



Perceptions of 21st-Century Skills Competence and Digital Literacy among Pre-Service English Language Teachers

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Abstract

This study investigates pre-service English language teachers' perceptions of digital literacy and 21st-century skills competence within contemporary teacher education. As educational systems increasingly prioritize technology integration and learner-centered pedagogies, teachers are expected to possess cognitive, social, and digital competencies alongside subject-matter knowledge. Adopting a quantitative correlational design, data were collected from pre-service English language teachers enrolled in an English Language Teaching program through standardized and validated measurement scales. Descriptive statistics, correlation analyses, and independent samples t-tests were employed to examine participants' self-perceived levels of digital literacy and 21st-century skills, as well as relationships between these perceptions and selected demographic variables. Findings revealed that pre-service teachers generally reported high perceptions of 21st-century skills, particularly in creativity, critical thinking, collaboration, and problem-solving. Digital literacy perceptions were moderate to high, with stronger self-assessments in digital content creation and evaluation than in technical competencies. A statistically significant positive relationship was identified between digital literacy and 21st-century skills perceptions. These results underscore the critical role of teacher education programs in fostering such competencies while highlighting the need for more systematic, practice-oriented digital skills training. The study contributes to literature on teacher preparedness in the digital age and offers implications for curriculum design and professional development in English language teacher education.

Keywords Competence Perceptions Digital Literacy Pre-Service Teachers 21st-Century Skills

İngiliz Dili Eğitimi Öğretmen Adaylarının 21.yy Becerileri Yeterlik Algıları ve Dijital Okuryazarlık Algıları

Özet

Bu çalışma, günümüz öğretmen yetiştirme bağlamında İngilizce öğretmen adaylarının dijital okuryazarlık ve 21. yüzyıl beceri yeterliliklerine ilişkin algılarını incelemektedir. Eğitim sistemlerinin teknoloji entegrasyonu ve öğrenci merkezli pedagojileri giderek önceliklendirmesiyle birlikte, öğretmenlerin alan bilgisinin yanı sıra bilişsel, sosyal ve dijital yetkinliklere sahip olmaları beklenmektedir. Nicel korelasyonel araştırma deseni benimsenerek veriler, İngilizce Öğretmenliği programına kayıtlı öğretmen adaylarından standart ve geçerliliği kanıtlanmış ölçüm araçları aracılığıyla toplanmıştır. Katılımcıların öz algı düzeylerini ve bu algılar ile demografik değişkenler arasındaki ilişkileri incelemek amacıyla betimsel istatistikler, korelasyon analizleri ve bağımsız örneklem t-testi uygulanmıştır. Bulgular, öğretmen adaylarının 21. yüzyıl becerilerine –özellikle yaratıcılık, eleştirel düşünme, iş birliği ve problem çözme alanlarında– ilişkin algılarının yüksek düzeyde olduğunu ortaya koymaktadır. Dijital okuryazarlık algıları orta ile yüksek arasında seyretmiş; teknik yetkinlikler yerine dijital içerik oluşturma ve değerlendirme becerilerinde daha güçlü öz değerlendirmeler gözlemlenmiştir. Dijital okuryazarlık ile 21. yüzyıl beceri yeterlilikleri arasında istatistiksel açıdan anlamlı, pozitif yönlü bir ilişki saptanmıştır. Bu sonuçlar, öğretmen yetiştirme programlarının söz konusu yetkinlikleri geliştirmedeki belirleyici rolünü vurgularken uygulamaya dönük dijital beceri eğitimine olan ihtiyacı da ortaya koymaktadır. Çalışma, dijital çağda öğretmen hazırlanışına ilişkin literatüre katkı sunmakta ve program tasarımı ile mesleki gelişim açısından önemli çıkarımlar sağlamaktadır.

Anahtar Kelimeler Yeterlik Algıları Dijital Okuryazarlık Öğretmen Adayları 21.yy Becerileri

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Introduction

This study focused on pre-service English language teachers' perceptions of 21st-century skills competence and digital literacy, and it was conducted to better understand the role of technology in education and to contribute to the improvement of teacher education processes. Digital literacy was identified as one of the most essential skills of the twenty-first century. In order to use classroom environments more effectively through digital resources, teachers were required to possess strong digital literacy skills (Karakuş, 2019). It was also emphasized that young individuals needed appropriate support to develop effectively within digital culture (Ministry of National Education [MoNE], 2023). Previous research had shown that educating individuals with the qualifications required by the modern era was only possible through high-quality teacher education (Özer & Gelen, 2008; Zhao, 2009).

Within the scope of the study, it was acknowledged that teachers first needed to understand what 21st-century skills were and why they were important. These skills included critical thinking, communication, collaboration, creativity, problem-solving, and respect for cultural diversity. The study highlighted that teachers were expected to learn how to foster these skills in learners and to design classroom environments that supported their development. Since individuals born into the digital age actively used technology as an integral part of daily life, English language teachers were considered to play a key guiding role in integrating language and technology in line with global developments. Accordingly, the levels of 21st-century skills and digital literacy among pre-service English teachers were regarded as highly significant (Çakanel, 2024).

In the literature, 21st-century skills had been defined in various ways. Van Laar et al. (2020) described these skills as competencies related to education and the workplace in the contemporary economy, while Anagün (2018) and Voogt and Roblin (2012) defined them as the skills individuals needed to adapt to twenty-first-century realities and to contribute effectively to the knowledge society. As indicated by these definitions, no single, universally accepted definition of 21st-century skills had been established (Joynes et al., 2019). Instead, the findings of previous studies suggested that 21st-century skills constituted a comprehensive skill set consisting of core competencies and related sub-skills (P21, 2017). In the literature, these skills had also been referred to using terms such as "life skills," "social-emotional skills, technical and soft skills," and "transferable skills."

