New Paradigms in Teacher Education: A Theoretical Review

Öğretmen Yetiştirmede Yeni Paradigmalar: Kuramsal Bir İnceleme

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ABSTRACT

In the face of rapidly changing educational, technological, and societal structures of the 21st century, traditional teacher training models have begun to prove insufficient. Recognized as the age of information and technology, this century has witnessed significant scientific and technological advancements that have led to rapid and fundamental transformations in key areas, particularly education. The global changes have made it imperative for teachers to renew both their individual and professional competencies as well as their social values. Technological advancements have revealed the need for a new image of the teacher. The traditional functions of teachers have started to be questioned, and a teacher profile capable of nurturing creative individuals is now expected. Therefore, it is seen as necessary to redefine the role of the teacher in society and the qualifications they should possess. This article explores emerging new paradigms in teacher education, changes in teacher roles, the impact of digitalization on education, competencies for addressing multiculturalism, and the understanding of lifelong learning. Based on a review of the literature, this study emphasizes within a theoretical framework the necessity of restructuring the teacher education system.

Keywords: Teacher Training, Paradigm, Technology, Information Age.

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ÖZ

21. yüzyılın hızla değişen eğitim, teknoloji ve toplum yapıları karşısında geleneksel öğretmen yetiştirme modelleri yetersiz kalmaya başlamıştır. Bilgi ve teknoloji çağı olarak kabul edilen bu yüzyılda bilim ve teknolojide yaşanan gelişmeler eğitim başta olmak üzere temel alanların hızlı ve köklü bir şekilde değişmesine yol açmıştır. Dünyada yaşanan değişimler öğretmenlerin bireysel ve mesleki becerileri ile sosyal değerlerinin yenilenmesini bir zorunluluk haline getirmiştir. Yaşanan teknolojik gelişmeler, yeni bir öğretmen imajına ihtiyaç duyulduğunu göstermektedir. Öğretmenlerin geleneksel işlevleri sorgulanmaya başlanmış ve yaratıcı bireyler yetiştiren bir öğretmen beklenmektedir. Bu nedenle öğretmenin toplum içindeki yeri ve sahip olması gereken niteliklerin yeniden tanımlanması ihtiyaç olarak görülmektedir. Bu makale, öğretmen yetiştirmede ortaya çıkan yeni paradigmaları, öğretmen rollerindeki değişimi, dijitalleşmenin eğitime etkisini ve çok kültürlülükle baş etme yeterliliklerini, yaşam boyu öğrenme anlayışını derinlemesine tartışmaktadır. Literatür taramasına dayalı bu çalışmada, kuramsal çerçevede öğretmen yetiştirme sisteminin yeniden yapılandırılması gerektiği vurgulanmaktadır.

Anahtar kelimeler: Öğretmen yetiştirme, Paradigma, Teknoloji, Bilgi Çağı.

1. INTRODUCTION

The 21st century demands not only the transmission of academic knowledge but also the development of high-level skills such as critical thinking, creativity, collaboration, and digital literacy (Trilling & Fadel, 2009). This has led to a reconsideration of the traditional role of teachers as mere transmitters of content. Every transformation in the field of education gains meaning through the interpretation and application by teachers. For this reason, qualified teachers are considered a prerequisite for any educational reform (MoNE, 2017). While teacher education systems have long operated within a centralized, rote-based structure focused on knowledge transmission, there is now a shift toward a learner-centered, technology-supported, culturally sensitive, and lifelong learning-oriented teacher profile (Darling-Hammond, 2006). Education is a tool for shaping both individuals and society through individuals. Thus, it is essential to consider the individual and societal functions of education within both national and international contexts. Teachers who will contribute to transforming society must be capable of raising individuals who meet changing personal and societal needs (Turan, 2006).

Traditionally, the teacher played the role of knowledge transmitter and educational authority. In contrast, in the modern educational paradigm, the teacher guides students in discovering knowledge by placing the learner at the center (Gutek, 2019). Teacher education today is being shaped by an educational approach responsive to the changing social structure and demands of the 21st century. Despite the established status and social role of the teaching profession, innovations in teacher education have brought about new models and approaches.

The diversification and widespread availability of information technologies, as well as individuals' access to knowledge regardless of time and space, have transformed both the meaning attributed to information and the ways in which it is accessed (Kozikoğlu & Altunova, 2018). The rapid developments in technology and individuals' easy access to desired information have changed the roles of teachers—who were previously responsible for knowledge transfer—and the competencies expected from them (Gürültü, Aslan & Alcı, 2020). Since teachers are both implementers and developers of education, the effort to train qualified teachers has always held a significant place on the societal agenda (MoNE, 2017). Therefore, it is understood that the approaches used in teacher education from past to present must be reinterpreted in accordance with the needs of the new social structure and aligned with innovations. According to Turan (2006), the primary mission of modern education is to help children discover their potential and use it for the benefit of society. Societies that will shape the future world are those that

have teachers capable of nurturing creative individuals. Therefore, teachers must facilitate the self-discovery and learning-based development of individuals to meet societal needs. These changing functions of education have necessitated the redefinition of both teaching and the teaching profession.

