, who are the teachers of the future, towards AI is important as it is an indicator that can directly affect the role and use of AI in education. In this regard, the current study's findings reveal that pre-service EFL teachers' attitudes towards AI differ according to demographic and experience variables. First, it was observed that male participants' cognitive attitudes and general attitudes towards AI were more positive than female participants. The higher scores of males on the cognitive dimension indicate that they have a more positive or strong disposition in their knowledge, beliefs, and thoughts about AI. Similarly, higher scores of males in total scale scores indicate that they have a more positive attitude towards AI in general. This finding is mostly in line with the existing literature (Fietta et al., 2022; Schepman & Rodway, 2023; Yetişensoy, 2024; Zhang & Defoe, 2019) with some exceptions (Katsantonis & Katsantonis, 2024). To exemplify, Fietta et al. (2022) also conducted a study with 829 participants (377 females and 452 males) and found that women had a more negative attitude than men. This may indicate that female participants exhibit a more cautious or hesitant approach to their perceptions of AI. Considering that Katsantonis and Katsantonis (2024) conducted their study in Greece with 190 students, inconsistencies or exceptions might occur due to contextual differences or the uneven distribution of gender groups in their sample (82.45 % female).

Descriptive results suggest that participants who reported being familiar with AI technologies exhibited more positive attitudes in the affective and behavioral dimensions compared to those unfamiliar with AI. However, this difference was not observed in the cognitive dimension. Given the very small number of participants in the not familiar group, these findings should be interpreted with caution and considered indicative rather than conclusive. As previous research suggests, familiarity is generally associated with positive perceptions (Garcia-Marques et al., 2016); however, the lack of a significant difference in the cognitive dimension suggests that mere knowledge is not sufficient to develop positive attitudes in this dimension. This can be associated with the concepts of perceived usefulness and perceived convenience in the context of the technology acceptance model. This, further, implies that cognitive attitudes may be shaped by additional factors beyond familiarity, such as individuals' critical thinking

abilities (Simonovic et al., 2022), richness of experience (Katsantonis & Katsantonis, 2024), or level of education.

In addition, the participants who actively use AI exhibit higher attitudes towards it in the behavioral and cognitive dimensions, but do not show a similar trend in the affective dimension, suggesting that usage experiences play an important role in shaping individuals' attitudes towards AI. The behavioral scores of third-grade students, which is another finding of this study, are significantly higher than those of first-grade students, which supports the above finding. This difference may be explained by senior students having integrated AI more into their educational processes or having gained more knowledge about the technology. However, previous studies yielded mixed findings. In Cho and Seo's study (2024) with nursing students, it was found that second-year students had significantly higher acceptance attitudes towards AI than third-year students. Yet, in Kostantionso and Kostantinos' study (2024), no significant relationship was found between students' grade level and their affective and behavioral attitudes. This diversity in students' attitudes towards AI in different contexts and across different disciplines suggests that a combination of individual, educational, and contextual factors may be influential in shaping attitudes.

One of the qualitative findings of the study is the challenges of AI concerning such as lack of knowledge, lack of understanding of AI or vulnerability to misguidance, anxiety, and ethical violations such as cheating and plagiarism. In addition, inadequate infrastructure and classroom management problems were also frequently raised. These findings were in line with the existing literature. For example, studies addressing the impacts of AI in education often point to a lack of technological infrastructure, which points to socioeconomic disparities resulting from unequal access to technology (Salas-Pilco et al., 2022). Teachers' inadequate technological pedagogical content knowledge (Adipat et al., 2023; So & Kim, 2009), along with ethical concerns and misuse of AI, such as cheating and plagiarism (Cotton et al., 2023) are also significant challenges to the effective integration of these technologies, as extensively highlighted in the literature. However, while the existing literature emphasizes how AI can support teachers in classroom management (Wang, 2021; Younas et al., 2023), it was interesting to see that the participants of this study perceived that the integration of AI into the classroom environment could cause classroom management issues. This difference may stem from participants' limited knowledge and experience about the potential benefits of AI in education and its supportive role in classroom management, or factors such as lack of pedagogical preparation and infrastructure. Although the participants seemed to be aware of the pedagogical advantages of AI, such as accessibility and time-saving, they may have been unable to apply this theoretical knowledge in practice. This indicates that pre-service teachers need more comprehensive training on the integration of AI in the classroom.

Implications, Limitations, and Future Directions

This study has revealed that attitudes towards AI are manifested differently in the cognitive, affective, and behavioral dimensions of EFL preservice teachers. The findings suggest that familiarity with AI positively affects especially affective and behavioral attitudes, but it is not sufficient alone in the cognitive dimension. Therefore, it is important to systematically include AI literacy in teacher education programs.

Adding modules on the pedagogical use, ethical dimensions, and practical applications of AI technologies in the programs will be effective in developing candidates' critical thinking skills. In addition, opportunities need to be provided for the use of AI-supported tools in internship and practicum processes. For policy makers it is imperative to update national teacher education programs to include AI skills and to develop standards on the ethical use of AI in education and data security.

The study has some limitations. First of all, the data was collected from a single state university in south-eastern Turkey, which limits the generalizability of the findings. In addition, due to the homogeneous nature of the sample, the views of pre-service teachers from different geographical regions and different university types could not be reflected. There are also limitations related to the data collection method; there may be a social desirability effect on the participants' responses. Moreover, due to the rapid change of AI technologies, the attitudes obtained represent only a specific time period.

This study reveals the diversity of pre-service EFL teachers' attitudes towards AI. While some pre-service EFL teachers were hesitant to adopt this technology, others were convinced of its potential benefits. This finding suggests that the place of AI in language education is not yet fully clarified. Since teachers' mindset towards innovative approaches in education influence the adoption and effective integration of new technologies (Lopes et al., 2023; Sarhan, 2023), the relationship between pre-service EFL teachers' attitudes towards AI and teachers' mindset could also be an important research topic.

In future research, it is also recommended to conduct similar studies with pre-service teachers from different regions and different educational institutions. Comparative research with in-service teachers and teacher trainers can reveal the effects of AI in education more comprehensively. It is also important to conduct experimental research measuring the effectiveness of educational interventions to increase AI literacy and qualitative studies examining the integration of AI into classroom practices. Finally, in-depth studies on the perception of ethical and pedagogical responsibilities related to AI would enrich the body of knowledge in this field.

Conclusion

This study examined the attitudes of pre-service EFL teachers in Türkiye towards AI and how these attitudes are shaped by various factors. The findings of the study revealed that males had higher attitudes towards AI than females, and participants who were familiar with AI and had used AI before had more positive attitudes than those who were not familiar. In addition, third-year students were found to have higher behavior scores than first-year students. However, the participants had limited knowledge about the potential benefits of AI in education and some of them were still hesitant to integrate AI into their teaching-learning processes. The results of the study suggest that not only technological but also pedagogical and ethical dimensions of AI integration should be considered. In order to effectively integrate AI into education, teachers need to be both knowledgeable about how to use this technology and able to evaluate the possible consequences of these technologies in the classroom and in the general educational environment. The study reveals that the relationship between pre-service EFL teachers' attitudes towards AI and teacher mindset needs to be examined in

more depth and that this relationship may be a critical factor for the effective integration of AI into education.

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Statement of Responsibility

Pelin Derinalp: Conceptualization, methodology, software, validation, formal analysis, investigation, resources, data curation, writing-original draft, writing-review & editing, visualization, supervision, and project administration. Melek Halife: Data collection, transcription, and funding acquisition. The first draft of the manuscript was written by Pelin Derinalp and both authors commented on previous versions of the manuscript. Both authors read and approved the final manuscript.

Conflicts of Interest

No conflict is disclosed.

Data Availability Statements

Data is available based on request.

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EFL Teachers' Insights on Incorporating AI in Language Education*

İngilizce Öğretmenlerinin Dil Eğitimine Yapay Zekanın Dahil Edilmesine İlişkin Görüşleri

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ABSTRACT: Recent advancements in Artificial Intelligence (AI) are transforming language education by enabling more effective instructional practices and enhanced learning outcomes. AI-driven technologies—including tutoring systems, personalized learning platforms, and automated assessment tools—have the potential to revolutionize classroom instruction. While the integration of these technologies is still in its early stages, the current mixed-methods study aimed to investigate English language teachers' awareness of and perspectives on the use of AI in language education. Quantitative data were collected from 437 participants through the administration of the AI Awareness Level Scale for Teachers via an online survey. Also, semi-structured interviews were conducted with 14 volunteer English teachers to gain deeper insights. The qualitative data were analyzed through content analysis, with interview recordings transcribed using MAXQDA 24. The findings yielded a generally high level of AI awareness among English teachers which varied significantly based on age, gender, and educational background. The qualitative findings underpinned several perceived benefits of AI integration, including enhanced language skill development, increased student motivation, real-time feedback, and improved time efficiency. However, concerns were also raised regarding potential drawbacks such as over-reliance on technology, reduced human interaction, and ethical considerations. Overall, the participants of the study advocated for the meaningful and supportive integration of AI, emphasizing its role that complements rather than replaces the teacher's central role in the educational process.

Keywords: Artificial intelligence, EFL, foreign language education.

ÖZ: Yapay zekâ (YZ) alanındaki son gelişmeler, daha etkili öğretim yöntemlerini ve daha iyi öğrenme çıktılarını teşvik ederek dil eğitimi yeniden şekillendirmektedir. Teknoloji, sınıf içi eğitimde değişimlere yol açmıştır ve YZ odaklı teknolojiler, akıllı özel ders sistemleri, kişiselleştirilmiş öğrenme platformları ve otomatik not verme uygulamaları aracılığıyla sınıf içi eğitimde devrim yaratma potansiyeline sahiptir. Bu gelişmelerin henüz erken aşamalarda olduğunu göz önünde bulunduran bu karma yöntemle dayalı çalışma, İngilizce öğretmenlerinin yapay zekanın dil eğitimine entegrasyonu konusundaki farkındalıklarını ve içgörülerini incelemeyi amaçlamıştır. Çevrimiçi bir anket aracılığıyla öğretmenler için YZ Farkındalık Düzeyi Ölçeği uygulanarak 437 katılımcıdan nicel veriler toplanmıştır. Daha derin içgörüler elde etmek için, 14 gönüllü İngilizce öğretmeni ile yarı yapılandırılmış görüşmeler yapılmıştır. Nitel veriler içerik analizi kullanılarak analiz edilmiş ve ses kayıtları transkripsiyon için MAXQDA 24 programında işlenmiştir. Bulgular, İngilizce öğretmenlerinin YZ teknolojileri konusunda yüksek düzeyde farkındalığa sahip olduğunu ortaya koymuş ve bu farkındalığın yaş, cinsiyet ve eğitim derecesine göre değiştiği sonucunu elde etmiştir. Nitel bulgular, YZ'nin dil becerilerinin geliştirmesi, öğrenci motivasyonunun artırması, anında geri bildirim vermesi ve zamandan tasarruf etme gibi çok sayıda avantajı olduğunu altını çizmiştir. Ancak, teknolojiye aşırı bağımlılık, insan etkileşiminin azalması ve etik kaygılar gibi potansiyel dezavantajlara ilişkin endişeler de dile getirilmiştir. Genel olarak, çalışmanın katılımcıları, YZ'nin eğitim sürecinde öğretmenin merkezi rolünü ikame etmekten ziyade tamamlayıcı bir rol oynadığını vurgulayarak, anlamlı ve destekleyici bir şekilde entegre edilmesini savunmuştur.

Anahtar kelimeler: Yapay zekâ, yabancı dil olarak İngilizce, yabancı dil eğitimi.

* This study was conducted as part of the first author's master's thesis under the academic supervision of the corresponding author.