Digital literacy, which was closely related to 21st-century skills and often considered one of their sub-dimensions, was examined as a fundamental competence for language teachers in contemporary educational contexts. Digital literacy was defined as the ability to use digital tools effectively to access reliable sources, verify, manage, analyze, evaluate information, produce new knowledge, and communicate appropriately (Yazıcı, 2023). Particularly in foreign language education, literacy had been examined from multiple perspectives, which brought digital literacy to the forefront (Akın, Akın, & Bilgin, 2024). The findings emphasized that digital literacy played an indispensable role in strengthening language skills and increasing professional self-confidence.

The originality of the study became evident when the national literature was examined. In the Turkish context, a limited number of studies had investigated pre-service English language teachers' perceptions of 21st-century skills competence and their relationship with digital literacy. This study addressed this gap by focusing on third- and fourth-year pre-service teachers enrolled in English Language Teaching programs in Türkiye. The developmental stage of the participants was taken into account, and the necessity for foreign language teaching and learning materials to meet specific criteria was emphasized.

Although previous research had largely focused on pre-service teachers' perceptions of technology use, correlational and regression-based studies examining the relationship between 21st-

century skills competence perceptions and digital literacy perceptions had remained scarce. Therefore, this study contributed to the literature by examining these variables together. The findings suggested that understanding pre-service teachers' perceptions provided valuable insights into both their educational experiences and their future professional practices. The results also helped identify areas within teacher education programs that required further strengthening.

In addition, the study highlighted the importance of encouraging pre-service teachers to consider 21st-century skills and digital literacy when selecting and designing foreign language teaching materials. This emphasis was considered essential for enabling future teachers to respond more effectively to learners' needs.

Within the study, pre-service teachers' digital literacy levels and perceptions of 21st-century skills competence were examined across dimensions such as ethics and responsibility, general knowledge and functional skills, daily use, and privacy and security. The research problem was formulated as "What are pre-service English language teachers' perceptions of 21st-century skills competence and digital literacy?" Given the rapid technological changes of the twenty-first century, it was emphasized that individuals needed to be well-prepared and equipped for future life and that English teachers played a crucial role in this process (Çakanel, 2024).

Finally, the study examined the relationship between pre-service teachers' perceptions of 21st-century skills competence and digital literacy. Although previous studies had suggested a possible relationship between these variables (P21, 2017), empirical evidence had been limited. By employing descriptive statistics as well as correlation and hierarchical multiple regression analyses, this study provided quantitative evidence supporting the assumption that higher perceptions of 21st-century skills competence were associated with higher levels of digital literacy. The findings offered important implications for future research and teacher education practices.

The primary aim of this study was to examine pre-service teachers' perceptions of 21st-century skills competence and digital literacy in order to understand teachers' needs in contemporary educational contexts and to improve educational practices accordingly. Twenty-first-century skills were conceptualized as a broad set of competencies that extended beyond traditional literacy, mathematics, and science skills to include critical thinking, communication, collaboration, and effective use of technology. These skills enabled learners to solve complex problems, access information, and communicate effectively. Digital literacy, on the other hand, referred to individuals' ability to understand digital technologies, use them effectively, critically evaluate information, and communicate meaningfully in digital environments. Within this framework, how pre-service teachers perceived these skills and how they planned to integrate them into their own teaching practices was considered crucial for the future of the education system.

The main objective of the study was to obtain empirical data on pre-service teachers' perceptions of 21st-century skills competence and digital literacy. This information was regarded as essential for understanding how the integration of contemporary technologies and the use of digital tools influenced pre-service teachers' learning and teaching approaches. Accordingly, the study aimed to develop an in-depth understanding of pre-service ELT teachers' perceptions of these competencies and to contribute to the improvement of educational practices in line with these findings.

Similarly, another key objective of the study was to examine the relationship between pre-service ELT teachers' perceptions of 21st-century skills competence and their perceptions of digital literacy, as well as to investigate how these perceptions varied according to demographic variables such as age, gender, and year of study. In line with these objectives, the study sought answers to the following research questions:

1. What are the perceptions of pre-service English language teachers regarding their 21st-century skills competence?

2. How do pre-service English language teachers perceive their digital literacy levels?
3. Is there a significant relationship between pre-service teachers' perceptions of 21st-century skills competence and digital literacy?
4. Do pre-service teachers' perceptions of 21st-century skills competence differ significantly according to age, gender, and year of study?

The findings derived from these research questions provided important insights into pre-service English language teachers' perceptions of 21st-century skills and digital literacy and offered valuable guidance for improving educational practices in teacher education programs.

Literature Review

21st Century Skills

Due to the rapid growth of technology, globalisation, and the demands of the workforce, the idea of 21st-century skills has become increasingly prominent in educational discourse. While there isn't a single, widely accepted definition, 21st-century skills are typically defined as a collection of abilities that allow people to work efficiently in knowledge-based, technologically advanced, and complex societies (Voogt & Roblin, 2012; Joynes et al., 2019). These abilities focus on higher-order thinking, flexibility, and social interaction rather than the more conventional academic literacies of reading, writing, and numeracy.

The conceptualization of 21st-century skills has been greatly aided by frameworks created by international organizations. Critical thinking, creativity, communication, teamwork, information literacy, media literacy, and technological literacy are among the fundamental skill areas identified by the Partnership for 21st Century Learning (P21) framework (P21, 2017). According to Voogt and Roblin (2012), 21st-century competences include intrapersonal, interpersonal, and cognitive aspects, all of which are critical for active citizenship and lifelong learning. Additionally, Van Laar et al. (2020) contend that these abilities are intimately related to digital competencies, especially in professional and educational settings.

21st-century skills are increasingly seen in teacher education as both instructional prerequisites and learning goals. It is expected of teachers to model and encourage these skills in their pupils in addition to having them themselves (Anagün, 2018; Erten, 2020). Perceptions of 21st-century abilities are linked to teaching self-efficacy, openness to innovation, and readiness to use technology into instructional practices, according to research done with pre-service teachers (Özden et al., 2018; Ünver, 2021). According to these results, teacher education programs have a significant impact on how aspiring educators perceive and assimilate these skills.