The questioning of the traditional function of education has led to the assignment of new roles and qualifications to teachers and the teaching profession. Every society has begun to develop educational and teacher training policies that meet its specific needs. In developed societies, the selection, training, and professional development of teachers are being restructured in response to evolving individual and social demands. Given that teachers are the practitioners of education who prepare society for the future, their training is seen as critically important. This article aims to identify the key components of this transformation in light of current literature and to evaluate the emerging paradigms in teacher education within a theoretical framework.

2. THE LIMITATIONS OF TRADITIONAL TEACHER EDUCATION APPROACHES

The rapid developments brought about by advancements in information and communication technologies and digitalization have distinctly differentiated the current century from previous ones (Erten, 2020). For many years, teacher education has been conducted through a traditional model that perceives teachers as the ultimate authority of knowledge and centers around conventional teaching methods. These models prioritize imparting pedagogical content knowledge to pre-service teachers; however, they often lack practical components and are disconnected from real-life contexts (Grossman, Hammerness, & McDonald, 2009). In contrast, artificial intelligence (AI) has led to transformative changes in many fields, particularly influencing understanding and practices related to teaching and learning (An et al., 2023). Edmond (2017) highlights predictions that go beyond the impact of AI on human life, suggesting that robot teachers may take on educational roles and human teachers may serve as assistants to these "intelligent machines." Therefore, understanding teachers' attitudes toward AI is crucial for its effective and successful integration in schools (Holmes et al., 2019). Despite predictions that AI may replace teachers, educators remain indispensable stakeholders in AI-based educational practices (Seufert et al., 2020). The rapid advancement of educational technologies and the ongoing digital transformation in education underscore the need for a paradigm shift in teacher training policies and practices.

The competencies expected of individuals in the 21st century have evolved in line with the changing roles of teachers (Sayın & Seferlioğlu, 2016). A defining feature of 21st-century skills is their emergence in response to the evolving demands of our time. Consequently, new-generation teachers must possess the competencies necessary to nurture individuals who are critical thinkers and proficient users of information technologies (Coşkun, 2022). Teachers play a pivotal role in equipping students with the skills required by this century (Erten, 2020). However, it is critically important to examine the extent to which teachers themselves possess these 21st-century skills (Uyar & Çiçek, 2020). The generally low level of such competencies among pre-service teachers in Turkey may be attributed to the lack of competency-based approaches in teacher education programs. Although 21st-century skills have been implemented for a long time in developed countries, their recent adoption in Turkey can be seen as an indicator of the need for improvement in teacher qualifications (Berkant & Varki, 2022). It has been frequently emphasized that the short-term and superficial practical courses provided to teacher candidates in Turkish teacher education programs are inadequate in fostering professional competencies (Yüksel, 2004). In the traditional approach, teachers are typically positioned as the sole

conveyors of knowledge, while students are passive recipients. This approach is increasingly incompatible with the dynamic social and technological structure of today's world.

Today, the requirements of the digital age, the redefinition of the teacher's role, changing student needs, and new educational approaches have all imposed new professional responsibilities on teachers. Moreover, teaching as a profession demands a continuous openness to development in terms of competency (MoNE, 2017). Within the context of national and international developments, updating professional teaching competencies and preparing teachers to meet the needs of the modern era should be among the country's foremost priorities. The Teacher Strategy Document (2017) emphasizes the need to revise teacher competencies in line with current demands and to use these competencies as a reference in the implementation of teacher education programs. Within this framework, teacher education has become one of the most pressing and significant priorities in our education system. Day (2002) also underlines the importance of involving teachers in educational reforms, highlighting the significance of their professional competencies in meeting the demands of the modern world. In Turkey, teacher education has long been debated as a matter of national significance. To strengthen society, it is essential to develop long-term teacher education policies and models. Additionally, experts responsible for training teachers should also be involved in shaping educational policies and models (Turan, 2006). Considering the crucial role of teachers in educating individuals within society, it is of utmost importance that approaches to their education and professional development are structured by educational experts.

2.1. New Paradigms: Theoretical Foundations and Practical Reflections

Globalization and technological advancements have transformed the requirements of the modern era, positioning the ability to apply knowledge to real-life situations as an essential skill for individuals to adapt to social life. As early as the late 20th century, Singh (1991) predicted that developments in information technologies would shift the role of teachers in education toward a more student-centered approach. Accordingly, the teacher's role has been redefined to include preparing the learning environment in harmony with technology and facilitating learning by guiding students (Güneş, 2014; 2016). From the early 19th century to the current 21st-century technological era, various educational approaches—each with distinct characteristics—have influenced both the education system and the teacher training process. In this regard, it is crucial to understand these educational approaches and adapt them to contemporary models of teacher education.

New teacher education models are being restructured through an interdisciplinary perspective. In response to the dynamic conditions of today's world, each country is developing new policies tailored to its national needs in order to reform its teacher training approaches (Turan, 2006). Within this framework, educational paradigms are evolving, and the following approaches in teacher education serve to explain this transformation.