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The increasing presence of technology has led to significant shifts in numerous aspects of life, and its impact on education is particularly profound. The growing integration of information and communication technologies in schools is not only improving traditional teaching methods but is also reshaping the teaching process, creating a more dynamic, interactive, and tailored approach that addresses the varied needs of today's learners. Education benefits from recent technological progress because digital learning platforms help students customize their studies according to their personal schedule and learning pace (Haleem, 2022). With the world becoming more interconnected through technological advances, the role of English language learning and teaching has become more prominent. The integration of technology has also transformed language education, moving the focus from grammar rules and memorization to effective communication (Eaton, 2010). It has promoted a shift from behavioral approaches to constructivist methods, emphasizing that languages are most effectively learned through active, real-world interactions (Wang, 2005). Although constructivism does not mandate the use of technology, its emphasis on learners actively constructing knowledge through experience has influenced the incorporation of technological tools in language education. Technology offers many benefits in language education. Traditional language classrooms often limit access to resources and real-world exposure to the target language, but digital tools and online platforms help overcome these barriers (Merzifonlu & Tulgar, 2023). Learners can interact with other speakers, enhance communication skills in authentic and meaningful contexts through collaborative learning, and construct knowledge independently (Jin, 2011; Kasapoğlu-Akyol, 2010; Parvin & Salam, 2015). Technology integration in language learning settings enhances interaction, promotes self-directed learning, and improves educational outcomes. It also helps motivate students, encourages active language use, supports collaboration, and enhances students' confidence in studying English (Rivera Barreto, 2018). Meanwhile, Artificial Intelligence (AI) is one of the most recent emerging innovations to revolutionize language instruction.

AI can be defined as the ability of machines to replicate human-like behavior. According to Ertel (2018), the primary goal is to create systems capable of understanding, reasoning, and learning autonomously. AI has the potential to transform education by influencing key areas such as teaching approaches, learning environments, school management, and evaluation techniques (Chiu et al., 2023). Some AI-driven technologies that improve learning outcomes and contribute to individualized instruction include intelligent tutoring systems, personalized learning platforms, and automated grading applications. AI-based learning platforms can track student progress and customize lessons to correspond with their individual needs (Hashim et al., 2022). With automated grading tools, students can receive immediate feedback on their assignments, helping them to identify and correct mistakes quickly, which is difficult in traditional crowded classrooms where time is limited (van der Vorst & Jelcic, 2019). Intelligent tutoring platforms help teachers manage administrative duties such as grading and tracking students' progress with less effort, which can reduce teachers' workload. For instance, Martin et al. (2023) states that teachers mainly rely on AI to enhance student engagement, automate assessment processes, and track the students' learning progress. Additionally, by analyzing these data such as attendance and assignment completion rates, teachers can detect early warning signs of academic

difficulty and identify students who may be at risk of dropping out or falling behind. Therefore, teachers can provide interventions in time and offer the necessary support (Luckin & Holmes, 2016). With the time saved, teachers can focus more on improving lesson plans, adopting new teaching methods, and supporting students individually, ultimately raising the quality of both teaching and learning. AI-powered language learning applications such as Duolingo and Busuu help learners develop their speaking, reading, and listening skills and support vocabulary retention through structured lessons and interactive exercises (Hockly, 2023). Similarly, Wei (2023) demonstrates that AI-mediated Duolingo contributes significantly to students' language success, enhancing their motivation and self-directed learning abilities. Consequently, AI-based applications not only facilitate improved language acquisition but also foster independent and effective learning habits. AI-powered tools like Grammarly and Write & Improve support learners in enhancing their writing skills. For instance, Grammarly offers personalized suggestions to improve grammar, punctuation, and style, while Write & Improve provides automated feedback that encourages practice and self-correction. Rahman et al. (2022) and Syahnaz and Fithriani (2023) found that these tools significantly improve students' writing scores. They provide valuable immediate feedback, and this helps students develop their writing skills independently, motivating them to complete assignments more effectively.

Recent studies have explored the potential of AI-based chatbots, which replicate natural language. These tools create human-like conversations, offering students opportunities for interactive and meaningful exchanges outside the classroom. Chatbots can reduce student anxiety which affects their learning experience. Language learners can find traditional classroom environments intimidating due to their fear of making linguistic mistakes. They typically feel less pressure and stress without human intervention as they do not have to worry about being judged (Annamalai et al., 2023; Fryer et al., 2017). According to research by Chien et al. (2022) and Ebadi and Amini (2022), AI chatbots not only enhance motivation and participation but also provide a solution for students struggling with shyness. The students in these studies reported feeling more confident and willing to speak after using chatbots, as the bots allowed them to practice without the fear of judgment and worrying about making mistakes. This is especially valuable for shy learners, as they can practice and improve their skills anonymously.

While AI can enhance language teaching by offering dynamic and interactive learning opportunities, its successful integration depends on teachers' perspectives and their readiness to apply technological advancements. Teachers who embrace innovation and consider AI as a valuable tool may integrate it effectively into their teaching practices, using it to support classroom activities and student progress. On the other hand, teachers who prefer traditional methods might resist AI, perceiving it as a threat to their teaching style. Therefore, it is crucial to explore how teachers perceive AI and what factors influence their acceptance or resistance. An et al. (2023) discovered that teachers' technological competence is linked to their willingness to incorporate AI into their teaching. When teachers have a deeper understanding of digital tools and emerging technologies, they are more inclined to use AI-driven teaching methods. This direct relationship also highlights the importance of equipping teachers with the necessary technological skills. For instance, Uddin et al. (2024) revealed that teachers face

challenges in using AI-based e-assessment due to insufficient technical skills and the lack of appropriate training programs. Choi et al. (2023) found that teachers who hold constructivist beliefs are more open to adopting AI compared to those who follow traditional teaching methods. The study also indicated that teachers' acceptance of AI is significantly influenced by factors such as trust, usefulness, and ease of use. Among these, the ease of constructing educational AI tools was found to be the most powerful factor. This emphasizes that AI tools should be user-friendly and practical to gain widespread acceptance in the classroom. In other words, when integrating new technologies into their teaching, teachers are more inclined to use technology that is easy to understand and implement. When faced with complex systems, they may feel discouraged (Aldunate & Nussbaum, 2013). They are concerned that over-reliance on technology might reduce students' creativity and motivation (Bekou et al., 2024) and it can negatively impact the emotional connection between teachers and students (Uygun, 2024) while they think that AI may not completely take over the teacher's role (Yolcu, 2024).

Drawing on the insights of 10 Turkish AI specialists from various universities, Çetin & Aktaş (2021) explores future scenarios where AI plays a growing role, particularly in managing classrooms and schools. They state that teachers should develop both their pedagogical practices and AI literacy to ensure readiness for the future. Meanwhile, school principals need to strengthen their leadership skills and raise their awareness of how AI can be incorporated into all school operations to be ready for the changing educational landscape. In a relevant study, Dülger & Gümüşeli (2023) examined the views of both school principals and teachers in Istanbul on the role of AI in schools. Principals noted its usefulness in managing documentation but expressed concern over AI's limitations in handling flexible decision-making. Teachers appreciated AI's efficiency and support in educational delivery, including rapid access to information and assessment. Despite these advantages, both groups firmly believed that AI could not replace the emotional and empathetic dimensions of their professions.

Understanding teachers' perceptions and attitudes is key to exploring how AI can be effectively incorporated into language instruction, as it is among the newest technologies shaping language teaching. Given that research on AI in English language teaching is still at an early stage, growing interest in the field necessitates further studies on teachers' use of AI (Çelik et al., 2022). Since teachers are key figures in adopting AI technologies in classrooms, their perceptions significantly influence the success of implementation. By addressing their concerns and improving their readiness, AI integration in language education can become more effective. Therefore, the present study aims to contribute to the field by examining English teachers' perspectives, enhancing their AI awareness, and providing insights into the practical application of AI in English instruction through addressing following research questions:

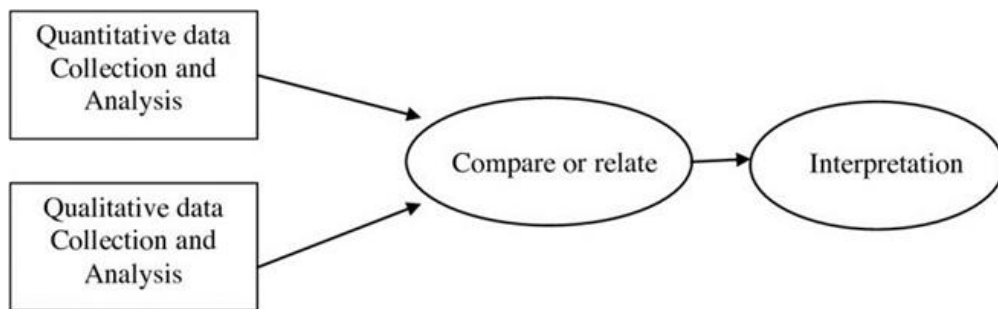
- 1) What is the current AI awareness level among English teachers?
- 2) Do English teachers' AI awareness levels vary significantly based on gender, age, teaching experience, educational background, undergraduate degree program, and the grade level at which they teach?
- 3) What are the perceptions of English teachers on the use of AI in English language instruction?

Method

The study employs a convergent mixed-method design to achieve its objectives, combining both qualitative and quantitative data to gain a more thorough understanding (Creswell & Creswell, 2018). While qualitative methods allow for detailed exploration of specific cases, quantitative methods are useful for making generalizable conclusions (DeCuir-Gunby & Schutz, 2016). Oral and Çoban (2020) explain that in a convergent parallel mixed-method design, qualitative and quantitative data are equally prioritized, analyzed independently, and later synthesized during the interpretation stage, as demonstrated in Figure 1.

Figure 1

Convergent Parallel Mixed Methods Design (Creswell and Creswell, 2018)



Note. (Based on Creswell and Creswell, 2018).

Participants

The study focuses on gaining insights into the awareness and viewpoints of English teachers working at various grade levels across Türkiye. A total of 384 participants proposed to provide a 95% confidence interval and maintain statistical reliability (Büyüköztürk et al., 2020; Ural & Kılıç, 2006). The survey was completed by 448 participants in this research, but 11 incomplete responses were excluded from the dataset. To gain a clearer understanding of the participant's profile, demographic details are provided in Table 1 and 2.

Table 1 reveals that the sample was predominantly female, and participants were mainly in their 30s and early 40s, indicating a mid-career population. The most frequently reported teaching experience range was 6–10 years. At the end of the online quantitative survey, participants were asked if they would be willing to take part in follow-up interviews. Then, teachers who volunteered were contacted via email, with detailed information provided regarding the interview process. A total of 14 teachers responded and agreed to participate. As a result, the convenience sampling method was applied, selecting interviewees based on their voluntary participation. The background information of these participants is provided in Table 2.

Table 1
The Demographic Details of the Participants

Variable	Group	n	Percent (%)
Gender	Female	339	77.6
	Male	98	22.4
Age	20-30	126	28.8
	31-40	216	49.4
	41-50	84	19.2
	+51	11	2.5
Teaching Experience	0-5 years	99	22.7
	6-10 years	136	31.1
	11-15 years	98	22.4
	16-20 years	62	14.2
	+21 years	42	9.6
Educational Background	Bachelor	332	76.0
	Master	101	23.1
	PhD	4	0.9
Graduation Program	ELT	336	76.9
	ELL	86	19.7
	Other	15	3.3
Grade Level They Teach at	Primary	89	20.4
	Secondary	205	46.9
	High school	129	29.5
	Other	14	3.2

Table 2
Background Details of the Interviewees

Participant	Gender	Educational Background	Graduation Program	Teaching Experience	Location	Grade Level They Teach at
P1	Female	MA student	ELT	3 years	Şanlıurfa	Secondary
P2	Male	BA	ELT	2 years	Batman	High school
P3	Female	BA	ELL	8 years	Konya	Primary/ Secondary
P4	Female	MA student	ELL	6 years	Konya	Secondary
P5	Male	BA	ELL	8 years	Konya	Primary
P6	Male	BA	ELT	9 years	Şanlıurfa	Secondary
P7	Female	BA	ELT	18 years	İstanbul	Secondary/High School
P8	Female	MA student	ELT	12 years	Konya	Secondary
P9	Female	BA	ELL	10 years	Düzce	High School

P10	Female	BA	ELT	4 years	Ağrı	Primary/ Secondary
P11	Female	PhD student	ELT	8 years	Kocaeli	High School
P12	Female	BA	ELT	9 years	Hatay	Secondary
P13	Male	BA	ELT	4 years	Van	High School
P14	Female	MA	ELL	5 years	Bilecik	Primary

According to Table 2, the interview group consists of 4 male and 10 female teachers. These teachers have a wide range of experience levels from 2 years of experience to the least to 18 years of experience the most. One participant holds a master's degree, and nine of them have bachelor's degrees. Furthermore, three participants are continuing their studies in master's programs, while one is pursuing a doctorate. This specific demographic range strengthens a broad representation of perspectives.