Learning and Innovation Skills

Learning and innovation skills hold a significant place among the different aspects of 21st-century abilities. Critical thinking, creativity, communication, and collaboration—often referred to as the "4Cs"—are regarded as essential for problem-solving, knowledge production, and productive engagement in both social and professional spheres (P21, 2017). While creativity stresses originality, adaptability, and idea production, critical thinking entails the capacity to assess arguments, analyse data, and reach well-reasoned conclusions. Conversely, communication and cooperation emphasise fruitful teamwork and successful interactions with people in a variety of settings.

Pre-service teachers generally view themselves as reasonably competent in learning and innovation skills, especially creativity and teamwork, according to empirical research (Erdoğan & Eker, 2020; Güler, 2019). Analytical and systemic thinking abilities are frequently reported at lower levels than creativity-oriented competences, according to certain research that has found variation among sub-dimensions (Anagün et al., 2016; Sayın, 2023). These variations emphasise how crucial it is to specifically

incorporate learning and innovative abilities into teacher education programs rather than presuming that they will develop naturally as a result of regular coursework.

Constructivist and learner-centred approaches to education are intimately related to learning and innovative skills from a pedagogical standpoint. It has been demonstrated that instructional strategies that prioritise inquiry-based learning, problem-based assignments, group projects, and reflective thinking aid in the growth of these skills (Zhao, 2009; Voogt & Roblin, 2012). Since language acquisition entails social contact, communication, and meaning-making by nature, these practices are especially pertinent to the training of English language teachers.

Furthermore, current research indicates that practice-oriented courses, teaching practicum experiences, and chances for reflective engagement have an impact on pre-service teachers' perceptions of learning and innovative skills (Çınar, 2021; Çakanel, 2024). Stronger self-perceptions of these abilities tend to emerge as teacher candidates advance through their programs, suggesting a cumulative influence of experiential learning and pedagogical training. This trend emphasises how teacher education programs must consistently and logically include 21st-century learning frameworks.

Digital Literacy

With the rapid growth of digital technologies and their incorporation into teaching and learning processes, the idea of digital literacy has emerged as a key element of educational research. While technical abilities were the main focus of early conceptualisations of digital literacy, more recent definitions highlight a more comprehensive and intricate collection of competencies that encompass social, ethical, critical, and cognitive aspects (Voogt & Roblin, 2012; van Laar et al., 2020). In this sense, digital literacy now includes the ability to access, assess, produce, and successfully transmit knowledge in digital contexts rather than just being able to use digital technologies.

According to Yazıcı (2023) and Akın, Akın, and Bilgin (2024), digital literacy is the capacity to use digital technologies critically and intentionally for information processing, communication, issue solving, and knowledge creation. According to Bayrakçı and Narmanlıoğlu (2021), digital literacy is a comprehensive concept with several facets, such as social involvement, advanced production, general knowledge and functional abilities, ethics and accountability, and privacy and security. The intricacy of digital literacy and its applicability in both personal and professional settings are highlighted by this multifaceted viewpoint.

Digital literacy is generally accepted in teacher education as a need for 21st-century teaching effectiveness. According to Zhao (2009) and van Laar et al. (2020), teachers are expected to construct technology-enhanced learning environments, incorporate digital tools into instructional methods, and assist students in developing critical and ethical approaches to digital knowledge. Digital literacy levels are strongly associated with instructional creativity, openness to pedagogical change, and technology integration self-efficacy, according to research done with pre-service teachers (Çelikkaya & Köşker, 2023; Sayın, 2023). These results imply that teachers' opinions of digital literacy have a significant influence on the choices they make about their lessons and methods in the classroom.

Pre-service teachers frequently exhibit inconsistent digital literacy profiles, nevertheless, according to the literature. They tend to report poorer competence in advanced technical skills, troubleshooting, and system-level operations, even while many have relatively high confidence in areas like digital content consumption, communication, and basic production (Bayrakçı & Narmanlıoğlu, 2021; Tuğba Doğan, 2022). This disparity illustrates the difference between technical-operational and conceptual-pedagogical digital skills, which has been often noted in various educational settings. These results highlight how crucial it is to create teacher preparation programs that cover both practical technical skills and pedagogical applications of technology.

21ST Century Skills and Language Education

Scholarly interest in the connection between language instruction and 21st-century skills has grown, especially in the discipline of English Language Teaching (ELT). Many essential 21st-century skills, such as intercultural awareness, communication, teamwork, and critical thinking, are intrinsically linked to language education (Zhao, 2009; Voogt & Roblin, 2012). English language instructors are required to prepare students for both linguistic accuracy and efficient communication in a variety of digital, multicultural, and diverse contexts because English serves as a worldwide lingua franca.

21st-century skills are frequently included into ELT settings using project-based, task-based, and communicative teaching methods. By encouraging students to solve problems, communicate with others, use language creatively, and think critically, these pedagogies concurrently develop linguistic and transversal competencies (Memiş & Erdem, 2013; Zhao, 2009). As a result, the pedagogical decisions and instructional orientations of English language instructors are strongly associated with their assessments of their proficiency in 21st-century abilities.

Higher perceptions of 21st-century abilities are associated with a greater likelihood of adopting learner-centred approaches and technology-enhanced practices, according to empirical research on pre-service English language instructors (Anagün, 2018; Ünver, 2021). According to Erdoğan and Eker (2020), pre-service teachers' 21st-century talents were substantially linked to their propensity for lifelong learning, indicating that these abilities support ongoing professional development and adaptation. According to Erten (2020), pre-service teachers who had higher self-perceptions of 21st-century skills were also more prepared to provide creative and engaging learning environments.

At the nexus of language instruction and 21st-century abilities, digital literacy is especially important. Beyond the classroom, digital tools give language learners access to real-time communication opportunities, multimodal resources, and authentic input (Akin et al., 2024; Yazıcı, 2023). Digital literacy facilitates online and blended learning environments and allows language teachers to choose, modify, and create teaching resources effectively. Therefore, digital literacy can be seen as a mediator that improves the pedagogical implementation of 21st-century skills as well as a component of those skills.