Traditional Educational Approach

As the oldest form of education, this approach is centered around the direct transmission of knowledge to students. Its primary goal is to deliver content to learners, with the teacher serving as a conduit of information (Alamargot, 2001). The teacher, positioned at the center of the educational process, is responsible for presenting, defining, explaining, and organizing knowledge in a manner appropriate to the students' level (Barnier, 2005, as cited in Güneş, 2016). However, recent technological

advancements—particularly those affecting learning and teaching practices—have rendered this approach increasingly ineffective.

Behaviorist Approach

This approach interprets the goal of the educational process as a change in behavior and associates learning with the realization of behavioral transformation (Güneş, 2014). Within this perspective, which views knowledge as content that manifests in observable behavior, the teacher is expected to model appropriate behaviors so that students can learn through imitation (Barnier, 2005). Focusing heavily on teacher training, this model considers the teacher as a behavioral role model and emphasizes the importance of the teacher's character over student learning. It regards teacher quality as the most critical issue within the education system.

Cognitive Approach

The cognitive approach considers the student as an individual who processes information and sees learning as a mental process that cannot be directly observed (Güneş, 2014). In this context, learning occurs when the teacher equips the student with the necessary skills and processes to facilitate active learning. The teacher's role is to enhance students' cognitive abilities and promote their active participation in the learning process. This understanding is also reflected in teacher education, where teachers are expected to specialize professionally to develop students' cognitive skills. Today, teaching is widely recognized across many countries as a profession that requires specialized knowledge and expertise.

Constructivist Approach

This student-centered approach encourages learners to discover knowledge through inquiry and to construct meaning based on their individual learning styles. It aims to foster individuals who continuously improve themselves through integrating new knowledge. The primary objective of this approach is defined as "teaching students how to learn." In this model, the teacher facilitates the learning process and supports students in engaging in active learning (Güneş, 2014; Kozanitis, 2005). Constructivism in teacher education focuses on producing teachers who teach how to learn, rather than simply transmitting information. Consequently, teachers are expected to embrace lifelong learning as "learning teachers." Teacher training programs that adopt this model emphasize skill-based approaches to ensure that teachers develop competencies across various domains. In Turkey, the constructivist approach was incorporated into the national curriculum in 2004 and officially implemented in 2006

3. Teacher Education: Models And Contemporary Transformations

Teacher education is conceptualized through two distinct models within a specific pedagogical approach: concurrent and consecutive models. In the concurrent model, theoretical and practical professional courses are delivered simultaneously. In contrast, the consecutive model entails that individuals first complete their theoretical subject-area education, and only then enroll in teacher education programs if they wish to pursue a teaching career. This model offers flexibility to education systems in the process of teacher preparation (European Commission/EACEA/Eurydice, 2018).

Similar to Turkey, the majority of European countries adopt the concurrent model in their teacher education systems. Depending on the educational level and national structure, either one or both models may be employed in the teacher training process (OECD, 2014).The training of teachers, as the primary implementers of education, has become a critical area—particularly in the wake of

technological developments that have triggered a rethinking of education systems. Evolving individual and societal needs have necessitated the redefinition of the teacher's role, responsibilities, characteristics, and professional competencies. Traditional models of teacher education are being reshaped to align with contemporary educational paradigms. The following section outlines current models and characteristics of teacher education in the 21st century, reflecting this shift in educational understanding.

3.1. The Lifelong Learning Teacher Model

The modern understanding of the teaching profession envisions the teacher as both an instructor and a lifelong learner. Professional development for teachers is no longer confined to pre-service education; it now includes continuous learning through in-service training, peer learning, and professional learning communities (Avalos, 2011). In the 21st century, education systems are increasingly shifting toward more flexible structures, with curricula that place the student at the center and emphasize learning processes (Gültekin, 2014). Teacher learning involves knowledge sharing, practice-based feedback, and critical reflection. In this context, Professional Learning Communities (PLCs) are effective structures that support collective teacher learning (Stoll et al., 2006).

Trilling and Fadel (2009) identified key findings on how 21st-century skills can be evaluated within the framework of lifelong learning. Teachers are expected to sustain their individual and professional growth in alignment with the concept of lifelong learning, lead continuous innovation in their learning environments, and foster a culture of learning among students.

Today, 21st-century skills are defined as the competencies necessary to meet the demands of the digital age—skills that enable individuals to fulfill digital requirements and synthesize and analyze information effectively (Belet Boyacı & Güner Özer, 2019). Teachers responsible for cultivating such individuals must themselves possess the necessary qualifications to integrate knowledge into life, demonstrate digital proficiency, and effectively utilize technology in educational contexts (Bozkurt & Çakır, 2016). Ensuring continuous professional learning for teachers is essential for the success of educational reforms and for the improvement of learning outcomes. Key dimensions expected to support professional development in teachers include:

- Being open to learning and embracing lifelong learning.
- Applying what is learned and sharing it with students.
- Viewing learning and self-improvement as a way of life.
- Ensuring unlimited access to professional learning and practice opportunities for teachers.
- Establishing a direct link between student learning and the teacher's professional development.
- Recognizing the human factor as fundamental to professional development (Bredeson, 2002).