Data Collection Tools

This study employed both AI awareness scale for quantitative data and semi-structured interviews for acquiring deeper, qualitative insights. According to Bekhet and Zauszniewski (2012), combining both types of data strengthens the findings and increases the reliability of the results. In line with the study's objectives, the 'Teachers' Artificial Intelligence Awareness Scale' by Ferikoğlu and Akgün (2022) was used to collect quantitative data due to its relevance and contextual appropriateness. In other words, the scale is specifically designed to assess teachers' awareness and perceptions regarding the integration of AI technologies into educational settings. It is a multidimensional scale designed to assess a broad spectrum of AI-related knowledge including theoretical understanding, practical usage, beliefs, attitudes, and cognitive associations. In this study, it was carefully selected due to its meticulous development and validation process. Originally consisting of 78 items, the scale was refined through Exploratory Factor Analysis that eliminated 27 items with values below 0.40, resulting in a highly consistent 51-item version. A Kaiser-Meyer-Olkin (KMO) value of 0.983 together with a Cronbach's Alpha score of 0.986 validates the scale's high reliability. It is categorized into two parts: *the first* part focuses on demographic information, such as the teacher's background, *the second* consists of 51 AI-related items, organized into four sub-dimensions as *practical knowledge* (items 1–16), *beliefs and attitudes* (items 17–30), *the ability to associate* (items 31–40), and *theoretical knowledge* (items 41–51). Participants' opinions were measured using a 5-point Likert scale, ranging from strongly agree to strongly disagree. This framework allows for a detailed exploration of teachers' AI awareness from different perspectives. An online version of the scale was created using Google Forms. The link was shared with English teachers on WhatsApp and Facebook. All participants were given clear instructions and consent forms.

Semi-structured interviews were conducted to complement the quantitative data. Semi-structured interviews followed a guided but flexible format, allowing interviewers to adjust questions as needed and ask follow-ups, leading to a deeper understanding of participants' perspectives (Dömbekci & Erişen, 2022). To ensure the reliability of the interviews, a structured and systematic approach was followed throughout both the question development and analysis stages. The interview questions were developed

based on a thorough review of existing literature and theoretical underpinnings to align with the study's objectives. Initially, seven interview questions were drafted. These questions were then piloted with three EFL teachers currently working in the field to assess the clarity and comprehensibility of the items. An expert also reviewed the questions to ensure that they were aligned with the intended research goals. Several revisions were made based on their constructive feedback. The pilot study concluded that some questions might elicit similar answers. Therefore, those questions were combined into one well-structured question and the finalized interview schedule consisted of five well-structured questions. Participants were asked about their understanding of AI, their experiences with it in English language teaching, its advantages and disadvantages in language teaching, and their perspectives on its potential future role in education, including whether it could replace teachers. They were conducted in Turkish to ensure comfort and avoid language barriers. Drew (2014) suggests that using one's native language in interviews enhances clarity, confidence, and ease of expression. Participants' consent was also received to record their audios and each session lasted approximately 15 minutes. The process continued until data saturation was reached when further interviews did not provide new ideas.

Data Analysis

First, the normality of the data distribution was examined to determine the appropriate statistical methods. Skewness and kurtosis values remained between -2 and +2, allowing the use of parametric tests for analysis, as suggested by George and Mallery (2011). Quantitative analysis was conducted using SPSS-27.0. To compare groups, different statistical tests were applied: the independent samples T-test offers analyses between two groups while one-way ANOVA provides analysis for three or more groups. When there was not enough data for parametric testing in variables, the Kruskal-Wallis H test, which serves as the non-parametric equivalent of one-way ANOVA, was used instead (Karagöz, 2010).

In the analysis of qualitative data obtained from semi-structured interviews, the descriptive content analysis method was applied. This method involves examining the data in depth to extract essential codes and themes, which ultimately shape the relevance of the findings (Büyüköztürk et al., 2020). There are four primary steps in this process: coding the data, identifying recurring themes, systematically organizing the themes, and finally, analyzing and interpreting the results to derive meaningful conclusions. In the first stage, the data was uploaded into the MAXQDA 24 program for transcription. Teachers' identities were protected by replacing their names with codes such as P1, P2, and P3, ensuring confidentiality throughout the study. The coding process involved reviewing all responses thoroughly to gain an understanding of the overall picture and then categorizing and identifying themes. Initially, the transcribed data underwent an in-depth reading process. Recurring words and expressions associated with AI were identified and highlighted. Following the initial coding of the interview data, a thematic analysis was conducted to uncover the themes. The codes were grouped into broader categories that reflected participants' shared perspectives. This process revealed several key themes, including the perceived practicality of AI, its role in improving skills, and concerns about it. Frequency of codes were noted to highlight the most prominent ideas. To maintain coding reliability, two experts

reviewed and coded the data using the research questions as a guide. They identified themes independently, during which new categories and codes emerged. The final coding was cross-checked by an experienced educator to confirm reliability. Table 3 outlines the most significant recurring themes identified in the interviews and presents a sample coding scheme applied in the content analysis.

Table 3

Coding Scheme Based on EFL Teachers' Opinions Regarding AI

Category	Code	Description	Frequency
Advantages	Improving Language Skills	Enhances grammar, speaking, writing, and pronunciation	6
	Saving Time	Helps with lesson planning and reduces workload	5
	Increasing Motivation	Makes learning more engaging and motivating	4
Disadvantages	Promoting Laziness and Over-reliance	Leads to dependency on AI, reducing critical thinking	9
	Reducing Human Interaction	Limits real communication and emotional connection	3
Future Considerations	AI Cannot Replace Teachers	Lacks human qualities like empathy and social support	10

The coding scheme in Table 3 summarizes the prominent themes. These themes portray a thoughtful evaluation from teachers, acknowledging AI's promise while recognizing its limitations. The coding scheme thus provides an organized approach to capturing complex teacher insights.

Ethical Procedures

The research process began with obtaining permission from the scale developers via email. Following this, ethical approval was obtained from Necmettin Erbakan University (Date: 13/10/2023, Number: 2023/419). Research permission was then granted by the Ministry of National Education. In line with ethical research protocols, participants were provided with comprehensive details about the study, including its aims, their rights, and the procedure for withdrawing from the research if desired. To ensure confidentiality, individual codes were assigned to all participants, ensuring that their identities remained anonymous.

Results

AI Awareness Level of EFL Teachers

To seek answer to the first research question about the AI awareness of English teachers, the study analyzed the average responses on the scale. Scores ranged from 55 to 255, with AI awareness levels classified as very low (55-95), low (95-135), medium (135-175), high (175-215), and very high (215-255).

Table 4
Test Results

Variable	n	Mean	SD	Kolmogorov Smirnov (p)	Skewness	Kurtosis	Cronbach's Alpha
Practical Knowledge	437	62.63	6.410	.000	.151	.472	.836
Belief/Attitude	437	48.97	8.034	.000	-.231	1.429	.885
Ability to Associate	437	35.65	5.166	.000	.066	1.481	.810
Theoretical Knowledge	437	40.02	4.975	.001	.220	1.154	.787
AI Awareness Level	437	187.60	19.945	.000	.517	1.108	.939

*p<0.05

Table 4 provides a comprehensive overview of the descriptive statistics, normality test results, and reliability measures. Although the Kolmogorov-Smirnov tests revealed non-normality, the skewness and kurtosis values suggest that the distributions are sufficiently symmetrical and fall within the accepted bounds of -2 to +2, indicating that parametric analyses are appropriate (George & Mallery, 2011). High Cronbach's alpha values (.787 to .939) demonstrated the strong reliability of the scales. As also demonstrated in Table 3, the test results revealed that the overall AI Awareness Level had a mean score of 187.6, which falls between the high category range of 175-215, corresponding to the high awareness category.

Demographic Influences on EFL Teachers' AI Awareness

The findings related to the second research question explore whether English teachers' levels of AI awareness vary significantly based on various demographic factors. These factors include gender, age, level of education, teaching experience, type of bachelor's degree program, and the grade level they teach. The statistical analysis conducted for this purpose provides insights into how these variables influence AI awareness levels among teachers.

Table 5
The Independent Samples t-Test Results for the Gender Variable

Variable	Group	n	Mean	SD	t	df	p
Practical Knowledge	Female	339	62.11	6.332	-3.222	435	.001*
	Male	98	64.45	6.375			
Belief/Attitude	Female	339	48.78	7.872	-.920	435	.358
	Male	98	49.63	8.578			
Ability to Associate	Female	339	35.13	5.187	-4.016	435	.000*
	Male	98	37.47	4.684			
Theoretical Knowledge	Female	339	39.80	4.916	-1.774	435	.077
	Male	98	40.81	5.123			
AI Awareness Level	Female	339	186.23	19.409	-2.697	435	.007*

Male 98 192.36 21.120

*p<0.05

The study found that male English teachers demonstrate higher levels of practical knowledge and ability to make associations related to AI, with significant differences in both subscales ($p<0.05$). However, no significant gender difference is found in the belief/attitude subscale or theoretical knowledge. The overall AI awareness score indicated that male teachers have a higher AI awareness than female teachers, with a mean of 192.36 compared to 186.23, and the difference was statistically significant ($p=0.007$).

To explore whether there are significant differences in AI awareness based on academic qualification, Table 6 displays the findings of independent samples t-tests performed on data collected from teachers with varying education levels (Bachelor's, Master's, or Ph.D. degrees).

Table 6

AI Awareness Differences Based on Teachers' Academic Degrees

Variable	Group	n	Mean	SD	t	df	p
Practical Knowledge	BA Degree	332	62.22	6.498	-2.367	435	.018*
	MA or Ph.D. Degree	105	63.91	5.971			
Belief/Attitude	BA Degree	332	48.60	8.207	-1.741	435	.082
	MA or Ph.D. Degree	105	50.16	7.370			
Ability to Associate	BA Degree	332	35.48	5.289	-1.286	435	.199
	MA or Ph.D. Degree	105	36.22	4.735			
Theoretical Knowledge	BA Degree	332	39.94	5.055	-.598	435	.550
	MA or Ph.D. Degree	105	40.28	4.726			
AI Awareness Level	BA Degree	332	186.67	20.216	-1.753	435	.080
	MA or Ph.D. Degree	105	190.57	18.849			

*p<0.05

The analysis in Table 6 indicates a statistically significant difference in practical knowledge scores ($p=0.018<0.05$), with teachers holding master's or doctoral degrees showing higher scores than those with a bachelor's degree. However, no significant differences are observed in other categories like belief/attitude ($p=0.082$), ability to associate ($p=0.199$), theoretical knowledge ($p=0.550$), or overall AI awareness scale ($p=0.080$).

In Table 7, the results of a one-way ANOVA are presented to examine the potential influence of teaching experience on various aspects of AI awareness. This analysis aims to identify whether the amount of professional experience contributes to variations in awareness and engagement with AI technologies in educational settings. The teaching experience variable was categorized into five distinct groups: 0–5 years, 6–10 years, 11–15 years, 16–20 years, and more than 21 years.