The strong correlation between pre-service teachers' perceptions of 21st-century skills and their digital literacy levels has been highlighted by a number of Turkish research (Çakanel, 2024; Sayın, 2023). According to these research, pre-service teachers who believe they are technologically literate also frequently describe being more creative, adept at solving problems, and cooperative. This connection bolsters the claim that digital literacy serves as a catalyst for the creation and use of more comprehensive 21st-century skills.

There is still a dearth of study specifically on pre-service English language teachers, despite the expanding corpus of literature. Numerous studies that have already been conducted either look at digital literacy or 21st-century skills separately or concentrate on teachers from other subject areas, such as science or social studies (Erten, 2020; Yaşar, 2021). Furthermore, there aren't many studies using regression-based and correlational designs to look at the predictive link between these characteristics, especially in the context of ELT in Turkey. The necessity for empirical research that methodically examines how pre-service English language instructors view and connect to these competencies is highlighted by this gap.

In conclusion, research shows that digital literacy and 21st-century abilities are closely related and extremely pertinent to language instruction. Since language classrooms naturally encourage communication, teamwork, and critical engagement with digital content, English language instructors are in a strategic position to help students develop these competencies. Therefore, it is crucial to

comprehend how pre-service teachers view these abilities in order to impact professional development programs, curriculum design, and teacher education regulations.

Methodology

Research Design

This study was a quantitative correlational research that examined pre-service English language teachers' perceptions of 21st-century skills competence and digital literacy. A survey research design was employed, and the relationships (correlations) among the variables as well as multiple regression analyses were conducted. Survey studies refer to research carried out with large-scale samples and aim to identify participants' opinions, skill levels, interests, abilities, and attitudes (Büyüköztürk, Çakmak, Akgün, Karadeniz, & Demirel, 2018). Such studies collect data to determine the fundamental characteristics of a group and are generally structured through the use of standardized measurement scales. The data are typically collected not from the entire population but from a specific sample.

One type of survey research, the cross-sectional survey model, was used in this study. In cross-sectional survey designs, the characteristics under investigation are measured at a single point in time (Büyüköztürk et al., 2018). This model enabled the researchers to examine the variables simultaneously and to analyze the relationships between pre-service teachers' perceptions of 21st-century skills competence and digital literacy within the same dataset.

Participants and Sampling

The study group of this research, which examined pre-service English language teachers' perceptions of 21st-century skills competence and digital literacy, consisted of third- and fourth-year pre-service teachers enrolled in English Language Teaching programs. A survey research design employing purposive sampling was used, and the selection criterion was limited to pre-service English teachers studying in their third and fourth years.

Purposive sampling aims to select participants who possess specific characteristics in order to obtain the most relevant and informative responses to the research questions. This sampling method is particularly useful for identifying participants who are most closely aligned with the focus of the study. Since the primary focus of the research was on pre-service English language teachers, it was considered essential that the participants belonged to a specific level of teacher education (Yalçın & Yıldız, 2020).

The criterion of selecting third- and fourth-year students was based on the assumption that these pre-service teachers had reached a more advanced stage in their professional development. At this stage of their education, they had not only completed core coursework related to English language teaching but had also gained classroom-related experience, which enabled them to provide more informed and reflective responses aligned with the objectives of the study. Within this framework, the study reached a total of 212 pre-service English language teachers.

Table 1. Demographic information of participants

Variable	Category	n	%
Gender	Female	149	70.28
	Male	63	29.72
Age	18–20	10	4.72
	21–23	36	16.98
	24–26	98	45.75
	27–29	61	27.83
	30–31	5	1.89
	32 and higher	2	2.83

Variable	Category	n	%
Grade	3. grade	159	75.00
	4. grade	53	25.00
Total		212	100.00

Data Collection Tools

In this study, the Digital Literacy Scale and the 21st-Century Skills Competence Perception Scale were used as data collection instruments. The 21st-Century Skills Competence Perception Scale was originally developed by Anagün, Atalay, Kılıç, and Yaşar in 2016 and was used to evaluate pre-service teachers' perceptions of their 21st-century skills competence.

To determine the reliability of the scale, Cronbach's alpha internal consistency coefficient, Spearman-Brown, and Guttman Split-Half reliability values were examined. The reliability analyses indicated that the overall Cronbach's alpha coefficient was .889, while the Spearman-Brown and Guttman Split-Half coefficients were both .731. According to Şencan (2005), a reliability coefficient of .70 or higher is considered sufficient for scientific research, whereas studies focusing on interest and aptitude require reliability coefficients of at least .85. Considering that the item-total correlation values of the scale ranged between .152 and .499, the scale was found to demonstrate a consistent structure at the item level as well.

The scale consisted of five-point Likert-type items, ranging from Never (1), Rarely (2), Sometimes (3), Often (4), to Always (5). The same scale was also used by Erdoğan and Eker (2020) in their study titled "Investigation of the Relationship between Turkish Pre-Service Teachers' 21st-Century Skills and Lifelong Learning Tendencies."

The second data collection instrument used in the study was the Digital Literacy Scale (DLS). This scale was developed and validated by Bayrakçı and Narmanlıoğlu (2021). The Digital Literacy Scale consisted of 29 items and included six dimensions: Ethics and Responsibility, General Knowledge and Functional Skills, Daily Use, Advanced Production, Privacy and Security, and Social Dimension. A confirmatory factor analysis (CFA) was applied during the main validation process, and the results indicated that all fit indices related to the structural validity of the scale were at acceptable levels. Accordingly, the reliability and validity of the Digital Literacy Scale were tested and confirmed (Narmanlıoğlu & Bayrakçı, 2021).

Since both scales had established validity and reliability and had been used in previous empirical studies, and because they were closely aligned with the purpose, topic, and research questions of the present study, they were employed as data collection instruments. Prior to data collection, the necessary permissions were obtained from the scholars who developed the scales.