Teachers' ability to meet expected qualifications and technological competencies often varies depending on the practical training they receive. Among OECD and EU countries, Turkey is one of the countries that allocates the least amount of time for pre-service teaching practice. However, teaching practice is critical for preparing teacher candidates for the profession and for familiarizing them with the education system. Therefore, as in OECD and EU countries, Turkey should allocate sufficient time and resources to teaching practice within its teacher education programs (Çelik & Bozgeyikli, 2019). Given the complexity of evolving educational approaches, teachers are expected to design alternative teaching

strategies, develop instructional activities, and create effective learning environments. However, the reluctance of teachers to move away from traditional teaching approaches poses an increasingly significant challenge for the future of societies.

3.2. Critical Pedagogy Perspective

Freire (1970) criticized the notion of viewing students as empty vessels to be filled with information. Instead, he advocated for a dynamic and transformative relationship in which both teacher and student learn, question, and grow together. Within this framework, integrating critical pedagogy into teacher education programs fosters teachers' awareness of social inequalities, cultural differences, and issues of justice (Giroux, 2011). In recent years, technological advancements have diminished national boundaries in education, leading to increasingly internationalized educational processes and the emergence of multicultural learning environments.

One of the primary goals of education is to ensure equal rights for children from diverse backgrounds by eliminating disparities rooted in their social and familial contexts. Teachers must be aware of students' individual differences and implement inclusive educational practices that address inequalities within the classroom. In this regard, pedagogical training offered in teacher education programs plays a critical role. Recent studies indicate that digital transformation has intensified disparities among students, particularly in terms of access to technology and the ability to use information and communication technologies (Işık & Bahat, 2021). In response, the new paradigm of digitalized education calls for measures to reduce differences in access to education, technology use, and remote learning opportunities.

Nieto (2000) emphasized the critical role of increasing cultural diversity, socio-economic inequality, and the limited access to rights among the majority of society in the 21st century. From this perspective, education is considered a powerful tool to help young people navigate and overcome these challenges. Facilitating the success and social integration of students from low socio-economic backgrounds is a key priority of contemporary education systems (Fullinwider, 2001). Therefore, all nations must ensure active participation of teachers in educational innovations to foster equitable and inclusive learning environments.

3.3. Technological Pedagogical Transformation (TPACK Model)

In the digital age, teachers are expected to integrate technology with pedagogical knowledge to design effective learning environments. The TPACK model, developed by Mishra and Koehler (2006), proposes the integration of content knowledge, pedagogical knowledge, and technological knowledge by teachers. Therefore, teacher education programs must include practical components that facilitate this integration. According to Gülpınar (2005), the desired transformation in digitalized education can only occur if teachers, who are at the core of the education system, accept and embrace ongoing changes.

Contemporary educational paradigms, along with the dissolution of traditional boundaries and the demand for equal access to educational opportunities for all, have led to the emergence of a multidimensional understanding of citizenship. Teachers in the digital age must be trained with an awareness of multiculturalism and must possess the competencies to engage with diverse student populations. Teacher education is critically important for shaping the future, development, and transformation of societies (Tutkun & Aksoyalp, 2010). Teachers must be aware of the rapid pace of technological change and be capable of accurately interpreting how the paradigms of the 21st century

influence educational practices (Çalık & Sezgin, 2005). This shift reinforces the necessity of training highly qualified teachers who can adapt to contemporary societal demands (Kazu & Yenen, 2014).

In most OECD countries, the teacher candidacy process is supported through practice-based training and professional development programs. Between 1995 and 2015, Turkey implemented a multi-stage teacher training process involving foundational, preparatory, and practical training modules, followed by seminars and examinations. Since 2015, the Ministry of National Education (MoNE) has introduced reforms to the teacher candidacy process. According to the Regulation on Appointment and Relocation of Teachers (2015), the candidacy process includes:

⁻ A one-year probationary teaching period with three performance evaluations

⁻ A written and/or oral examination.

Candidates who complete these requirements become tenured teachers at the end of the one year (MoNE, 2015).

To help modern societies cope with the challenges of adapting to technological change, it is essential to reform education policies through the lens of teacher competencies (Tutkun & Aksoyalp, 2010). Teachers' ability to effectively use emerging information technologies is increasingly seen as a fundamental requirement for preparing future generations. Consequently, the continuous updating of teacher education curricula and training programs in line with technological advancements is not merely an option-it is a necessity brought about by the era of technological transformation.

3.4. Multicultural Education and Cultural Competence

Globalization, migration flows, and increasing cultural diversity have made it imperative for teachers to possess cultural sensitivity in classroom settings. Banks (2004) emphasized that teachers should be capable of empathizing with students from different cultural backgrounds, be free from cultural biases, and approach them with fairness. Cultural competence is a multifaceted quality that encompasses not only knowledge but also attitudes and behaviors (Gay, 2002). In the 21st century, the skills required of students are also necessary for the professional development of teachers (Orhan-Göksün, 2016).

Teachers must adapt learning environments to evolving circumstances and restructure instructional goals accordingly. They should enhance their knowledge and skills to address the cultural diversity present in educational programs (Collwill & Gallagher, 2007; Pettersson, Postholm, Flem & Gudmundsdottir, 2004). Therefore, 21st-century education programs must be interdisciplinary and holistic in nature (Shaw, 2008). Skills such as digital competence, the use of technological tools, and cultural awareness are now considered essential life skills (Anagün et al., 2016; Belet Boyacı & Güner Özer, 2019). Teachers must be trained in information and communication technology (ICT) literacy, learning-to-learn strategies, and cultural competence, all of which are essential in the 21st century (Scardamalia, Bransford, Kozma & Quellmalz, 2014). In the 20th century, teacher education at the international level was recognized as necessary, including content addressing cultural differences (Lappan & Le, 2002).