Table 7

Analysis of AI Awareness Based on Teaching Experience

Variable	Group	n	Mean	SD	Source of Var.	df	Mean Square	F	p
Practical Knowledge	0-5 years	99	63.26	6.316	BG	4	43.644	1.063	.374
	6-10 years	136	63.02	6.441	WG	432	41.062		
	11-15 years	98	61.76	6.758	Total	436			
	16-20 years	62	61.90	6.307					
	+21 years	42	63.00	5.785					
	Total	437	62.63	6.410					
Belief/Attitude	0-5 years	99	50.38	7.777	BG	4	89.724	1.395	.235
	6-10 years	136	48.26	7.881	WG	432	64.305		
	11-15 years	98	49.17	8.687	Total	436			
	16-20 years	62	47.79	8.524					
	+21 years	42	49.24	6.469					
	Total	437	48.97	8.034					
Ability to Associate	0-5 years	99	36.75	5.528	BG	4	47.814	1.805	.127
	6-10 years	136	35.47	4.675	WG	432	26.494		
	11-15 years	98	35.55	5.356	Total	436			
	16-20 years	62	34.63	5.351					
	+21 years	42	35.43	4.870					
	Total	437	35.65	5.166					
Theoretical Knowledge	0-5 years	99	40.92	5.094	BG	4	36.644	1.487	.205
	6-10 years	136	39.40	4.730	WG	432	24.637		
	11-15 years	98	39.93	5.255	Total	436			
	16-20 years	62	39.79	4.760					
	+21 years	42	40.50	4.984					
	Total	437	40.02	4.975					

AI Awareness Level	0-5 years	99	191.31	20.725	BG	4	508.258	1.281	.277
	6-10 years	136	186.79	18.118	WG	432	396.785		
	11-15 years	98	186.41	22.531	Total	436			
	16-20 years	62	184.98	19.067					
	+21 years	42	188.17	18.207					
	Total	437	187.60	19.945					

*p<0.05

Based on the statistical findings presented in Table 7, there are no statistically significant differences in AI awareness levels among teachers with different years of experience. Teachers with 0–5 years of experience had slightly higher scores in practical knowledge ($M = 63.26$), compared to other groups, but the observed differences were not statistically meaningful ($p = 0.374$). The scores for practical knowledge ($p=0.374$), belief/attitude ($p=0.235$), ability to associate ($p=0.127$), theoretical knowledge ($p=0.205$), and overall AI awareness ($p=0.277$) suggest that teaching experience does not have a notable impact on AI awareness levels.

Table 8 explores the distribution of AI awareness levels among English teachers by age using the Kruskal-Wallis test. The Kruskal-Wallis H test, a non-parametric alternative to one-way ANOVA, is used when assumptions for ANOVA, such as normal distribution and sufficient sample sizes, are not met (Büyüköztürk, 2018). Given that the "51 and over" age group consists of only 11 participants, this test was applied for age groups.

Table 8

Assessing AI Awareness Across Age Groups: Kruskal-Wallis H Test Results

Variable	Group	n	Mean	SD	H	df	p
Practical Knowledge	20-30	126	63.44	6.174	3.722	3	.293
	31-40	216	62.21	6.481			
	41-50	84	62.40	6.754			
	51 and over	11	63.27	4.496			
	Total	437	62.63	6.410			
Belief/Attitude	20-30	126	50.95	7.446	13.531	3	.004*
	31-40	216	48.15	8.039			
	41-50	84	47.89	8.563			
	51 and over	11	50.82	6.720			
	Total	437	48.97	8.034			
Ability to Associate	20-30	126	36.99	5.259	11.493	3	.009*
	31-40	216	35.23	4.832			
	41-50	84	34.61	5.601			

	51 and over	11	36.73	4.315			
	Total	437	35.65	5.166			
Theoretical Knowledge	20-30	126	40.96	5.060	10.086	3	.018*
	31-40	216	39.45	4.880			
	41-50	84	39.88	5.064			
	51 and over	11	41.55	3.643			
	Total	437	40.02	4.975			
AI Awareness Level	20-30	126	192.35	19.883	12.962	3	.005*
	31-40	216	185.44	19.469			
	41-50	84	185.42	20.724			
	51 and over	11	192.36	15.455			
	Total	437	187.60	19.945			

* $p < 0.05$

The statistical analysis using the Kruskal-Wallis H test demonstrates that practical knowledge scores do not significantly differ by age ($p = 0.293 > 0.05$). However, a significant difference is observed in the belief and attitude subcategory ($p = 0.004 < 0.05$). Post hoc analysis reveals that Turkish EFL teachers aged 20-30 ($M = 50.95$) score significantly higher than those aged 31-40 ($M = 48.15$) and 41-50 ($M = 47.89$). Similarly, the ability to associate scores varies significantly ($p = 0.009 < 0.05$), with younger teachers performing better than their older counterparts. Theoretical knowledge scores also present a notable gap ($p = 0.018 < 0.05$), with those aged 20-30 surpassing those in the 31-40 age group. Lastly, the overall AI awareness scale reveals a notable difference ($p = 0.005 < 0.05$), with teachers aged 20-30 ($M = 192.35$) demonstrating higher awareness than those aged 31-40 ($M = 185.44$). These results indicate that younger English teachers tend to be more knowledgeable and adaptable in integrating AI into their teaching practices.

Table 9 presents the results of a Kruskal-Wallis H test conducted to determine whether English language teachers' AI awareness and its sub-dimensions significantly differ according to their educational background. The participants were categorized into three groups: those with degrees in English Language Teaching (ELT), English Language and Literature (ELL), and other academic fields.

Table 9
Impact of BA Graduation Program on AI Awareness

Variable	Group	n	Mean	SD	H	df	p
Practical Knowledge	ELT	336	62.32	6.432	3.418	2	.181
	ELL	86	63.33	6.097			
	Other	15	65.60	7.008			
	Total	437	62.63	6.410			
Belief Attitude	ELT	336	48.68	7.747	2.102	2	.350
	ELL	86	49.59	8.577			
	Other	15	52.07	10.600			
	Total	437	48.97	8.034			
Ability to Associate	ELT	336	35.43	4.816	3.873	2	.144
	ELL	86	36.05	6.118			
	Other	15	38.53	6.151			
	Total	437	35.65	5.166			
Theoretical Knowledge	ELT	336	39.70	4.829	6.715	2	.035*
	ELL	86	40.80	5.151			
	Other	15	42.87	6.058			
	Total	437	40.02	4.975			
AI Awareness Level	ELT	336	186.38	19.457	5.165	2	.076
	ELL	86	190.40	20.106			
	Other	15	199.07	25.508			
	Total	437	187.60	19.945			

*p<0.05

As depicted in Table 9, the Kruskal-Wallis H test results for the BA graduation program variable show no significant differences in scores related to practical knowledge, belief and attitude, or ability to associate AI concepts. However, the theoretical knowledge subcategory reveals a significant difference, with teachers from non-ELT programs scoring higher than their ELT counterparts. Despite this, the overall AI awareness levels across the different groups remain statistically similar.

The Kruskal-Wallis H test was also conducted to determine whether AI awareness levels among English teachers vary depending on the grade levels they teach (e.g., primary, secondary, or higher education) and Table 10 shows the results.

Table 10

Results Based on the Grade Levels at Which Teachers Work

Variable	Group	n	Mean	SD	H	df	p
Practical Knowledge	Primary	89	62.40	6.686	2.460	3	.483
	Secondary	205	62.42	6.685			
	High school	129	62.92	5.977			
	Other	14	64.43	4.127			
	Total	437	62.63	6.410			
Belief Attitude	Primary	89	48.65	8.441	6.121	3	.106
	Secondary	205	48.40	8.315			
	High school	129	49.93	7.190			
	Other	14	50.57	8.401			
	Total	437	48.97	8.034			
Ability to Associate	Primary	89	35.19	5.300	2.989	3	.393
	Secondary	205	35.62	5.392			
	High school	129	35.88	4.762			
	Other	14	37.00	4.641			
	Total	437	35.65	5.166			
Theoretical Knowledge	Primary	89	39.87	5.279	.278	3	.964
	Secondary	205	40.12	4.910			
	High school	129	39.99	5.077			
	Other	14	39.86	2.983			
	Total	437	40.02	4.975			
AI Awareness Level	Primary	89	187.09	19.991	3.821	3	.281
	Secondary	205	186.84	20.780			
	High school	129	188.72	19.290			
	Other	14	191.86	12.390			
	Total	437	187.60	19.945			

*p<0.05

The analysis reveals that there are no significant differences in practical knowledge ($p=0.483$), belief and attitude ($p=0.106$), ability to associate ($p=0.393$), theoretical knowledge ($p=0.964$), or the AI Awareness Level Scale score ($p=0.281$). Therefore, it can show that the grade level at which teachers work does not substantially affect their AI awareness, and it highlights that AI-related competencies are not confined to a specific teaching level.

EFL Teachers' Insights on AI Integration

To enrich the study with qualitative perspectives, semi-structured interviews were used, supporting a more comprehensive data triangulation process. The focus of the third research question was to understand teachers' perspectives toward AI integration in English language

instruction. Based on the interviews, most participants (f=5) perceive AI as a tool that simplifies life and tasks. Several highlight its role in saving time (f=4), while some of them define it as a key to the future (f=2) or a system driven by algorithms (f=2). One participant (P2) associates AI with job displacement, stating that while it enhances convenience, it also threatens jobs that depend on human labor.

“I am pretty excited about AI as it can deal with all the boring paperwork we always have. This is important because sometimes we get lost in all the formal work and do not have much time left for students.” (P7)

Six interviewees reported no use of AI, while others incorporated it in various language teaching scenarios. For example, P1 used AI for simplifying material for younger students, and P2 tried to support dyslexic students with speech recognition. P7 regularly uses ChatGPT to stay updated on current language trends. While P9 used it to generate language project ideas such as Erasmus or E-twinning, P11 integrated AI into debate preparation, allowing students to adapt their language use based on roles, which led to greater student autonomy. P11 explains how she incorporates AI into lessons to improve students' language abilities.

“During a classroom debate on ‘Climate Change,’ my students initially prepared speech drafts, which they later edited with AI support. After a while, the students did not need me to help them anymore because they learned how to use AI. They used it not just to find answers but to help them learn English in new ways.” (P11)

P2 attempted to integrate Dragon, a speech recognition tool, to support dyslexic students in writing.

“Our plan was to use Dragon, a speech recognition tool, to help dyslexic students with writing difficulties. However, it did not work as we hoped as the students quickly lost their interest and the program had trouble recognizing their speech.” (P2)

In the third interview question, teachers were asked about the benefits of using AI in their teaching. The top benefit mentioned was improving language skills (f=6), with teachers emphasizing how AI can aid in learning speaking, writing, and grammar. AI's ability to improve language skills was seen as an essential tool in facilitating a more engaging and interactive learning experience. The responses were categorized into themes. Table 11 outlines the various advantages of AI as shared by English teachers.

Table 11

English Teachers' Opinions on the Positive Aspects of AI

Code	f
Improving language skills	6
Practical in terms of time	5
Motivation	4
Fosters imagination and creativity	2
Interaction	2
Immediate Feedback	1
Economic	1
Improving self-confidence	1
f= frequency	

As summarized in Table 11., the teachers mainly viewed AI as a tool that could enhance various language skills, (f=6). They also appreciated its time-saving efficiency (f=5) and its motivational impact on students (f=4). Other noted advantages included fostering creativity (f=2), improving interaction (f=2), offering immediate feedback (f=1), providing economic benefits (f=1), and boosting self-confidence (f=1).

P2 provided an example of how AI can be used to enhance classroom activities, particularly in speaking lessons. In this case, students provide prompts to Dall-E to create images. These images are then analyzed as part of a classroom discussion, which helps students develop their speaking skills. P2 also noted how AI can be used to quickly generate writing topics suited to different student levels, helping teachers overcome moments when they're struggling to come up with ideas for assignments.

"For example, students generate images using Dall-E by typing in prompts, which are later shown on the board. The class then examines the image to discuss its story and guess the prompts that might have been used to create it" (P2)

P10 asserts that AI can contribute to more innovative thinking and expand students' worldviews.

"It could enhance practicality in classroom. It can promote learning by experiencing, possibly leading to innovative methods. It may even generate ideas that students might not normally consider. It can broaden their perspectives and help them think in bigger ways. After all, it's a smart technology that knows how to search everything online." (P10)

The drawbacks of AI, according to English teachers, were discussed in response to the fourth interview question. The coded disadvantages are shown in Table 12 below.

Table 12

The Negative Aspects of AI According to Teachers

Code	<i>f</i>
Causing laziness and over-dependence	9
Lack of human interaction	3
Inhibiting creativity	2
Fear of job loss	2
Ethical concerns	2
Misinformation	1
Inequality	1

f= frequency

As can be seen in Table 12, the disadvantages reported by participants primarily centered around AI encouraging laziness and over-reliance on technology (f=9). Furthermore, the lack of human interaction (f=3) and the potential for AI to hinder creativity (f=3) were also frequently mentioned.