Data Analysis

After the reverse-coded items were recoded, the collected quantitative data were entered into IBM-supported SPSS software and analyzed statistically. Statistical software packages such as SPSS enable researchers to conduct a wide range of analyses, including frequency distributions, means, standard deviations, correlations, and factor analyses (Garip, 2022). In the first stage of the analysis, the normality of the data distribution was tested. Based on the results of the normality tests, either parametric or non-parametric statistical analyses were performed.

When the required sample size was achieved and the assumptions for parametric testing were met, descriptive statistical analyses (mean, distribution, standard deviation, percentage, and frequency) were conducted. In addition, correlation analyses and hierarchical multiple regression analyses were performed to examine the relationships among the variables and to determine their predictive power.

Quantitative data analysis enabled the numerical examination of the collected data and the interpretation of the findings through appropriate statistical methods.

Ethics Committee Permission

This study was conducted in accordance with the ethical approval obtained from the Ethics Committee of the Firatt University Social Sciences Ethics Committee board, dated 02.05.2025 with document number 2025/09.

Findings

Although the target sample size was initially set at 500 pre-service teachers, the final dataset consisted of 212 participants whose responses were complete and met the statistical assumptions required for analysis. A total of 57 cases were excluded following a systematic data screening procedure conducted in SPSS. Specifically, outliers were identified using multiple criteria, including standardized residual values exceeding ± 3.00 , Mahalanobis distance values evaluated against the critical chi-square threshold ($p < .001$), and visual inspection of boxplots. These criteria were applied consistently across all analyses to ensure the robustness and comparability of the results.

Following the completion of the data cleaning process, the most appropriate SPSS statistical analysis techniques were determined and applied for each research question. Accordingly, both descriptive statistics and advanced inferential analyses aimed at examining relationships among variables—such as correlation analyses and T-tests—were employed. The findings were organized and interpreted in line with the logical sequence of the research questions and were reported in a comprehensive manner consistent with the overall purpose of the study.

Pre-Service ELT Teachers' Perceptions of 21st-Century Skills

According Table 2, Pre-service teachers' perceptions of 21st-century skills were generally found to be high (M ranging between 3.80 and 4.25). This finding indicates that the participants perceived themselves as highly competent in core 21st-century skills such as creativity, critical thinking, problem solving, communication, and collaboration. The relatively high mean scores suggest that pre-service teachers believed they were able to actively use these skills in both their personal and academic lives.

Table 2. *Pre-service ELT teachers' perceptions of 21st century skills competence*

Item	Mean	SD	Min	Max
Generating creative ideas	4.06	0.83	1	5
Using thinking techniques	4.02	0.81	1	5
Trying multiple solutions	3.90	0.76	1	5
Understanding whole–part relationships	3.52	0.96	1	5
Using imagination	4.06	0.83	1	5
Evaluating new ideas	4.00	0.83	1	5
Understanding different perspectives	4.01	0.84	1	5
Asking reflective questions	3.89	0.91	1	5
Working patiently toward solutions	4.03	0.82	1	5
Evaluating arguments (N = 212)	3.95	0.85	1	5

Furthermore, the increasing emphasis placed on these skills within teacher education programs appears to have enhanced pre-service teachers' awareness, recognition, and development of such competencies. The findings reveal that learning experiences in faculties of education supported students' self-confidence regarding these skills, which may positively influence their future professional practices. Therefore, the high level of perceived competence suggests that pre-service teachers are well equipped to meet the demands of contemporary educational environments.

Pre-Service ELT Teachers' Perceptions of Digital Literacy

Pre-service ELT teachers' perceptions of digital literacy were found to be generally at a moderate-to-high level (Table 3). This level indicates that the participants possessed a certain degree of confidence in working with digital technologies. The highest mean scores were observed in digital content creation and digital content evaluation skills ($M = 4.33$), suggesting that pre-service teachers perceived themselves as competent in higher-order digital skills such as accessing information, processing information, creating digital materials, and evaluating existing digital resources in terms of quality. This finding also points to their potential to act as active users and to assume productive roles in digital learning environments.

Table 3. Comparison of 21st-century skills beliefs and digital literacy beliefs

Variable	21st-century skills	Digital literacy
1. 21st-Century Skills	—	.47***
2. Digital Literacy	.47***	—

In contrast, the mean score related to technical digital skills was relatively low ($M = 2.82$), indicating that participants felt less competent in basic technological operations such as installing and configuring digital tools, troubleshooting technical problems, or managing system-level processes. When these findings are considered together, it becomes evident that pre-service teachers held stronger self-perceptions regarding conceptual and pedagogical digital competencies, while they required additional support in mastering the technical aspects of digital tools.

These results suggest that placing greater emphasis on hands-on technical digital skills training within teacher education programs could contribute to the development of a more comprehensive level of digital literacy.

Interaction Analysis between Pre-Service ELT Teachers' Demographic Characteristics and Their Perceptions of 21st-Century Skills and Digital Literacy

The analysis of the gender variable indicated that it did not have a statistically significant effect on either pre-service teachers' digital literacy levels or their perceptions of 21st-century skills. This result suggests that female and male students demonstrated similar levels of self-perception in core competencies such as the use of digital technologies, problem solving, creativity, communication, and collaboration. The literature also includes studies showing that gender-based differences in digital literacy and 21st-century skills have been diminishing over time, and this finding is consistent with the results of the present study.