Today, competencies such as improved cultural adaptability, cultural sensitivity, and the ability to navigate social and professional life are regarded not only as life skills but also as career competencies necessary for success. In line with international competency frameworks, digital literacy, adaptability, socialization, intercultural skills, accountability, and transparency are all classified as vital life skills (Aydın, 2019; Belet Boyacı & Güner Özer, 2019; Çelebi & Altuncu, 2019). Intercultural education in

teacher training has become a priority in educational reform across the world. The significance of teacher preparation in building sustainable multicultural societies is emphasized by international education agencies such as UNESCO (Tutkun & Aksoyalp, 2010). Multiculturalism and pluralism are now considered essential qualities in 21st-century teacher education (Spiecker & Steutel, 2001). Flexibility toward different lifestyles, support for equal rights, and resistance to discrimination are among the core traits every 21st-century teacher must possess. Teacher education in this century must aim to instill multicultural understanding and competencies and should be delivered at an international level.

3.5. Inclusive and Student-Centered Approaches

New educational paradigms position the teacher not as a transmitter of information but as a facilitator of learning. Within this framework, approaches such as constructivist teaching, active learning, project-based learning, and collaborative learning have gained prominence (Bransford, Brown & Cocking, 2000). Today, unlike in the past, education systems—and teachers—are expected not to simply transfer knowledge, but to cultivate individuals who can produce and apply new knowledge (Eğmir & Çengelli, 2020). Since adapting to technology and accessing rapidly spreading information to solve daily-life problems has become essential for all individuals, these competencies are now indispensable (Anagün, Atalay, Kılıç & Yaşar, 2016).

Under current conditions, it is necessary to develop 21st-century skills for both individual and societal advancement. Educational programs should increasingly focus on activities that promote and develop these skills. Student-centered teaching methods and techniques have proven effective in instilling these competencies and in measuring personal transformation (Berkant, 2018). Education must be restructured to meet these new needs, and teachers should be equipped with the knowledge and skills to implement such changes effectively. To succeed in education and in the workplace, 21st-century individuals must use technology effectively, be open to new ideas and experiences, and possess leadership skills (Eryılmaz & Uluyol, 2015). Teachers responsible for cultivating such individuals must be capable of assessing educational processes and classroom activities, and they must strive for continuous improvement and innovation (Alp & Taşkın, 2008). Pre-service teachers should not only learn these approaches theoretically but also experience and internalize them in practice-based settings.

The European Union (2006) has proposed a set of "Key Competences for Lifelong Learning" to be addressed in teacher education programs. Competencies such as learning to learn, social and civic competence, cultural awareness, and expression are also key goals of the constructivist approach (Güneş, 2016). Countries such as Germany, the UK, France, and Portugal have revised their pre-service teacher education systems to instill these competencies through constructivist reforms (European Union, 2007). In Turkey, the Council of Higher Education (YÖK) has also acknowledged the need to revise teacher training programs in line with the constructivist model to promote active learning (YÖK, 2007). Throughout the Republican era, teacher education programs in Turkey differed from those in Europe in terms of duration, curriculum, and qualification requirements until the widespread adoption of constructivist education in 2006.

In European countries, university-level education has been a requirement for entering the teaching profession since the early 19th century. In Turkey, the requirement for university-level teacher training was officially introduced in 1973 by the Basic Law of National Education (Law No. 1739), which defined teaching as "a specialized profession responsible for the educational and instructional duties of the state." With the enactment of the Teaching Profession Law in 2024, this definition has been reinforced,

and teaching is now officially recognized as a professional specialization. In light of these developments, teacher education is viewed as a critical pillar for shaping the future of the country in alignment with the requirements of the 21st century.

3.6. Comparative and Integrative Evaluation of Teacher Education Theories

The lifelong learning teacher model, critical pedagogy approach, TPACK model, multicultural education approach, and inclusive student-centered teaching approaches focus on different dimensions of teacher education; however, they can be considered complementary theoretical frameworks in constructing a holistic teacher competency framework. A common characteristic of these theories is that they position teachers not merely as transmitters of knowledge, but as professionals who facilitate learning, assume social responsibility, and adapt to change.

The lifelong learning teacher model and the TPACK model similarly emphasize the necessity for teachers to engage in continuous professional development. While the lifelong learning approach addresses professional development as a process-oriented and continuous phenomenon, the TPACK model structures this development through the integration of technology, pedagogy, and content knowledge. In this sense, the lifelong learning approach represents the philosophical and behavioral dimension of professional development, whereas the TPACK model supports its practical and competency-based dimension.

The critical pedagogy approach and the multicultural education approach primarily focus on the social dimension of education. Critical pedagogy examines education within the context of power relations, inequalities, and social justice, whereas multicultural education emphasizes cultural diversity, cultural responsiveness, and equal educational opportunities. From this perspective, critical pedagogy enhances teachers' social awareness, while multicultural education supports the translation of this awareness into classroom practices.