"Laziness. Students are already depending on the internet for their homework. Now, with AI tools, it's easier to submit work that isn't truly their own. There are even cases where people have used it to write their master's theses, academic articles, or book chapters. It's becoming a serious ethical problem." (P13)

Fewer teachers expressed concerns about job loss, ethical issues, misinformation, and inequality. For instance, P10 highlights that AI could diminish the social aspect of learning. She believes that eye contact, spontaneous discussions, and casual socializing are integral to a rich learning environment. On the other hand, P4 raises concerns about AI potentially reducing intellectual effort. She argues that when information is easily accessible, both students and teachers may stop challenging themselves, weakening their problem-solving and analytical abilities. This dependence on AI could hinder the development of essential cognitive skills, limiting creativity and active participation in the learning process.

One of the key discussions in the interview was whether AI could completely replace teachers in the classroom. According to the majority of teachers ($f=10$), AI cannot yet take over the role of human teachers in the classroom due to its lack of social interactions. They emphasized that teaching is not just about delivering information but also about building connections, understanding students' emotions, and fostering motivation. According to P13 and P14, teachers not only educate but also inspire, support, and act as mentors, guiding them in their personal growth.

“Teaching, for me, is a social activity. That’s why I don’t believe anything can ever replace the teacher. It is special when a teacher looks a student in the eye and explains something. Students need that kind of connection. Without it, something is missing. Without looking at students, without being there for them, teaching loses its full effect.” (P14)

P6 believes that AI cannot take a teacher’s place because it struggles with surprising situations in class.

“Machines do not have human qualities. In teaching, the most important thing is interaction. Students do not always follow the rules exactly. Sometimes they break rules or act differently every day. However, AI follows the rules and programs assigned to it. How will AI handle unexpected situations? Teachers listen to students’ problems and share their emotions. Can AI fulfill that role?” (P6)

Discussion and Implications

The quantitative findings of this study reveal that Turkish EFL teachers demonstrate a high level of AI awareness, with an average score of 187.60 on the Artificial Intelligence Awareness Level Scale. This result is consistent with several prior studies on AI awareness and readiness among teachers (Nazaretsky, 2022; Zhao et al., 2022; An et al., 2023; Kaplan-Rakowski et al., 2023). For instance, Zhao et al. (2022) analyzed AI literacy among 1013 Chinese teachers, revealing that most had moderate to high levels of understanding and AI competency. Nazaretsky et al. (2022) further reported that teachers had high confidence in AI-based education ($M=3.8$) and recognized its potential to assist both students and teachers. A study by An et al. (2023) investigated EFL teachers' attitudes toward integrating AI into their classrooms. The findings showed that all measured factors scored above 3 on a 5-point scale, indicating that teachers generally held positive views on AI. The results also indicated that teachers possessed adequate knowledge of AI technologies and expressed a willingness to incorporate them into their teaching practices. Additionally, Kaplan-Rakowski et al. (2023) found that teachers were widely supportive of AI, agreeing with 14 out of 15 statements on a Likert scale measuring attitudes toward AI in education. Luckin et al. (2022) suggest that teachers with greater AI readiness tend to integrate AI more effectively into their teaching. These findings collectively can reinforce the idea that AI

awareness among educators is growing, with English teachers demonstrating readiness to incorporate AI into their classrooms. Given the demonstrated high level of AI awareness and positive attitudes among Turkish EFL teachers, providing in-service training programs and resources for AI integration might accelerate the modernization of language education. Some training programs can build on their existing readiness to enhance teachers' practical skills. Moreover, education leaders may foster collaborative platforms where experienced teachers can share best practices and innovations related to AI integration.

However, the findings of this study contrast with those of Chounta et al. (2022). They found that Estonian teachers had lower self-reported AI knowledge. Nearly half (47%) admitted to having minimal AI familiarity, and 35% rated their knowledge as moderate, while only 6% considered themselves highly knowledgeable in AI. Interestingly, when tested on basic AI principles, 60% answered correctly, highlighting a potential mismatch between teachers' self-perceptions and their actual AI literacy. Likewise, Lindner and Berges (2019) highlight that teachers, despite their curiosity about AI, often lack detailed knowledge of its principles and applications. Their views and assumptions about AI tend to be formed by media stories rather than technical education or professional exposure. They also pointed out that teachers' views and assumptions about AI tend to be formed by media stories rather than technical education or professional exposure. Teachers' insufficient knowledge of artificial intelligence might cause them to convey misconceptions to students (Coşkun, 2024). Therefore, it is essential to address and resolve these knowledge deficiencies. These findings might suggest that there is a need for targeted professional development and teacher training programs that clarify misconceptions and avoid bias.

The current study also examined how various demographic factors, such as gender, age, educational background, and teaching experience, influence AI awareness among teachers. The analysis showed that male teachers had significantly higher AI literacy, greater practical competence, and better associative thinking abilities than female teachers. One possible reason for this is that women may have had fewer opportunities or less encouragement to explore AI-related tools, leading to lower confidence levels. These results are consistent with Hopcan et al. (2023), which found that female teacher candidates exhibited more AI-related anxiety, and Nyaaba et al. (2024), which reported that male pre-service teachers used AI tools more frequently. Additional support comes from Demiröz and Türker (2020), who found that male English teachers had superior technological skills in classroom settings. Furthermore, Mahdi and Al-Dera (2013) observed that female teachers incorporated ICT tools into their lessons less frequently. However, Wang et al. (2023) presented contrasting findings, reporting that AI readiness among Chinese teachers did not differ significantly between genders. These findings highlight that further research is needed to explore contextual factors that may influence gender differences in AI readiness across diverse cultural and educational settings.

The independent sample t-test analysis revealed that teachers with master's or doctoral degrees scored significantly higher in practical AI knowledge than those with a bachelor's degree. This might be because higher education programs can provide more opportunities to engage with current and emerging technologies. These programs may also emphasize staying updated with new technologies and AI awareness. Supporting

this, Ferikoğlu and Akgün (2022) show that teachers with higher education levels are better at keeping up with technological advancements. Another significant finding from the study revealed that younger English teachers, specifically those aged 20-30, exhibited greater awareness and proficiency in AI than their older colleagues. This is likely because they have grown up in an increasingly digital world and received more recent training that includes AI applications. Similar conclusions have been reached in other studies (Demiröz & Türker, 2020; Ferikoğlu & Akgün, 2022; Chan & Tsi, 2023), reinforcing the consistency of findings across different research contexts. They support this finding, showing that younger teachers find it easier to integrate digital tools into their work. Similarly, Deniz (2022) notes that younger individuals experience lower AI-related anxiety, further explaining their readiness to embrace these innovations. This implies that lifelong learning opportunities should be emphasized to help older educators bridge the digital gap. Educational organizations might consider mentorship programs pairing younger, tech-savvy teachers with more experienced colleagues to facilitate peer support and knowledge sharing. In line with the findings of Mahdi and Al-Dera (2013) and Demiröz and Türker (2020), the current research discovered no significant differences in teachers' AI awareness when considering the grade levels they teach or their teaching experience. This could mean that teachers' engagement with AI is less about their teaching context and more about their exposure to and attitudes toward emerging technologies.

Interviews with 14 English teachers highlighted that AI improves language learning, saves time, provides immediate feedback, and boosts creativity and student motivation. These results align with findings from Adıgüzel et al. (2023) and Zulkarnain and Yunus (2023), who reported that AI fosters engagement and participation, and enhances communication skills. Similarly, the research in Pakistan by Firdaus and Nawaz (2024) showed that AI helps improve communication skills, particularly where students have limited chances to use English, which echoes the benefits seen in the current study. In a similar vein, Adıgüzel et al. (2023) emphasized the potential of AI chatbots to improve communication skills in language learning, improving effectiveness, productivity, and student engagement through personalized support. The study found that while AI in education offers several benefits, it also raises concerns such as over-reliance, loss of human interaction, inhibiting creativity, and job loss fears among Turkish EFL teachers. Teachers expressed worries that AI might hinder critical thinking by offering immediate solutions to problems and could lead to job loss as it automates tasks. Additionally, unequal access to AI technologies may deepen educational inequalities. These concerns are in line with the findings of researchers like Chounta (2022) and Cong-Lem et al. (2024), who warned that AI might hinder interaction, critical thinking, and creativity, and might lead to unhealthy reliance on technology. When asked about AI's potential to replace teachers, most of the teachers ($f=10$) in this study expressed the belief that AI cannot fully substitute human educators, largely because it cannot offer the social interaction and emotional intelligence that are crucial to effective teaching. Teachers argued that AI can assist with some educational functions but cannot replace human traits such as empathy, cultural understanding, and the ability to build relationships and trust. These human qualities play a crucial role in developing a student's personal and academic development, making AI a limited tool in the classroom. This view corresponds with earlier studies (Chounta, 2022; Çetin &

Aktaş, 2021; Dülger and Gümüşeli, 2023; Katemba, 2020; Sumakul et al., 2022) where participants pointed out that AI may help with instructional delivery but fails to meet the emotional and cultural needs of students.

Contrary to the findings of this study, Edwards and Cheok (2018) assert that AI-powered robot teachers will eventually take over many teaching roles, reducing the need for human educators. They argue that robot teachers could replace human instructors altogether. Their research emphasizes that AI-based robot teachers can help address financial constraints in the education sector, as hiring and maintaining human teachers is often costly and complex. However, while they acknowledge the possibility of large-scale job losses, they also suggest that AI's integration into education will lead to the emergence of new career opportunities for educators, potentially in AI development, curriculum design, or technology-assisted learning facilitation.

Fitria (2021) highlights that AI lacks the natural intelligence inherent in humans and should be seen as a tool to enhance teachers' abilities. Thus, AI tools may reduce teachers' workloads by managing tasks like grading or attendance tracking, but the core of teaching—guiding students toward success and fostering meaningful learning—remains a human responsibility. Yolcu (2024) further emphasizes that although AI will not entirely replace teachers, those who effectively integrate AI into their lessons will likely outperform those who do not. In conclusion, the findings of the study reinforce the idea that AI offers advantages in language instruction, including enhanced engagement, immediate feedback, and improved communication skills although there are concerns about over-reliance, diminished human interaction, and job security. The results align with previous research emphasizing AI's supportive role rather than its potential to replace educators and maximize benefits in education.

Conclusion

This study concludes that most participants have a high level of AI awareness, acknowledging its strengths and limitations in language instruction. Notably, significant differences in awareness levels were observed based on gender and age, indicating that these demographic factors may influence how AI is perceived and understood. Teachers holding postgraduate qualifications scored notably higher in practical AI knowledge, highlighting the role of advanced education in fostering effective AI application in classrooms. Interviewees identified several positive outcomes of using AI including improved student performance in language skills, time efficiency, instant feedback, increased student interest, and self-confidence. On the other hand, they also cited some drawbacks such as overdependence on technology, reduced interpersonal communication, diminished creativity, and various ethical concerns.

While AI offers valuable support, it is currently incapable of independently managing classrooms. To ensure successful AI integration, teachers must improve their technological knowledge and AI literacy skills. In this regard, providing in-service training programs can facilitate this process. Further research is needed to determine the readiness of both teachers and students to integrate AI into their learning environments. Additionally, broadening research to include all educational stakeholders such as students, parents, and administrators is crucial for evaluating AI's impact on roles and responsibilities within education. Since students' perspectives were not included in the present study, future research should explore AI's impact on language skills from their

viewpoint. Longitudinal studies can further track AI's long-term effects in ELT, evaluating its sustainability. As AI's role in English language teaching continues to develop, it is crucial to investigate future challenges and develop practical solutions. By analyzing potential barriers such as data privacy concerns, algorithmic bias, and educational inequality, researchers and educators can create clear guidelines to ensure AI's responsible and effective integration into language learning. Overall, there is a clear need for established guidelines to govern the responsible use of AI technologies. Since teachers play a pivotal role in this process, their perspectives should be central to policy development.

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Statement of Responsibility

Seher Üretmen and Cemile Doğan worked collaboratively on the design of the study, Seher Üretmen was responsible for data collection and analysis, while Cemile Doğan contributed to the literature review and discussion. Both authors participated in writing and revising the manuscript and approved the final version for submission.