Table 4. T-test results for the effects of grade on 21st-century skills and digital literacy

Variable	Year of Study	n	M	SD	t	p	η^2
21st-Century Skills	3rd Year	159	3.96	0.62	2.03	.044*	.019
	4th Year	53	4.15	0.58			
Digital Literacy	3rd Year	159	3.68	0.55	1.59	.113	.012
	4th Year	53	3.74	0.51			

To examine the effect of year of study, an independent samples t-test was conducted comparing third- and fourth-year pre-service ELT teachers. The results revealed a statistically significant difference in 21st-century skills perceptions, with fourth-year students ($M = 4.15$, $SD = 0.58$) reporting higher levels than third-year students ($M = 3.96$, $SD = 0.62$), $t(212) = 2.03$, $p = .044$, $\eta^2 = .019$. This finding suggests that progression within the teacher education program may be associated with increased self-perceptions of 21st-century skills, potentially reflecting the cumulative influence of pedagogical coursework and practical teaching experiences.

In contrast, no statistically significant difference was found in digital literacy perceptions between third- ($M = 3.68$, $SD = 0.55$) and fourth-year students ($M = 3.74$, $SD = 0.51$), $t(212) = 1.59$, $p = .113$, $\eta^2 = .012$. This result indicates that digital literacy perceptions appear relatively similar across the two groups. However, this finding should be interpreted with caution. The absence of a statistically significant difference does not provide direct evidence regarding the underlying developmental sources of digital literacy. Rather, it suggests that, within the scope of the present study, digital literacy perceptions remain relatively stable across year levels. Further research employing longitudinal or mixed-method designs is needed to better understand the factors contributing to the development of digital literacy.

Discussion and Conclusion

Discussion

The purpose of the current study was to investigate how pre-service English language instructors perceived digital literacy and 21st-century skills competency, as well as the connections between these two concepts and a few chosen demographic factors. The results offer significant insights into how aspiring English language instructors view their level of readiness for the demands of modern education and how teacher preparation programs may facilitate or hinder the growth of these skills.

Pre-service ELT teachers' positive opinions of 21st-century abilities, especially in areas like creativity, critical thinking, problem solving, communication, and teamwork, are among the study's most notable conclusions. This finding is in line with earlier studies that have been carried out both domestically and abroad and have demonstrated that pre-service teachers typically believe they are proficient in the fundamental 21st-century abilities (Anagün et al., 2016; Erdoğan & Eker, 2020; Voogt & Roblin, 2012). The comparatively high mean scores indicate that teacher education programs have started to internalize the language surrounding 21st-century abilities and include these competencies, either openly or indirectly, in their curricula.

The pedagogical orientation of English language teaching programs, which frequently emphasize communicative, learner-centered, and constructivist techniques, may also be responsible for the strong self-perceptions associated with creativity and reflective thinking. These methods inherently promote abilities including problem-solving, perspective-taking, idea generating, and teamwork (Zhao, 2009; Memiş & Erdem, 2013). Throughout their academic career, pre-service ELT teachers may become more conscious of these competencies because language acquisition naturally entails interaction, meaning negotiation and critical engagement with texts.

Digital literacy perceptions were found to be at a moderate-to-high level overall, which is another noteworthy conclusion of the study. Pre-service ELT teachers' opinions of technical digital competencies were significantly lower, despite their strong confidence in their ability to create and evaluate digital content. According to previous research, pre-service teachers frequently exhibit greater pedagogical and conceptual digital abilities than technical-operational ones (Bayrakçı & Narmanlıoğlu, 2021; van Laar et al., 2020). This pattern is consistent with those findings. To put it another way, participants thought they were competent users and creators of digital information, but they lacked confidence when it came to complex technical procedures, system configuration, and troubleshooting.

The nature of digital engagement among university students, who often use digital technologies for communication, content consumption, and basic production but receive little formal training in technical digital skills, may be reflected in this imbalance. It might also mean that pedagogical technology use is given more weight in teacher education programs than technical expertise. Although pedagogical digital competency is clearly important, teachers may not be able to handle digital learning environments on their own, adjust to new technologies, or effectively handle technological difficulties in the classroom if they lack technical confidence.

The study's main contribution is the discovery of a statistically significant positive correlation between digital literacy and judgements of 21st-century skills competency. This result is consistent with theoretical frameworks (P21, 2017; Van Laar, Van Deursen, Van Dijk, & De Haan, 2020) that view digital literacy as a crucial element or enabling dimension of 21st-century abilities. Digital literacy may act as a catalyst for broader cognitive and social competencies, as pre-service teachers who felt more technologically literate also tended to report greater levels of creativity, critical thinking, and teamwork.

This finding aligns with earlier research in the Turkish setting that showed pre-service teachers' 21st-century abilities and digital literacy to have moderate to significant connections (Çakanel, 2024; Sayın, 2023). Digital tools facilitate inquiry-based learning, collaborative problem solving, and creative creation, all of which contribute to the development of 21st-century skills from a pedagogical standpoint. Consequently, the ability of educators to create learning environments that support these competencies may be directly impacted by their level of digital literacy.

In terms of demographic factors, the results showed no statistically significant gender disparities in perceptions of digital literacy or 21st-century abilities. This finding is consistent with recent research indicating that gender-based differences in transversal and digital competence have decreased over time (Van Laar et al., 2020; Erdoğan & Eker, 2020). This convergence may be explained by the pervasiveness of digital technologies and the normalisation of technology use by both sexes. This research shows that teacher education programs can take a more inclusive and non-differentiated approach when addressing these competencies, challenging previous ideas that digital competence is gendered.

On the other hand, views of 21st-century skills were found to be significantly influenced by the year of study, with senior students expressing higher levels of competence than first-year students. This result implies a long-term cumulative impact of professional socialisation, practicum experiences, and instructional coursework. Students' self-efficacy in relation to 21st-century abilities may be strengthened as they advance through their teacher education programs and are given additional opportunities for reflective practice, group projects, and classroom application (Çınar, 2021; Ünver, 2021). The lack of a discernible variation in year-level perceptions of digital literacy, however, suggests that the development of digital competence may be less methodically organized within the curriculum and more impacted by personal experiences and informal learning.

Conclusion

The current study offers quantitative data on pre-service English language instructors' opinions of digital literacy and 21st-century skills competency, as well as the connections between these concepts. According to the results, pre-service teachers believe they are moderately to highly proficient in digital literacy and have a solid foundation of 21st-century skills. The strong positive correlation between these two notions emphasizes how intertwined transversal skills and digital competency are in modern teacher preparation.