Inclusive and student-centered approaches, on the other hand, strengthen the practical implementation dimension of all other theoretical approaches. While lifelong learning emphasizes continuous professional growth, the TPACK model focuses on technology integration, critical pedagogy highlights social consciousness, and multicultural education promotes cultural awareness, inclusive and student-centered approaches demonstrate how these competencies can be implemented within learning environments.

One of the major differences among these theories lies in their primary focus areas. The TPACK model mainly concentrates on structuring teachers' pedagogical and technological competencies, whereas critical pedagogy emphasizes teachers' social roles and transformative potential. The lifelong learning approach centers on individual professional development, while multicultural education strengthens the social and cultural dimensions of teaching. Inclusive and student-centered approaches primarily focus on instructional design and learning experiences.

When these theoretical approaches are evaluated collectively, it becomes evident that the new paradigm in teacher education requires a multidimensional structure. Modern teachers are expected not only to possess content knowledge but also to be capable of integrating technology into teaching, demonstrating cultural sensitivity, developing awareness of social inequalities, engaging in lifelong learning, and designing student-centered learning environments. In this respect, these theoretical approaches provide a comprehensive and integrated framework for teacher education.

4. METHOD

This section presents information regarding research design and how the relevant literature was analyzed in line with the research objective.

4.1. Research Design

This study was designed within the framework of a qualitative research approach to examine new paradigms in teacher education. A literature analysis method based on document analysis was employed. Document analysis involves the systematic examination of written materials that contain information about the phenomenon being investigated (Yıldırım & Şimşek, 2016). In this study, academic studies related to teacher education, teacher training, 21st-century skills, digital transformation, and new approaches in education were analyzed.

The study is descriptive in nature and is based on the comparative analysis of theoretical approaches existing in the literature. In qualitative research, literature review is not only considered a process of information compilation but also a meaning-making process through thematic analysis (Bowen, 2009).

4.2. Data Collection

The research data were obtained through a systematic literature review. National and international databases were used for the literature search:

- Web of Science
- Scopus
- ERIC
- Google Scholar
- TR Index
- National Thesis Center of the Council of Higher Education (YÖK)

The following keywords were used in the literature search:
- Teacher education
- Teacher training models
- Lifelong learning teacher
- Critical pedagogy
- TPACK
- Multicultural education
- Inclusive education
- 21st century skills
- Teacher professional development

Studies published between 2000 and 2024 were examined. This time frame was selected because digital transformation in teacher education and 21st-century skills have been widely discussed in the literature during this period. The studies included in the research consisted of:
- Peer-reviewed academic journal articles
- Reports published by international organizations (OECD, UNESCO, etc.)
- Foundational theoretical studies in teacher education
- Studies published after 2000
- Studies directly related to teacher education and teacher training

Additionally, non-peer-reviewed publications, studies not directly related to the topic, duplicate studies, and studies without accessible full texts were excluded from the analysis. As a result of the screening process, a total of **912** studies were reviewed, and **36** studies that met the inclusion criteria were included in the analysis.

4.3. Data Analysis

The documents obtained in the study were analyzed using thematic analysis, one of the qualitative data analysis methods. Thematic analysis enables the identification and categorization of meaning patterns within the data (Braun & Clarke, 2006). The document analysis process consisted of the following stages:
1. Reading the documents and conducting preliminary analysis
2. Coding meaningful expressions
3. Grouping codes into categories
4. Transforming categories into themes
5. Interpreting the themes

Theme and Coding Structure: As a result of the analysis, the following main themes were identified:

- Theme 1: Professional Development and Lifelong Learning

- Theme2: Technological Pedagogical Transformation (TPACK and Digital Competencies)

- Theme 3: Social and Cultural Dimensions (Critical Pedagogy and Multicultural Education)

- Theme 4: Instructional Approaches (Inclusive and Student-Centered Education)

4.4. Validity and Reliability

To increase the reliability of the study, data were collected from multiple databases, different types of academic sources (articles, books, and reports) were used, and the coding process was reviewed repeatedly. These practices are among the methods that enhance reliability in qualitative research (Lincoln & Guba, 1985).

5. FINDINGS BASED ON THE LITERATURE REVIEW

With the digitalization of education, the role of teachers in education and society has begun to be reinterpreted. In the 21st century, it is emphasized that teacher education processes should integrate educational innovations and adopt an approach in which the teacher is positioned at the center of the learning process (Verloop et al., 2001). In this context, how teachers adapt to transformations in education and their attitudes toward new educational approaches are considered determining factors in the successful implementation of innovations in education systems.

Teachers' digital competence levels are critically important in the integration of information and communication technologies into educational environments. OECD TALIS 2018 data reveal that a significant proportion of teachers perceive themselves as inadequate in digital competence and require continuous professional development in this area (OECD, 2019). In addition, technology has the potential to enhance teachers' collaboration, pedagogical content sharing, and instructional effectiveness.