Conflicts of Interest

The authors state that there are no potential conflicts of interest regarding this article.

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Preservice Elementary Teachers' Entertainment-oriented Media Literacy and Critical Literacy Skills for Internet*

Öğretmen Adaylarının Eğlence Odaklı Medya Okuryazarlığı ve İnternet İçin Eleştirel Okuryazarlık Becerileri

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ABSTRACT: This survey study explores the relationship between entertainment-oriented media literacy and critical literacy skills for internet among 355 preservice elementary teachers, using the Entertainment-Oriented Media Literacy Scale and the Critical Literacy Scale for Internet. Findings indicate high levels of both literacy types, with a weak positive correlation between them. Female students demonstrated higher entertainment-oriented media literacy, while critical literacy skills showed no gender difference. Fourth-year students and those with media literacy course experience exhibited enhanced skills in both areas. Students producing content and those using the internet for education and shopping displayed higher entertainment-oriented media literacy. Additionally, students who used the internet for news and information had higher critical literacy. Frequent entertainment media users also exhibited stronger media literacy skills. Results suggest that media literacy courses contribute to improved critical evaluation of media content, though room for growth remains. The study highlights the significance of media literacy education in teacher preparation programs and recommends targeted interventions to further develop critical literacy skills related to media and Internet use among future educators.

Keywords: Critical literacy, entertainment, internet, media literacy, preservice teachers.

ÖZ: Bu ilişkisel tarama çalışması, 355 sınıf öğretmeni adayının eğlence odaklı medya okuryazarlığı ile internet için eleştirel okuryazarlık becerileri arasındaki ilişkiyi Eğlence Amacına Duyarlı Medya Okuryazarlığı Ölçeği ve İnternet İçin Eleştirel Okuryazarlık Ölçeği kullanarak incelemektedir. Bulgular, her iki okuryazarlık türünün de yüksek düzeyde olduğunu ve aralarında zayıf bir pozitif korelasyon bulunduğunu göstermektedir. Kadın öğrenciler yüksek düzeyde eğlence odaklı medya okuryazarlığı becerisi gösterirken, eleştirel okuryazarlık becerilerinde cinsiyet farkı görülmemiştir. Dördüncü sınıf öğrencileri ve medya okuryazarlığı dersi alanlar her iki alanda da gelişmiş beceriler sergilemiştir. İçerik üreten ve interneti eğitim ve alışveriş için kullanan öğrenciler daha yüksek eğlence odaklı medya okuryazarlığı göstermiştir. Ayrıca, haber ve bilgi için internet kullanan öğrencilerin eleştirel okuryazarlığı daha yüksektir. Medyayı eğlenceye yönelik daha sık kullananlar ise yüksek medya okuryazarlığı becerilerine sahiptir. Sonuçlar, medya okuryazarlığı derslerinin medya içeriğinin eleştirel değerlendirilmesine katkıda bulunduğunu, ancak gelişim için hala alan olduğunu göstermektedir. Çalışma, öğretmen yetiştirme programlarında medya okuryazarlığı eğitiminin önemini vurgulamakta ve geleceğin eğitimcilerin internet kullanımıyla ilgili eleştirel okuryazarlık becerilerini daha da geliştirecek müdahaleler önermektedir.

Anahtar kelimeler: Eleştirel okuryazarlık, eğlence, internet, medya okuryazarlığı, sınıf öğretmen adayı.

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Media literacy encompasses a diverse range of meanings (Potter, 2022), but its most common usage refers to an individual's skills, knowledge structures, and personal capacity to construct broader frameworks for understanding media. Potter (2019) defines media literacy as a set of perspectives that we actively employ to engage with mass media and interpret the meanings of the messages we encounter. Critical literacy, on the other hand, involves the ability to analyze, critique, and question attitudes, beliefs, and ideologies present in written texts, media, and other forms of communication. It goes beyond accepting information at face value, encouraging individuals to examine the underlying assumptions, biases, and power structures in various texts and messages (Luke, 2012; Janks, 2018). Potur (2014) emphasizes that critical literacy also aims to develop individuals' skills in questioning media content and responding actively. In the current information age, these critical literacy skills have become increasingly important for the conscious and effective use of electronic media (Burnett & Merchant, 2019).

The rapid development and proliferation of digital technologies have significantly increased individuals' interaction with media, particularly in the realm of entertainment. Digital media usage for entertainment purposes has become a widespread phenomenon, especially among younger generations (Jordan, 2017). Digital entertainment tools such as social media platforms, video sharing sites, and video games over the internet have become a fundamental part of everyday routines, necessitating a new set of skills to navigate this digital landscape effectively (Jenkins et al., 2016).

With the advancement of technology, the appropriate use of evolving communication tools and how users process the content provided by the internet or media have recently become important issues (Arğın, 2021; Buckingham, 2015). This situation highlights the importance of media literacy and critical literacy skills, particularly in the field of education, increasing its significance for preservice teachers to develop these skills. These individuals, who will guide their students in the future, must understand and manage the benefits and risks brought by the digital age (Ata & Yıldırım, 2016; Redmond, 2015).

Despite the growing importance of media literacy and critical literacy skills in today's technology-driven world, there is a lack of in-depth research exploring the relationship between entertainment-oriented media literacy and critical literacy skills for internet among preservice teachers. This study aims to address this gap by investigating these skills in preservice elementary teachers and exploring various demographic factors that may influence them. By doing so, this research contributes to our understanding of how future educators are prepared to navigate and teach in an increasingly digital world.

Entertainment-Oriented Internet Use and Media Literacy

In the digital era, media plays a pivotal role in several aspects of human life, from socialization and information consumption to education and entertainment. The concept of new media encompasses all electronic devices capable of connecting to virtual environments, such as tablets, smartphones, smartwatches, and computers. The internet serves as the foundation for new media, with its visual and auditory platforms and applications analogous to countries and cities in the physical world, creating a parallel universe often referred to as the virtual realm (Aslan & Tuncer-Basel, 2017).

Social media has surfaced as a key concept in internet-based interaction, allowing users to create profiles, share content, and interact in virtual environments. The purposes of social media usage vary widely, including gaming, commenting, travel planning, product tracking, sharing experiences, and communication (Erol & Hassan, 2014; Hazar, 2011). While earlier studies (Boyd & Ellison, 2007) laid the groundwork for understanding social media, more recent research has highlighted its evolving nature and impact on society (Keles et al., 2020; Polanco-Levican & Salvo-Garrido, 2022).

Generational differences in internet usage are notable, with Y and Z generations using the internet more for social media and entertainment, while the X generation focuses on news and communication (Özdemir, 2021). In Turkey, digital age students mainly use the internet for communication and entertainment, followed by activities such as reading news, chatting, gaming, and watching movies (Yılmaz, 2012). This trend is not unique to Turkey; similar patterns have been observed globally, with younger generations showing a greater propensity for entertainment-oriented internet use (Anderson & Jiang, 2018). Scolari and colleagues (2020) emphasize the significance of grasping how younger generations interact with media in non-academic settings and the processes through which they acquire these skills.

The COVID-19 has significantly accelerated the entertainment-oriented use of e-media. Due to increased time spent at home and social isolation, people have turned to digital platforms, resulting in a rise in subscriptions to film and series platforms, increased interest in digital games, and the popularity of digital activities such as online concerts, virtual museum tours, live broadcasts, and social media events (Küçükvardar & Türel, 2022). This shift has enabled individuals to use digital media more frequently and in various ways to meet their entertainment needs, highlighting the importance of entertainment-oriented media literacy. The idea of "entertainment-oriented media literacy skills" emerges as a crucial area for further exploration (Hobbs & Jensen, 2009) and participating consumption and the rapid development of new media culture needs rapid attention (Wang et al., 2019).

Entertainment-oriented media literacy, though rooted in general media literacy principles, specifically emphasizes the skills required to navigate, analyze, and critically engage with entertainment content in digital media. It encompasses the ability to discern quality content, understand the implications of excessive media consumption, and recognize potential biases or manipulations in entertainment media (Jeong et al., 2012). Effectively utilizing new media necessitates media literacy, which enables individuals to be knowledgeable about online risks while benefiting from online opportunities. While entertainment-oriented internet use offers numerous benefits, it also presents challenges. Excessive use can lead to addiction, social isolation, and exposure to misinformation (Kuss & Griffiths, 2017). Therefore, developing critical media literacy skills is crucial for navigating these potential pitfalls and maximizing the positive aspects of digital entertainment.

Assessing media critically, a prominent dimension in media literacy approaches, is particularly relevant in the context of entertainment-oriented internet use. Potter (2019) emphasizes that media literacy is built on useful information structures, and individuals need skills such as analysis, evaluation, and synthesis to make informed choices about media consumption. Kurt and Kürüm (2010) argue that critical

engagement with media requires analytical skills such as data analysis, problem-solving, questioning, and critical thinking.

The "critical" dimension of media literacy refers to critical thinking, which involves analyzing and evaluating knowledge claims to form informed judgments (Hitchcock, 2022). Teaching critical media literacy based on critical pedagogy refers to social justice education to challenge power relationships and existing social inequities (Buckingham, 2003; De Abreu, 2019; Hobbs, 2010; Kellner & Share, 2019). Entertainment-oriented media literacy is likely to become increasingly important as virtual and augmented reality technologies advance, blurring the lines between digital and physical experiences. This evolution requires new skills and critical approaches to media consumption.

Critical Literacy: Media Engagement as a Form of Power

The integration of media education and critical literacy education has become increasingly important, particularly in the context of 21st-century skills and entertainment-oriented media consumption (Valle et al., 2024). In addition to media consumption, youth are the drivers of innovation through media production as engaging in social change and redesigning the social world (Currie & Kelly, 2021). While modern media devices contribute to media literacy, it's crucial to recognize that media as "a venue for the operation of power" (& Kelly, 2021, p.406) and can be manipulated by power centers to influence people (Potur, 2014). Education plays a vital role in teaching healthy media consumption, especially in the scope of entertainment. Therefore, media literacy education should be provided in conjunction with critical literacy education (Semerci & Semerci, 2017).

Critical literacy, inspired by Paulo Freire's work, is an approach that allows individuals to understand the world and participate in thought processes. This concept aims to increase awareness and empower groups subjected to social and political discrimination. In the context of media, besides technology that enables communication there are messages embedded in that communication, so literacy takes the attention to the forms of communication as well as the various forms of media texts (Jenkins, 2006). Critical literacy skills enable individuals to question texts and content of various artifacts and distinguish between reality and fiction, fake and real, and the social impacts of the media (Hammer & Kellner, 2009; Syam & Nurrahmi, 2020). It also allows the reader and the user to question media, audiences, information and power from the perspective of sociopolitical issues, gender and class (Kellner & Share, 2019; Mihailidis, 2020).

As text media representations and their delivery technologies are never neutral and have their own purposes reflect histories, social dynamics, and cultural perspectives, while also holding power (Mason et al., 2018). Kellner and Kim (2010) contend that without a well-defined educational approach, user-generated technology risks becoming nothing more than a luxury item for the wealthy or a tool solely for personal enjoyment and self-expression. Transforming individuals from passive media consumers to active users is crucial when engaging with entertainment media, which often carries implicit messages about social norms, values, and power structures.

For preservice teachers, developing critical literacy skills within the realm of entertainment media is particularly important because they will guide future generations

in navigating the complex media landscape (Share et al., 2023). Critical literacy skills of preservice teachers affect their media literacy levels (Semerci & Semerci, 2017).

Adopting a critical approach to media literacy can help practitioners and researchers gain a deeper understanding of whether preservice teachers are more inclined to incorporate critical media explorations into their curriculum and teaching practices. This understanding helps them consider how to address these issues responsibly while teaching (Marlatt, 2020). Furthermore, preservice teachers can evaluate the credibility, reliability, and potential biases of entertainment media messages, supporting their ability to make informed choices when integrating media into the classroom.

In conclusion, while significant strides have been made in understanding critical literacy and its relationship to media education, there is a need for more focused research on how these concepts apply specifically to entertainment-oriented media literacy, especially in the context of teacher education.

Method

This study employed a quantitative research method to assess the critical literacy skills of preservice elementary school teachers in their use of digital media for entertainment purposes. Quantitative methods facilitate the systematic investigation of existing situations and events through the collection of numerical data via surveys and similar inventories, followed by analysis using statistical techniques (Ocak, 2019).