Overall, the findings point to significant advancements in the development of 21st-century abilities and knowledge in English language teacher education programs. However, the unequal distribution of digital literacy competencies—especially the lower ratings of technical digital skills—indicates that developing digital competencies requires a more thorough and balanced approach.

Limitations

Despite its contributions, this study has a number of limitations. First, the study used self-report data, which could be prone to overestimation of competence or social desirability bias. Second, only pre-service teachers enrolled in the English Language Teaching program were included in the sample, which limits the findings' applicability to other fields. Third, analysis of developmental changes over time or causal interpretations is not possible using the cross-sectional method. Further studies using

mixed-methods or longitudinal designs may shed further light on how these skills change over the course of teacher preparation.

Pedagogical Implications

The results of this study present numerous pedagogical implications for the education of English language teachers. First, teacher education programs should keep including 21st-century skills in a clear way. These abilities should not only be talked about in theory but also put into practice through real, collaborative, and reflective learning activities. Second, more focus should be put on practical technical digital skills, such as how to fix problems, how to use digital tools, and how to employ adaptive technology. Third, professional development programs should work to make digital literacy and teaching innovation more closely related, so that future teachers may create language learning environments that are open to everyone and use technology to improve them.

In summary, it is necessary to give pre-service English language teachers strong 21st-century abilities and digital literacy in order to meet the needs of modern education. Teacher education programs can better equip future teachers to navigate and manage the changing educational landscape by addressing both the pedagogical and technical aspects of digital competence.

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Genişletilmiş Özet

Giriş

Teknolojik ilerleme, küreselleşme ve toplumdaki değişen gereksinimler, 21. yüzyılda öğretmenlerden beklenen rolleri köklü biçimde dönüştürmüştür. Günümüzde öğretmenlerin yalnızca alan bilgisine sahip olmaları yeterli görülmemekte; bunun yerine, anlamlı ve çağdaş öğrenme deneyimleri oluşturabilmek için bilişsel, sosyal ve dijital becerilerden oluşan geniş bir yeterlik yelpazesine sahip olmaları beklenmektedir. Bu bağlamda eleştirel düşünme, yaratıcılık, iş birliği, iletişim ve problem çözme gibi 21. yüzyıl becerileri hem öğretmenler hem de öğrenciler için vazgeçilmez nitelikler hâline gelmiştir. Dijital okuryazarlık ise bu becerilerle yakından ilişkilidir; yalnızca dijital teknolojileri kullanabilmeyi değil, aynı zamanda dijital ortamlarda bilgiyi eleştirel biçimde değerlendirmeyi, üretmeyi ve paylaşmayı da kapsamaktadır.

Bu beceriler İngilizce Öğretimi (ELT) alanında özel bir öneme sahiptir. Dil öğretimi doğası gereği etkileşim, anlam oluşturma, kültürlerarası farkındalık ve iletişimi içermekte olup bunlar 21. yüzyıl becerilerinin temel bileşenleriyle doğrudan örtüşmektedir. Ayrıca çevrim içi kaynaklar, çoklu ortam materyalleri, öğrenme yönetim sistemleri ve etkileşimli platformlar aracılığıyla dijital teknolojilerin dil öğretimine giderek daha fazla entegre edilmesi, dijital okuryazarlığı İngilizce öğretmenleri için temel bir yeterlik hâline getirmiştir. Bu nedenle, hizmet öncesi İngilizce öğretmenlerinin 21. yüzyıl becerileri ve dijital okuryazarlık yeterliklerine ilişkin öz algılarını anlamak, öğretmen yetiştirme programlarının etkililiğini değerlendirmek ve pedagojik iyileştirme alanlarını belirlemek açısından büyük önem taşımaktadır.

Bu değişkenlere ilişkin küresel ölçekte artan bir araştırma literatürü bulunmasına rağmen, Türkiye'deki hizmet öncesi İngilizce öğretmenlerinin dijital okuryazarlık ve 21. yüzyıl becerileri yeterliklerine ilişkin algılarını ele alan çalışmalar sınırlıdır. Bu boşluğu doldurmak amacıyla yürütülen bu çalışma, hizmet öncesi İngilizce öğretmenlerinin 21. yüzyıl becerileri yeterlik algıları ile dijital okuryazarlık algılarını incelemeyi, bu algılar arasındaki ilişkiyi ortaya koymayı ve belirli demografik değişkenlere göre farklılaşp farklılaşmadığını belirlemeyi amaçlamaktadır. Böylece çalışma, alan yazına ampirik verilerle katkı sunmayı ve dijital çağda İngilizce öğretmen eğitiminin geliştirilmesine yönelik öneriler üretmeyi hedeflemektedir.

Yöntem

Bu çalışma, hizmet öncesi İngilizce öğretmenlerinin 21. yüzyıl becerileri yeterlik algıları ile dijital okuryazarlık algıları arasındaki ilişkileri incelemek amacıyla kesitsel tarama modeline dayalı nicel korelasyonel bir araştırma deseni kullanılarak yürütülmüştür. Tarama araştırmaları, geniş örneklemeler üzerinde katılımcıların görüşlerini, tutumlarını ve öz değerlendirmelerini belirlemede ve değişkenler arasındaki ilişkileri aynı anda incelemede özellikle etkilidir.

Araştırmaya, İngilizce Öğretmenliği programlarının üçüncü ve dördüncü sınıflarında öğrenim gören toplam 212 hizmet öncesi öğretmen katılmıştır. Amaçlı örnekleme yöntemi kullanılmış ve seçim ölçütü olarak öğretmen eğitiminin ileri düzeylerinde kayıtlı olma durumu esas alınmıştır. Bu tercih, üçüncü ve dördüncü sınıf öğrencilerinin daha gelişmiş pedagojik bilgiye ve daha fazla uygulama deneyimine sahip olmaları nedeniyle mesleki yeterliklerine ilişkin daha bilinçli öz değerlendirmeler yapabilecekleri varsayımına dayanmaktadır.