However, the literature presents diverse and sometimes contradictory findings regarding the effects of digitalization. While some studies suggest that digital technologies transform the teaching profession

and require the redefinition of pedagogical competencies, others indicate that technological transformation does not always translate into classroom practices as expected. It is reported that although teachers develop positive attitudes toward technology, their pedagogical integration skills may remain limited (García et al., 2023). Similarly, teachers are often reported to use digital tools not as part of pedagogical design but rather as implementers of ready-made applications. This situation suggests that technology may reinforce existing teaching approaches rather than transforming instructional processes. Therefore, teacher education programs should focus not only on technical skills but also on pedagogical transformation processes.

Studies conducted in Türkiye indicate that technological pedagogical content knowledge (TPACK) and technology self-efficacy are determining factors in teacher candidates' technology integration. However, while individual factors such as technology certification increase technology use self-efficacy, structural variables such as program type appear to have limited impact (Şimşek & Yazar, 2018).

Effective teacher education systems emphasize long-term practicum experiences, mentoring support, and the integration of theory and practice as fundamental components (Darling-Hammond, 2017). This approach highlights the necessity of supporting teacher education programs with practice-based professional development, especially in the technology era. Nevertheless, some studies indicate that excessive technology use may lead to negative outcomes in learning processes. In particular, overuse of AI-supported learning tools may lead to superficial learning and an illusion of competence among students (OECD, 2026). This finding highlights the importance of maintaining pedagogical balance in technology use.

In teacher education processes, not only technical competencies but also teacher self-efficacy, institutional support, and professional identity development are considered significant. Teachers' readiness to teach artificial intelligence and emerging technologies is often associated with psychological factors and lack of experience (Rajapakse et al., 2024). In the Turkish context, restructuring teacher education systems in comparison with developed countries has long been discussed (Atanur Baskan et al., 2006). Strengthening university teacher education infrastructure, encouraging postgraduate education, and establishing teacher education standards are considered important in this process (Keskin & Yazar, 2015; Köğce et al., 2014; Çelebi & Altuncu, 2019).

Table 1. Findings on New Paradigms in Teacher Education

Theme	Finding	Interpretation	Implications for Teacher Education
Digitalization and the Role of the Teacher	Digitalization is redefining the teacher's role; adaptation to innovations is required in teacher education.	The teacher is no longer a transmitter of knowledge but a learning designer.	Programs should be structured based on digital pedagogy.
Digital Competence and Professional Development	According to TALIS data, a significant proportion of teachers consider themselves inadequate in digital competence.	Continuous professional development is essential for digital transformation.	In-service training and lifelong learning systems should be strengthened.

Technology Use and Pedagogical Alignment	Technology can foster positive attitudes; however, pedagogical alignment may remain limited.	Technology alone does not ensure transformation.	Technology and pedagogy should be integrated (TPACK).
TPACK and Technology Self-Efficacy	Technology self-efficacy affects technology adoption; individual factors may be more influential than program type.	Psychological and individual factors are important.	Pre-service teachers' technology self-efficacy should be developed.
Practice-Based Teacher Education	Effective systems include long-term practice, mentoring, and theory–practice integration.	Lack of practice reduces teacher quality.	Clinical practice, mentoring, and school–university collaboration should be strengthened.
Risks of Technology	Excessive use of technology/AI may lead to superficial learning.	Digital pedagogical balance is necessary.	Critical technology literacy should be developed.
Teacher Identity and Institutional Support	Institutional support, professional identity, and self-efficacy influence technology adaptation.	Systemic factors are as important as individual factors.	School culture and institutional support mechanisms should be strengthened.
Teacher Education in the Context of Türkiye	In Türkiye, teacher education needs to be strengthened in terms of infrastructure, graduate education, and standardization.	There is a need for structural reform.	Teacher education policies should be restructured.
Dimensions of the New Paradigm	New paradigms: technology integration + pedagogical transformation + professional development + professional identity.	Teacher education should be multidimensional.	A holistic teacher education model should be developed.

The table generally shows that digitalization in teacher education is not limited to technology use alone; it needs to be addressed together with pedagogical transformation, professional development, and teacher identity. It also emphasizes that teacher education should be structured as a multidimensional system that is practice-based, supports continuous professional development, and is strengthened through institutional structures. In the context of Türkiye, the need for structural reform, standardization, and policy-level restructuring stands out.

When these findings are evaluated together, it becomes clear that new paradigms in teacher education should focus not only on technology integration but also on pedagogical transformation, continuity of professional development, critical technology literacy, and strengthening teacher professional identity. Furthermore, new paradigms demonstrate that their integration into teacher education systems is inevitable. For countries aiming to remain competitive in the future and keep pace with global developments, it has become essential to update teacher education programs by first improving the competencies of current teachers.

6. DISCUSSION

The literature findings indicate that digitalization has become an inevitable area of transformation in teacher education. However, it is also evident that the use of digital technologies in education does not automatically improve the quality of instruction. Teachers tend to use technology primarily when it contributes directly to the learning process and do not perceive technology as an end in itself. This suggests that technology integration should be evaluated within a pedagogical framework (OECD, 2019; Darling-Hammond, 2017).

