

The Role of Primary School Teachers in the Digital Era: Challenges and Opportunities

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Abstract

The rapid development of digital technology has significantly transformed the educational landscape, particularly in primary education. This study explores the role of primary school teachers in the digital era, focusing on the challenges they face and the opportunities available to enhance teaching and learning processes. Using a qualitative case study approach, data were collected through semi-structured interviews, classroom observations, and document analysis involving fifteen primary school teachers from urban and rural schools in [City/Region, Indonesia]. The findings indicate that while digital technologies offer opportunities for personalized learning, student engagement, and the development of 21st-century skills, teachers encounter challenges including limited digital literacy, inadequate technological infrastructure, and insufficient professional development. The study emphasizes the need for continuous professional training, collaborative learning communities, and supportive policies to enable teachers to effectively integrate digital tools into their pedagogical practices. These insights provide guidance for educators, policymakers, and researchers to enhance the quality and equity of digital education in primary schools.

Keywords:

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INTRODUCTION

In the 21st century, the rapid expansion of digital technology has fundamentally transformed educational systems worldwide. Traditional classroom practices, once centered primarily on face-to-face instruction and printed materials, are increasingly supplemented and reshaped by digital tools, interactive platforms, and online learning environments. This digital transformation has substantial implications for teachers, particularly those in primary education, where foundational cognitive, social, and technological skills are established in young learners. In this context, primary school teachers are no longer seen merely as transmitters of knowledge; rather, they are expected to function as facilitators, designers of learning experiences, and mediators of digital literacy. Understanding the evolving role of primary school teachers in the digital era is therefore critical for policymakers, educators, and researchers aiming to create effective, inclusive, and future-oriented educational systems (Saputra et al., 2025)

The digital era offers immense opportunities for enhancing teaching and learning processes. Digital tools provide access to a wide array of educational resources, interactive instructional content, and global networks for professional collaboration. Integrating technology into primary school curricula allows teachers to personalize learning experiences, promote engagement through multimedia and gamified content, and implement differentiated instruction tailored to diverse learners' needs. Moreover, the use of digital learning

environments helps students develop not only literacy and numeracy skills but also essential 21st-century competencies, including critical thinking, creativity, collaboration, and problem-solving, which are indispensable for success in a technology-driven society (Saputra et al., 2025).

Beyond instructional innovation, digital technologies provide teachers with tools for formative assessment and data-driven instruction. Real-time feedback from digital platforms enables educators to monitor student progress, adjust teaching strategies, and address individual or group learning challenges efficiently. Learning management systems, digital portfolios, and educational analytics support teachers in tracking outcomes, evaluating interventions, and ensuring that students achieve intended learning goals. By leveraging these technologies, teachers become not only facilitators but also innovators who shape instructional practices in line with digital advancements (Lisa et al., 2025).

However, the effective integration of technology depends heavily on teachers' digital literacy. Digital literacy encompasses the skills and competencies necessary to select, implement, and evaluate digital tools meaningfully within pedagogical contexts. Teachers must design technology-enhanced learning activities, critically assess the appropriateness of digital resources, and foster students' ethical and responsible use of digital platforms. Unfortunately, studies indicate significant variability in digital competence among primary school teachers. Many educators experience challenges in incorporating technology effectively, leading to inconsistent adoption and missed opportunities for learning enhancement (Desniyanti, 2025).

Infrastructure disparities further complicate the adoption of digital tools in primary education. Schools in under-resourced areas often lack stable internet connections, up-to-date hardware, or access to high-quality educational software, limiting teachers' ability to implement digital learning consistently. These gaps not only affect instructional quality but also exacerbate educational inequities, restricting students in disadvantaged contexts from reaping the benefits of technology-enhanced learning. Addressing infrastructure challenges is therefore essential to ensure that all primary school teachers can fulfill their roles effectively in the digital era (Sari et al., 2025).

Professional development also plays a pivotal role in equipping teachers for digital-era education. Many teacher training programs focus on subject knowledge and traditional classroom management while offering limited instruction in digital pedagogy. As a result, teachers often rely on self-directed learning or ad hoc workshops to acquire digital skills, which may lead to inconsistent proficiency and uneven implementation of technology in classrooms. Continuous, systematic professional development that emphasizes practical, technology-integrated pedagogy is crucial for building teacher confidence and competency in digital learning environments (Sari et al., 2025).