The research design was founded on a relational survey model, which aims to evaluate and measure the degree of association between two or more variables of interest, and this approach is particularly suitable for examining relationships and correlations among variables without manipulating the research environment (McMillan & Schumacher, 2014).

Population and Sample

The study population comprised preservice elementary school teachers studying at universities. A convenience sampling method was chosen for its practicality and efficiency in accelerating the data collection process, providing time and financial advantages (Baltacı, 2018). The sample consisted of 355 preservice elementary school teachers who volunteered to participate, representing the population in both quality and quantity, and aligning with the number of items in the survey used during the study.

Data from preservice elementary school teachers at three universities were analyzed and classified by gender, grade level, completion of a media literacy course, and university affiliation. 347 preservice teachers participated in the research, with 67% female (n=232) and 33% male (n=115) participants. Data from eight candidates were excluded due to incomplete coding or extreme values, resulting in the final analysis of data from 347 preservice elementary school teachers.

According to the research results, 34.3% of the students were in their 4th year (n=119), 29.7% in their 3rd year (n=103), 25.9% in their 2nd year (n=90), and 10.1% in their 1st year (n=35). The study aimed to reach an equal number of preservice elementary teachers who had and had not taken a media literacy course. However, it

was found that 68.3% of the students had not enrolled in a media literacy course (n=237), while 31.7% had completed the course (n=110).

Data Collection Process

The data were collected using an instrument comprising three main sections: demographic information of preservice elementary school teachers, the Entertainment-Oriented Media Literacy Scale (EOMLS) developed by Ulu-Aslan and Baş (2022), and the Critical Literacy Scale for Internet (CLSI) developed by Dal and Aktay (2015).

Ulu-Aslan and Baş (2022) developed a new 24-item scale due to the lack of existing media literacy measurement tools specifically designed to assess entertainment purposes and their unsuitability for the target audience. The scale was constructed using a five-point Likert structure. The Cronbach's Alpha value for the total items of the scale was 0.940, indicating a high level of data reliability. As noted by Seğer (2015), a value of 0.70 or above suggests that the scale possesses internal consistency. After verifying the data's suitability for factor analysis, item eigenvalue statistics, scree plot, and the percentage of factor components in total variance were examined to determine the appropriate number of factors.

The CLSI, developed by Dal and Aktay (2015), has been utilized in several studies to assess students' critical thinking abilities. A literature review was initially conducted on the topics of the internet, critical literacy, and the application of critical literacy in the context of the internet. Subsequently, a general framework was established, and expert opinions were sought. A pool of 33 items was created, rated on a five-point Likert scale to evaluate the frequency of specific tendencies and behaviors. Exploratory and confirmatory factor analyses were performed to assess the validity and reliability of the scale. The exploratory factor analysis showed that the scale comprised 27 items and a single factor. The Cronbach's Alpha, which measures the scale's internal consistency, was calculated to be 0.95. The confirmatory factor analysis demonstrated that the goodness-of-fit indices were within an acceptable range.

Data Analysis

The findings were analyzed using SPSS 25.0 software. Frequency and percentage analyses were conducted to determine the distribution of students according to their demographic characteristics, while the student levels related to the scales used were determined using means and standard deviations. Cronbach's Alpha reliability analysis was conducted to evaluate the reliability of the scales, and the results showed that all measurement tools had reliability scores above 0.70.

Hypotheses and sub-problems established in accordance with the research aim were statistically tested at a 95% confidence level ($p < 0.05$). Pearson correlation analysis was performed to explore the relationship between the independent and dependent variables, as it is appropriate for normally distributed, continuous data. Additionally, independent samples t-test was applied to determine the difference between binary groups according to the measurements, while one-way ANOVA was used for groups with more than two categories.

According to the results of the normal distribution analysis, it was determined that the data obtained had a normal distribution due to the proximity between the mean and median of the examined central tendency measurements, and the kurtosis and

skewness being between ± 2 (George & Mallery, 2021). Furthermore, given that the number of participants in the study was sufficient ($n \geq 30$), parametric methods, which are statistically more robust, were employed with the assurance provided by the central limit theorem (Ghasemi & Zahediasl, 2012).

Ethical Approval

This research has Akdeniz University Social Sciences and Humanities Scientific Research and Publication Ethics Committee approval with a date 09.06.2023 and number 662919.

Results

This section presents the results regarding preservice teachers' levels of critical literacy for the internet and entertainment-oriented media literacy (Table 1), as well as the relationship between these variables (Table 2).

Table 1

Mean Scores and Standard Deviations of Preservice Teachers' Media Literacy and Critical Literacy Levels

Variable	Mean	SD
Critical Literacy for Internet	3,64	0,54
Entertainment-Oriented Media Literacy	3,94	0,42

Students' critical literacy level averaged 3.64 ± 0.54 , corresponding to a 'high' level on the 5-point Likert scale. The highest means were observed for the items "I pay attention to whether the information on websites is up-to-date" ($M=4.07$) and "I pay attention to whether the opinions on websites conflict with my own views" ($M=4.07$). The lowest mean was for the item "I share content on social networks to facilitate societal transformation" ($M=3.12$). Students' entertainment-oriented media literacy level was high, with an average of 3.94 ± 0.42 . The highest means were found for the items "I question the accuracy of information in media content" ($M=4.20$) and "I follow different types of media tools suitable for my purpose" ($M=4.20$). The lowest mean was for the item "I question who creates entertainment-oriented media messages" ($M=3.64$).

A positive, low-level significant correlation ($r=0.370$; $p=0.001 < 0.05$) was found between students' critical literacy levels for the internet and their entertainment-sensitive media literacy levels (Table 2).

Table 2

Correlation Analysis between Critical Literacy for Internet and Entertainment-Oriented Media Literacy

Variables		Critical Literacy for Internet	Entertainment-Oriented Media Literacy
Critical Literacy for Internet	r	1	
	p		
Entertainment-Sensitive Media Literacy	r	0.370	1
	p	0.001*	

*p<0.05

This finding suggests that as students' critical literacy levels for the internet increase, their entertainment-oriented media literacy levels may also increase slightly.

Demographic Factors Affecting Entertainment-Oriented Media Literacy

The study found that preservice teachers' entertainment-oriented media literacy levels differed according to gender, grade level, and whether they had taken a media literacy course (Table 3).

Table 3

Differences in Entertainment-Oriented Media Literacy Levels Based on Gender, Grade Level, and Media Literacy Course Status

Demographic	Groups	Entertainment-oriented Literacy		Media	p	Scheff e
		Mean	SD	F/t		
Gender	Female	3.98	0.38	2.648	0.009 *	4>2
	Male	3.85	0.47			
Grade	1 st year	3.97	0.28	3.374	0.019 *	
	2 nd year	3.83	0.47			
	3 rd year	3.93	0.40			
	4 th year	4.01	0.42			
Media literacy course status	Not taken	3.90	0.41	-2.082	0.038 *	
	Taken	4.00	0.42			

*p<0.0

Students' entertainment-oriented media literacy levels showed significant differences based on gender ($p=0.009<0.05$). Females demonstrated higher levels of entertainment-oriented media literacy compared to males. Students' entertainment-oriented media literacy levels also differed significantly based on their grade level ($p=0.019<0.05$). Fourth-year students' levels ($M=4.01$) were higher than those of

second-year students ($M=3.83$). Students who completed a media literacy course showed significantly higher entertainment-oriented media literacy levels ($M=4.00$) compared to those who had not taken the course ($M=3.90$) ($p=0.038<0.05$).

Demographic Factors Affecting Critical Literacy for the Internet

The study revealed that preservice teachers' critical literacy levels for the internet did not differ by gender but showed differences based on grade level and whether they had taken a media literacy course (Table 4).

Table 4

Differences in Critical Literacy Levels for Internet Based on Gender, Grade Level, and Media Literacy Course Status

Demographic	Groups	Critical Literacy for Internet		F/t	p	Scheffe
		Mean	SD			
Gender	Female	3.64	0.53	-0.111	0.911	
	Male	3.65	0.57			
Grade	1 st year	3.38	0.63	6.657	0.001*	4>1-2
	2 nd year	3.54	0.51			
	3 rd year	3.66	0.54			
	4 th year	3.78	0.49			
Media literacy course status	Not taken	3.59	0.55	-2.740	0.006*	
	Taken	3.76	0.51			

* $p<0.05$

No significant difference was found between students' critical literacy levels for the internet and their gender ($p=0.911>0.05$). Significant differences were found between students' grade levels and their critical literacy levels for the internet ($p=0.001<0.05$). Fourth-year students' levels ($M=3.78$) were significantly higher than those of first-year ($M=3.38$) and second-year ($M=3.54$) students. Students who had taken a media literacy course demonstrated significantly higher critical literacy levels ($M=3.76$) compared to those who had not taken the course ($M=3.59$) ($p=0.006<0.05$).

Other Factors Affecting Entertainment-Oriented Media Literacy and Critical Literacy Levels for the Internet

The study also examined whether preservice teachers' entertainment-oriented media literacy levels and critical literacy levels for the internet differed according to their social media usage patterns, applications used, and content production status and type.

Differences Based on Social Media Usage Patterns

Preservice teachers who used the internet for shopping ($p=0.006<0.05$) and educational purposes ($p=0.008<0.05$) showed significantly higher entertainment-oriented media literacy levels compared to those who did not. Students' entertainment-oriented media literacy levels did not show significant differences based on using the

internet and social media for entertainment, news, and information gathering purposes (Table 5).

Table 5

Comparison of Entertainment-Oriented Media Literacy Levels by Social Media Usage Patterns

Social Media Usage Patterns	Groups	Entertainment-Oriented Media Literacy		F/t	p
		Mean	SD		
Time spent on social media	2 hours or less	3.91	0.45	0.469	0.626
	3-4 hours	3.94	0.39		
	4 hours or more	3.96	0.43		
Using internet for entertainment	No	3.84	0.38	-1.300	0.195
	Yes	3.94	0.42		
Using internet for news	No	3.85	0.37	-1.749	0.081
	Yes	3.95	0.42		
Using internet for information	No	3.87	0.39	-1.437	0.152
	Yes	3.95	0.42		
Using internet for shopping	No	3.82	0.45	-2.779	0.006*
	Yes	3.97	0.40		
Using internet for education	No	3.84	0.44	-2.681	0.008*
	Yes	3.97	0.41		

*p<0.05

Students who used the internet for news ($p=0.027<0.05$) and information gathering ($p=0.001<0.05$) purposes showed significantly higher critical literacy levels compared to those who did not. No significant differences were found in other measured categories (Table 6).

Table 6

Comparison of Critical Literacy Levels by Social Media Usage Patterns

Social Media Usage Patterns	Groups	Critical Literacy for Internet		F/t	p
		Mean	SD		
Time spent on social media	2 hours or less	3.70	0.48	1.625	0.198
	3-4 hours	3.65	0.53		
	4 hours or more	3.56	0.62		
Using internet for entertainment	No	3.72	0.48	0.883	0.378
	Yes	3.63	0.55		
Using internet for news	No	3.50	0.56	-2.228	0.027*
	Yes	3.67	0.53		

Using internet for information	No	3.44	0.59	-3.338	0.001*
	Yes	3.69	0.52		
Using internet for shopping	No	3.58	0.55	-1.145	0.253
	Yes	3.66	0.54		
Using internet for education	No	3.59	0.61	-1.038	0.300
	Yes	3.66	0.51		

*p<0.05

Differences Based on Applications Used

Tables 7 and 8 present the analysis results for the question: "Do preservice teachers' entertainment-oriented media literacy levels and critical literacy levels for the internet differ according to the applications they use?" Students who did not use other applications showed higher entertainment-oriented media literacy levels compared to those who did ($p=0.038<0.05$).