Research findings indicate that teachers need not only technical knowledge but also technological pedagogical content knowledge (TPACK) for effective technology integration. The TPACK framework enables teachers to integrate technology, pedagogy, and content knowledge to deliver effective instruction (Mishra & Koehler, 2006). Training programs focusing solely on technological skills do not sufficiently translate into classroom practice; instead, technology education integrated with pedagogical and content knowledge is considered more effective (Darling-Hammond, 2017). These findings suggest that teacher education programs should be structured to enhance pedagogical design skills. Similarly, research indicates that technology-focused teacher education practices positively influence teacher candidates' TPACK levels and their self-efficacy perceptions regarding technology integration; however, this effect may not always be strong (Şimşek & Yazar, 2018; Bozkurt, 2020). This suggests that sustainable technology integration requires long-term professional development models (OECD, 2019).

Teachers' adaptation to digital transformation is influenced by institutional support, professional development opportunities, and attitudes toward change. Although teachers recognize the benefits of digital tools, factors such as lack of professional development and resistance to change may complicate the integration process (Uyar & Çiçek, 2020; Bozkurt, 2020). This finding indicates that teacher education systems should not be limited to pre-service education alone. The use of artificial intelligence and emerging digital technologies in education has the potential to support instructional processes; however, it may also pose risks in terms of critical thinking, creativity, and deep learning skills. In particular, excessive use of AI-supported learning tools may lead to superficial learning and dependency risks (OECD, 2023). On the other hand, AI technologies are also reported to provide opportunities for pedagogical modeling, personalized learning, and the development of digital literacy in teacher education (UNESCO, 2021).

Furthermore, teachers' trust in and acceptance of technology are associated with their self-efficacy perceptions. Teachers with higher levels of technology self-efficacy tend to use technology more effectively in instructional processes and develop more positive attitudes toward technology use (Bandura, 1997; Şimşek & Yazar, 2018). In the Turkish context, it is evident that teacher education systems need to be strengthened in terms of practice-based education, mentoring support, and theory–practice integration. Practice-based teacher education models are reported to play a significant role in improving teacher quality in effective teacher education systems (Darling-Hammond, 2017; Atanur Baskan et al., 2006). When these findings are evaluated collectively, it becomes clear that new paradigms in teacher education should focus not only on technology use but also on pedagogical transformation, continuity of professional development, critical technology literacy, and strengthening teacher professional identity (OECD, 2019; UNESCO, 2021).

7. CONCLUSION AND RECOMMENDATIONS

This research aimed to thoroughly examine the results obtained through the application of bibliometric analysis methods in the fields of educational management and educational technologies. The analysis covered 2,864 academic studies published in the Web of Science database between 1983 and 2024. The findings reveal a significant increase in the number of studies on educational management and educational technologies. It was concluded that research in this field has rapidly increased, particularly since 2004, and that the role of digitalization in education has become even more important, especially after the COVID-19 pandemic. The increasing interaction between educational management and technologies shows that these two fields are complementary and play a critical role in increasing the effectiveness of educational processes.

In conclusion the findings of this study indicate that new paradigms in teacher education should be addressed through a holistic approach that integrates technology integration, pedagogical transformation, continuity of professional development, and strengthening teacher professional identity. These findings demonstrate that teacher education is not merely a process of developing technical skills but requires a multidimensional structure that encompasses pedagogical, cognitive, and professional development. Although improving teachers' digital competencies is an essential component of teacher education, it is not sufficient on its own. Teacher education programs should be designed within a comprehensive framework that supports pedagogical design skills, critical thinking, problem-solving abilities, and professional self-efficacy development.

Furthermore, teacher education systems should not be limited to pre-service education alone but should be supported through in-service training and postgraduate education opportunities. Practice-based teacher education models, mentoring systems, and university–school partnerships play a significant role in improving teacher quality. Overall, this study suggests that new paradigms in teacher education should move beyond technology-focused approaches and be addressed within a holistic framework that includes pedagogical transformation, continuous professional development, and critical technology literacy. These findings are expected to contribute to the development of teacher education policies and provide a theoretical framework for future research.

To prepare pre-service teachers in line with these new paradigms:

Recommendations for Teacher Education Programs

- Teacher education programs should be restructured to develop pedagogical design skills alongside technology integration.
- Teacher education programs should place greater emphasis on practice-based training, extended school practicum experiences, and mentoring practices.
- Program curricula should be updated to be competency-based and practice-oriented.

Recommendations for Professional Development Processes

- Continuous professional development programs should be designed to improve teachers' digital competencies.
- In-service training and postgraduate education opportunities should be encouraged to support teachers' professional development.

System-Level Recommendations

- University–school collaboration should be strengthened to enhance teacher candidates' practical teaching experience.
- Technology use in teacher education systems should be addressed together with its pedagogical and critical thinking dimensions

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Etik, Beyan ve Açıklamalar
1. Etik Kurul izni ile ilgili;

☑ Bu çalışmanın yazar/yazarları, Etik Kurul İznine gerek olmadığını beyan etmektedir.
2. Bu çalışmanın yazar/yazarları, araştırma ve yayın etiği ilkelerine uyduklarını kabul etmektedir.
3. Bu çalışmanın yazar/yazarları kullanmış oldukları resim, şekil, fotoğraf ve benzeri belgelerin kullanımında tüm sorumlulukları kabul etmektedir.
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