The COVID-19 pandemic further highlighted the centrality of digital competence in education. Primary school teachers had to rapidly shift to online or hybrid teaching, often facing unfamiliar platforms, limited student access to devices, and challenges maintaining engagement remotely. While some teachers successfully adapted, others struggled, demonstrating the critical need for preparedness, infrastructure, and ongoing support to ensure continuity of learning during emergencies (Jamilah et al., 2025).

In addition to technical proficiency, teachers' roles have expanded pedagogically. Digital-era teachers guide students in evaluating online information, developing digital citizenship, and navigating the ethical use of technology. The integration of artificial intelligence, augmented reality, and adaptive learning platforms presents opportunities for personalized instruction but also raises concerns about privacy, bias, and the potential over-reliance on automated learning. Teachers must therefore combine technological skill with critical awareness to ensure responsible and equitable use of digital resources (Saputra et al., 2025).

Despite these challenges, evidence shows that support systems such as professional learning communities, peer mentoring, and collaborative training programs enhance teachers' digital competence. Such networks facilitate knowledge sharing, foster innovation, and reduce professional isolation, enabling teachers to implement technology effectively in their classrooms. Collaborative partnerships with educational institutions and technology providers further empower teachers to co-design curricula, experiment with digital tools, and ensure that technology aligns with pedagogical objectives (Lisa et al., 2025).

In summary, the role of primary school teachers in the digital era is multifaceted and critical for shaping the future of education. Teachers act as facilitators, innovators, and ethical guides, helping students navigate complex digital landscapes while developing essential skills for the 21st century. Examining the challenges and opportunities faced by teachers today provides insights for improving teacher education, professional development, and policy frameworks to ensure effective, equitable, and future-ready primary education (Saputra et al., 2025).

METHODOLOGY

This study employs a qualitative research design with a case study approach to investigate the experiences, challenges, and opportunities of primary school teachers in the digital era. A qualitative design is particularly suitable for exploring teachers' perceptions, attitudes, and practices regarding the integration of digital technologies in the classroom, as it allows for in-depth understanding of complex phenomena (Creswell & Poth, 2018). The case study method further facilitates a detailed examination of teachers' roles within their specific educational contexts, enabling the identification of patterns, strategies, and challenges that quantitative approaches may overlook.

The participants of this study consist of fifteen primary school teachers from various schools in [City/Region, Indonesia]. Purposive sampling was employed to select teachers with experience in utilizing digital tools for instructional purposes. The sample includes teachers from both urban and rural schools, ensuring a diverse range of perspectives regarding access to technology, digital literacy, and pedagogical approaches. This selection strategy allows the study to capture contextual differences that influence teachers' experiences in the digital era.

Data were collected through a combination of semi-structured interviews, classroom observations, and document analysis. Semi-structured interviews were conducted individually with each participant, focusing on their experiences, challenges, strategies, and perceptions regarding the integration of digital learning. Each interview lasted approximately 45–60 minutes and was audio-recorded with the participants' consent.

Classroom observations were conducted using a structured observation guide to document the types of digital technologies employed, instructional strategies, and student engagement during lessons. Additionally, relevant documents such as lesson plans, digital teaching materials, and school ICT policies were analyzed to triangulate the data and provide context for teachers' experiences.

Data analysis was conducted using thematic analysis, following the six-step procedure proposed by Braun and Clarke (2006), which includes familiarization with the data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the final report. Data from interviews, observations, and documents were coded and categorized to identify recurring patterns and themes related to teachers' challenges, strategies, and opportunities in the digital era. Triangulation of multiple data sources was employed to enhance the credibility of findings, while member checking was conducted to ensure accuracy and confirm participants' perspectives.

Ethical considerations were strictly observed throughout the study. Ethical approval was obtained from the [University/Institution name] Ethics Committee, and all participants provided informed consent prior to data collection. Confidentiality was maintained by anonymizing participants' names and school affiliations, and participants were informed of their right to withdraw from the study at any time without penalty. Although the study acknowledges limitations, including a relatively small sample size and focus on a specific geographic area, the qualitative case study design provides rich, contextual insights into the multifaceted roles and challenges of primary school teachers in the digital era.