Table 7

Comparison of Entertainment-oriented Media Literacy Levels by Applications Used

Applications Used	Groups	Entertainment-oriented Media Literacy		t	p
		Mean	SD		
Instagram	Don't use	3.80	0.53	-1.437	0.161
	Use	3.95	0.41		
Tiktok	Don't use	3.95	0.40	1.499	0.135
	Use	3.87	0.48		
Twitch	Don't use	3.93	0.42	-0.399	0.690
	Use	3.96	0.43		
Twitter	Don't use	3.93	0.42	-0.249	0.803
	Use	3.94	0.41		
YouTube	Don't use	3.85	0.42	-1.264	0.207
	Use	3.94	0.42		
Spotify	Don't use	3.92	0.41	-0.455	0.649
	Use	3.94	0.43		
TV/movie platforms	Don't use	3.89	0.41	-1.500	0.135
	Use	3.96	0.42		
Others	Don't use	3.95	0.40	2.079	0.038*
	Use	3.76	0.62		

*p<0.05

According to comparison of used applications and critical literacy levels (Table 8), the students who did not use TikTok showed significantly higher critical literacy levels ($M=3.69$) compared to those who used it ($M=3.47$) ($p=0.003<0.05$). Students

who did not use Spotify demonstrated significantly higher critical literacy levels ($M=3.74$) compared to those who used it ($M=3.57$) ($p=0.003<0.05$).

Table 8

Comparison of Critical Literacy Levels by Applications Used

Applications Used	Groups	Critical Literacy for Internet		t	p
		Mean	SD		
Instagram	Don't use	3.65	0.49	0.046	0.963
	Use	3.64	0.54		
Tiktok	Don't use	3.69	0.54	2.947	0.003*
	Use	3.47	0.51		
Twitch	Don't use	3.64	0.55	-0.786	0.433
	Use	3.71	0.45		
Twitter	Don't use	3.65	0.54	0.401	0.689
	Use	3.63	0.54		
YouTube	Don't use	3.55	0.54	-1.039	0.299
	Use	3.65	0.54		
Spotify	Don't use	3.74	0.52	2.970	0.003*
	Use	3.57	0.54		
TV/movie platforms	Don't use	3.68	0.52	0.937	0.350
	Use	3.62	0.55		
Others	Don't use	3.65	0.54	0.345	0.730
	Use	3.61	0.48		

* $p<0.05$

Differences Based on Content Production Characteristics

Table 9 presents the analysis results for the research question: "Do preservice teachers' entertainment-oriented media literacy levels and critical literacy levels for the internet differ according to the characteristics of the content they produce?"

Table 9

Comparison of Entertainment-oriented Media Literacy and Critical Literacy Levels by Content Production Characteristics

The Surveys	Variables	Groups	Mean	SD	t	p
Entertainment-oriented Media Literacy	Content production	No	3.90	0.41	-2.956	0.003*
		Yes	4.07	0.43		
	Content type	Video	4.06	0.42	-0.229	0.820
		Other	4.09	0.45		
Critical Literacy for Internet	Content production	No	3.62	0.54	-1.707	0.089
		Yes	3.75	0.52		
	Content type	Video	3.81	0.52	1.097	0.277
		Other	3.66	0.50		

*p<0.05

Students who produce content demonstrated significantly higher entertainment-oriented media literacy levels (M=4.07) compared to those who do not produce content (M=3.90) ($p=0.003<0.05$). No significant difference was found in critical literacy levels based on content production status ($p=0.089>0.05$).

These findings indicate that preservice teachers' media and critical literacy skills vary according to various factors such as grade level, whether they have taken a media literacy course, and their internet usage habits.

Discussion and Conclusion

In today's world, the use of internet-connected media and social networks for entertainment purposes has seen a significant rise (Erdem, 2010). The proliferation of digital content has expanded the importance and scope of critical literacy skills (Küslü, 2022). This study reveals that preservice teachers spend an average of 3-4 hours daily on social media. According to Abbott (2013), the typical social media user dedicates approximately two hours daily to various online activities, including sharing images and messages, updating personal status, posting tweets, liking content, and commenting on the wide array of information shared across social platforms. Similar research shows that university students primarily use social media for relaxation, obtaining information, socializing, staying updated with news, and communication (Güney, 2018; Bedir, 2016). These findings indicate that social interactions among young people have largely shifted to digital platforms, underscoring the need for comprehensive research on digital media usage.

The results of this study demonstrate that preservice elementary school teachers have high levels of critical internet literacy and entertainment-focused media literacy. A positive and statistically significant relationship was observed between critical internet literacy and entertainment-oriented media literacy. This suggests that as students' critical literacy skills for the internet develop their levels of media literacy may also increase. However, the extent of this increase remains limited, as similar findings in literature suggest. For example, Karaman and Karataş (2009) and İnan (2010) found that while preservice teachers possess high media literacy skills, their highest competencies lie in "Being Informed," with the lowest scores in "Analytical Ability and Response Generation." Most preservice teachers do not engage in media production, indicating that their analytical and participatory skills in media are insufficient. Overall, findings of Gutiérrez-Ángel and colleagues (2022) review research indicate that university students possess digital literacy and utilize both the Internet and digital media effectively. Students demonstrated intermediate to advanced proficiency in communication and collaboration skills, adeptly using various chat platforms and communication apps. However, their abilities in producing and sharing multimedia content, were at a lower intermediate level. This area represents a key competency for future development among this demographic. It's worth noting that skill levels varied based on factors such as gender, age, and field of study. There is a clear need to implement comprehensive digital literacy programs for preservice teachers. Such training should be explicitly incorporated into their formal educational curricula. Fostering analytical and responsive skills can be supported through studies focused on critical literacy.

Media literacy encompasses the skills required to access, analyze, evaluate, and create media messages (Livingstone, 2004). This study shows that these skills are also effective in entertainment-oriented media use. Similarly, critical literacy is the ability to question, analyze, and evaluate information (Potter, 2022). In light of these findings, critical literacy education can be considered an effective strategy in strengthening students' media literacy skills. This supports the use of critical skills in entertainment-oriented internet use as well. However, further research is needed to determine the full extent of this effect.

Types of Literacy and Their Relationship with Other Variables

The levels of critical literacy and entertainment-oriented media literacy were examined concerning different variables, including gender, grade level, completion of a media literacy course, type of content produced, and the purpose of social media use.

When the results are examined, firstly, a significant difference was found between the gender factor of preservice teachers and their entertainment-oriented media literacy levels, with women having higher levels compared to men. This situation is not valid for critical media literacy skills according to the research results. Findings related to the gender factor contradict different research results. In the studies of Uslu et al. (2016) and Güney (2018), it was found that male preservice teachers had higher levels of media literacy. On the other hand, Çepni et al. (2015), and Karasu and Arıkan (2016) found no significant relationship between media literacy and gender. The lack of a significant difference between critical literacy levels for the internet and genders is consistent with the studies of Çiftçi (2019) and Bircan (2022). These results indicate

that gender is not a determining factor in critical literacy levels. Gender roles and gender inequality are among the topics addressed in the content of critical literacy (Gürcan & Kargın, 2023). The lack of observed gender difference may be due to insufficient discussion of gender roles, as suggested by Vatandaş (2011). More data is needed to discuss the reasons for this situation.

Secondly, both literacy levels varied according to the students' grade levels and whether they had taken a media literacy course. The research found that as the grade level increased, the level of media literacy also increased. 4th-year students' levels are higher compared to 2nd-year students. This difference can be explained by the fact that courses in upper grades require more field expertise and encourage students to research (Tatar, 2016). However, there are also conflicting findings in the literature. For example, Uslu et al. (2016) and Çepni et al. (2015) found no significant relationship between grade level and media literacy level. These conflicting results indicate that grade-specific strategies need to be developed in media literacy education. A similar result was found between students' critical literacy levels for the internet and their grade levels. This difference can be explained by the teaching methods applied in the later years of university education (e.g., discussion groups, project-based learning, and research projects) developing students' critical thinking and analysis skills (Türkben & Satılmış, 2022). As Korkmaz (2009) stated, it can be said that the course contents received in teacher education contribute to students' critical thinking skills. These results emphasize the need for systematic development of critical literacy skills in higher education.

Thirdly, it was determined that students who took a media literacy course had higher levels of entertainment-oriented media literacy compared to those who did not (Atmaca, 2016; Kartal, 2007). Atmaca (2016) determined that preservice teachers who took a media literacy course were more conscious about media and expressed themselves more effectively. Kartal (2007) found that students who took this course evaluated media texts from a more critical perspective. Similarly, a significant relationship was found between taking a media literacy course and critical literacy levels for the internet. This result shows that the media literacy course develops students' skills in analyzing and interpreting media content more critically (Atmaca, 2016). These findings emphasize the importance of media literacy courses in teacher education programs and show that these courses can increase students' ability to question and analyze information, and that these skills are also effectively applied in entertainment-oriented media use.

Fourthly, the research results showed a significant relationship between students' content production and their entertainment-oriented media literacy levels. It was found that students who produce content have significantly higher levels of entertainment-focused media literacy compared to those who do not. However, no significant relationship was found between content production and critical literacy levels. This situation reflects the difference between Karaduman's (2019) view that content production is one of the media literacy skills and Potur's (2014) view that critical literacy skills focus more on questioning and actively responding to produced content. These results emphasize that content production and critical analysis dimensions should be addressed together with critical literacy skills in media literacy education and indicate that teacher education programs should be re-evaluated accordingly.

Fifthly, within the scope of the research, the relationship between social media usage purposes (entertainment, news, information, shopping, and education) and entertainment-oriented media literacy levels and critical media literacy levels for the internet was examined. The findings showed a significant relationship between students' entertainment-oriented media literacy levels and their use of the internet for educational purposes and online shopping. Moreover, a significant relationship was found between students' use of the internet for news and information purposes and their critical literacy levels. These results indicate that as the frequency of preservice teachers using the internet for education and shopping increases, their media literacy levels increase, and as the frequency of using it as a source of information and news increases, their critical literacy levels also increase.

In media literacy education, it is essential to examine the content and messages related to these contents in the media. Today's media diversity has led to the presentation of content and advertising messages to consumers from a variety of different platforms. The skills acquired in relation to media literacy may become more apparent in the use of the internet for educational and shopping purposes (Kırık, 2017; Kula & Güler, 2019).

The increase in critical literacy level with the increasing frequency of using it as a source of information and news may be due to the fact that literacy skills are more focused on analyzing text content. In the study of Türkben and Satılmış (2022), it was also revealed that preservice teachers who use the internet for information purposes have high levels of critical literacy skills.

Finally, in this study, it was found that students who use entertainment-oriented popular media tools have higher media literacy skills. However, students who do not use platforms such as TikTok and Spotify have higher levels of critical literacy. This situation can be associated with users thinking that they do not need critical literacy skills on platforms such as TikTok (a social media application that allows creating and sharing videos as well as live streaming) and Spotify (a digital music, podcast, and audio streaming service that allows users to access to a vast content from content producers worldwide). This can be explained by individuals resorting to media tools to meet their entertainment and stress reduction needs (Park, et al., 2009). In the research of Yetkiner and Öztürk (2020), it was also emphasized that TikTok is used for reasons such as meeting daily entertainment needs, interacting with different people, relieving stress, and expressing oneself.

Overall, the study results suggest that when media literacy and critical literacy skills are taught together effectively to preservice teachers, development in both areas is enhanced. Teachers who have acquired these skills will be able to provide opportunities for these skills for their own students in an age where virtual environment and especially entertainment-oriented content are rapidly increasing.

Teachers can impart this skill to students by evaluating digital media in terms of critical literacy in their lessons. By organizing seminars and workshops on social media, methods to evaluate content from a critical perspective can be taught. In addition, by providing information about the ways of spreading disinformation and methods of being careful against these misleading contents, students can be encouraged to produce critical content. Researching digital media content in terms of critical literacy can improve

preservice teachers' media literacy and critical thinking skills for entertainment-sensitive internet use.

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This study was derived from the master's thesis of Betül Arıkan. Demet Seban and Aziz Aslan contributed to the study design and supervision. Demet Seban, serving as a field expert, contributed to the original draft of the manuscript. Aziz Aslan, as the official thesis advisor, and Betül Arıkan, as the student, were responsible for reviewing and editing the final draft. Demet Seban: Conceptualization, Methodology, Supervision, Writing - Original Draft. Betül Arıkan: Data Collection, Formal Analysis, Writing - Review & Editing. Aziz Aslan: Project Administration, Resources, Supervision - Review & Editing.

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