Veri toplamak amacıyla iki standartlaştırılmış ve geçerliği-güvenirliği kanıtlanmış ölçek kullanılmıştır. Anagün ve arkadaşları (2016) tarafından geliştirilen 21. Yüzyıl Becerileri Yeterlik Algısı Ölçeği, katılımcıların yaratıcılık, eleştirel düşünme, problem çözme ve yansıtıcı düşünme becerilerine yönelik algılarını ölçmektedir. Bayrakçı ve Narmanlıoğlu (2021) tarafından geliştirilen Dijital Okuryazarlık Ölçeği ise etik ve sorumluluk, genel bilgi ve işlevsel beceriler, günlük kullanım, ileri

düzyer üretim, gizlilik ve güvenlik ile dijital okuryazarlığın sosyal boyutları gibi çok boyutlu alanları kapsamaktadır.

Veri toplama sürecinin ardından yanıtlar eksiklikler ve uç değerler açısından incelenmiş, veri temizliği tamamlandıktan sonra analizler IBM SPSS yazılımı kullanılarak gerçekleştirilmiştir. Katılımcı algılarını özetlemek için betimsel istatistikler; değişkenler arasındaki ilişkileri ve demografik gruplar arasındaki farkları incelemek için korelasyon analizi ve T-test kullanılmıştır. Normallik varsayımlarının sağlandığı doğrulandıktan sonra parametrik istatistiksel yöntemler uygulanmıştır.

Bulgular ve Tartışma

Elde edilen bulgular, hizmet öncesi İngilizce öğretmenlerinin 21. yüzyıl becerilerine ilişkin öz algılarının genel olarak yüksek olduğunu göstermiştir. Ortalama puanlar, özellikle yaratıcılık, eleştirel düşünme, yansıtıcı sorgulama ve problem çözme alanlarında katılımcıların kendilerini oldukça yeterli gördüklerini ortaya koymaktadır. Bu sonuçlar, katılımcıların modern dil öğretimi için kritik olan üst düzey bilişsel süreçler ve iş birliğine dayalı uygulamalar konusunda kendilerine güvendiklerini göstermektedir. Bu yüksek algı düzeyi, ELT programlarının iletişimsel, öğrenci merkezli, yaratıcı ve yansıtıcı öğrenmeye verdiği önemle açıklanabilir.

Katılımcıların dijital okuryazarlık algıları ise genel olarak orta ile yüksek düzey arasında bulunmuştur. Özellikle dijital içerik üretimi ve değerlendirme becerilerinde yüksek öz değerlendirmeler dikkat çekmiştir. Bu durum, hizmet öncesi öğretmenlerin bilgiye erişme, dijital materyaller üretme ve çevrim içi kaynakları eleştirel biçimde değerlendirme konusunda kendilerine güvendiklerini göstermektedir. Bu bulgular, önceki çalışmaların da ortaya koyduğu gibi, öğretmen adaylarının pedagojik ve kavramsal dijital yeterliklerinin görece güçlü olduğunu desteklemektedir.

Buna karşılık, teknik dijital beceriler daha düşük ortalama puanlar almıştır. Katılımcılar teknik sorunları çözme, dijital sistemleri yapılandırma veya karmaşık teknolojik süreçleri yönetme konusunda daha düşük düzeyde öz yeterlik bildirmiştir. Bu durum, alanyazında sıkça vurgulanan bir eğilimi yansıtmaktadır: öğretmen adayları dijital içerik kullanımı ve üretiminde yetkin olsalar da teknoloji yoğun öğrenme ortamlarını bağımsız biçimde yönetmeye yönelik teknik uzmanlıkları sınırlı kalabilmektedir. Bu bulgu, öğretmen yetiştirme programlarında pedagojik teknoloji entegrasyonunun yanı sıra uygulamaya dayalı teknik eğitime de daha fazla yer verilmesi gerektiğini göstermektedir.

Korelasyon analizi, dijital okuryazarlık algıları ile 21. yüzyıl becerileri yeterlik algıları arasında istatistiksel olarak anlamlı ve pozitif bir ilişki olduğunu ortaya koymuştur. Dijital açıdan kendini daha yeterli gören öğretmen adayları aynı zamanda yaratıcılık, iş birliği ve problem çözme gibi becerilerde de daha yüksek düzeyde öz yeterlik bildirmiştir. Bu bulgu, dijital okuryazarlığın daha geniş kapsamlı 21. yüzyıl becerilerinin gelişimini destekleyen bir unsur olduğunu göstermektedir.

Demografik değişkenler açısından bakıldığında, kadın ve erkek katılımcılar arasında dijital okuryazarlık ve 21. yüzyıl becerileri algıları bakımından anlamlı bir fark bulunmamıştır. Buna karşın sınıf düzeyi, 21. yüzyıl becerileri algıları üzerinde anlamlı bir etki göstermiş; son sınıf öğrencilerinin yeterlik algılarının daha yüksek olduğu belirlenmiştir. Dijital okuryazarlık algıları ise sınıf düzeyine göre anlamlı bir farklılık göstermemiştir; bu da dijital okuryazarlık gelişiminin daha çok bireysel deneyim ve informal öğrenme süreçleriyle şekillendiğini düşündürmektedir.

Genel olarak bulgular, İngilizce öğretmen eğitimi programlarının 21. yüzyıl becerileri ve pedagojik dijital yeterliklerin gelişimini desteklediğini ortaya koymaktadır. Bununla birlikte, hizmet öncesi öğretmenlerin teknik dijital becerilerini güçlendirmek için ek desteğe ihtiyaç vardır. ELT programlarına yapılandırılmış ve uygulama temelli dijital eğitimlerin entegre edilmesi, geleceğin öğretmenlerini teknoloji açısından zengin öğrenme ortamlarına daha iyi hazırlayacaktır.