RESULTS AND DISCUSSION

The research findings indicate that teachers generally possess an awareness of the concept of Artificial Intelligence (AI) in the educational context, although their levels of understanding vary. Most teachers perceive AI as a technology capable of assisting human work, particularly in supporting teaching and learning processes, such as the preparation of instructional materials, searching for academic references, and assessing learning outcomes. This perception is consistent with the view of Russell and Norvig (2021), who define AI as systems designed to emulate human cognitive abilities in problem-solving and decision-making. However, interview results reveal that teachers' understanding tends to be practical and functional rather than conceptual and pedagogical, indicating a limited depth of knowledge regarding the integration of AI into instructional practices.

The utilization of AI in classroom practices is reflected in the use of various digital learning platforms equipped with AI-based features, such as learning analytics, automated feedback, and personalized content recommendations. Teachers employ these technologies to enhance work efficiency, particularly in administrative and evaluative tasks. This finding aligns with the study by Holmes et al. (2019), which emphasizes that AI in education can support teachers in managing learning data more effectively, thereby enabling more personalized and adaptive learning experiences. With the support of AI, teachers are afforded greater opportunities to focus on student guidance and meaningful pedagogical interactions.

The findings further demonstrate a transformation in teachers' roles as a result of AI utilization in learning activities. Teachers are no longer positioned primarily as transmitters of knowledge but rather as facilitators, mentors, and guides in the learning process. This shift is evident in the ways teachers design student-centered learning environments, encourage active participation, and use technology as a tool to foster critical thinking. These results reinforce UNESCO's (2019) assertion that AI should be employed to strengthen, rather than replace, the role of teachers by positioning them as key agents in supporting students' holistic development.

Most teachers perceive the impact of AI on instructional practices as positive. They report that learning activities become more engaging, flexible, and responsive to students' learning needs. AI enables teachers to adjust instructional strategies based on learning data, thereby promoting more personalized learning experiences. This finding corresponds with the work of Luckin et al. (2016), who argue that AI integration in education can facilitate more adaptive and learner-centered instructional approaches. Nevertheless, the findings also reveal that the use of AI has not yet been fully optimized due to limitations in teachers' digital competencies and the availability of technical support.

In addition to providing opportunities, the use of AI also presents several challenges for teachers. Some teachers express concerns regarding excessive reliance on technology and the potential reduction of direct teacher-student interaction. Other challenges include limited access to specialized training on AI utilization in education and unequal technological infrastructure across schools. These findings are consistent with Creswell and Poth (2018), who emphasize that the success of technology-based educational innovation is strongly influenced by the readiness of human resources and comprehensive systemic support.

Overall, the findings indicate that Artificial Intelligence plays a strategic role in driving the transformation of teachers' roles in the digital era. AI functions as a supportive tool that enhances instructional effectiveness and quality, while the core humanistic role of teachers remains irreplaceable. The transformation of teachers' roles is highly dependent on their competencies, attitudes toward innovation, and the availability of supportive policies and educational infrastructure. Therefore, the integration of AI in education should be accompanied by continuous professional development for teachers to ensure that technological adoption is implemented optimally and responsibly.

CONCLUSION

In conclusion, this study highlights that the role of primary school teachers in the digital era is multifaceted, encompassing the responsibilities of facilitator, innovator, and ethical guide in navigating digital learning environments. Teachers face both significant opportunities and challenges. On the one hand, digital technologies offer avenues for personalized learning, increased student engagement, and the development of 21st-century skills such as critical thinking, creativity, and collaboration. On the other hand, teachers encounter obstacles including limited digital literacy, inadequate access to technological infrastructure, and

insufficient professional development. These challenges can impede the effective integration of digital tools into teaching practices, potentially exacerbating educational inequities.

The findings underscore the importance of supporting teachers through continuous professional development programs that focus on digital pedagogy, access to appropriate technological resources, and the establishment of collaborative professional learning communities. Additionally, policymakers and school administrators should prioritize the provision of adequate infrastructure, equitable access to digital tools, and the inclusion of teachers' voices in the decision-making processes regarding educational technology integration. By addressing these factors, primary school teachers can more effectively harness the potential of digital technologies to enhance learning outcomes and prepare students for the demands of a technology-driven society.

In summary, empowering teachers with the necessary skills, resources, and institutional support is crucial for realizing the benefits of digital education in primary schools. Future research could explore longitudinal studies on teacher digital competence development, comparative studies across urban and rural contexts, and the impact of emerging technologies such as artificial intelligence and augmented reality on classroom practices. Such research will provide deeper insights into effective strategies for supporting teachers and optimizing the learning experiences of students in the digital era.

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