

ARTIFICIAL INTELLIGENCE AND THE TRANSFORMATION OF TEACHERS' ROLES IN THE DIGITAL ERA

M. Ihsan Ramadhani*

*¹Achmad Yani University of
Banjarmasin, South
Kalimantan, Indonesia

*email:
ihsandikdas@uvayabjm.ac.id

Abstract

The rapid development of Artificial Intelligence (AI) has significantly influenced various sectors, including education, particularly in reshaping the role of teachers in the digital era. This study aims to analyze how the integration of AI contributes to the transformation of teachers' roles in the learning process and to identify the opportunities and challenges faced by teachers in adopting AI-based technologies. This research employs a qualitative approach with a descriptive design. Data were collected through in-depth interviews, classroom observations, and documentation involving teachers who have utilized digital technologies supported by AI in their teaching practices. Data analysis was conducted using an interactive model consisting of data reduction, data display, and conclusion drawing. The findings indicate that the use of AI has shifted the role of teachers from primary knowledge transmitters to facilitators, mentors, and guides who support student-centered learning. AI assists teachers in improving efficiency, particularly in administrative and evaluative tasks, allowing them to focus more on pedagogical interactions and personalized learning support. However, the transformation of teachers' roles has not been fully optimized due to limitations in digital literacy, insufficient professional training, and unequal technological infrastructure. The study concludes that the successful integration of AI in education depends largely on teachers' competencies and systemic educational support to ensure effective, ethical, and human-centered learning practices.

Keywords:

Artificial intelligence
Teacher roles
Educational transformation
Digital era, learning



© 2025 M. Ihsan Ramadhani. Yayasan Pendidikan Literasi Borneo (Nomor AHU-0031523.AH.01.04.Tahun 2025). This is Open Access article under the CC-BY-SA License (<http://creativecommons.org/licenses/by-sa/4.0/>).

INTRODUCTION

The development of digital technology in the twenty-first century has brought profound and transformative changes across various aspects of human life, including the field of education. One of the most influential technological innovations in recent decades is Artificial Intelligence (AI). AI is defined as a branch of computer science that focuses on the development of systems capable of emulating human intelligence, including learning, reasoning, language understanding, and decision-making abilities (Russell & Norvig, 2021). In the educational context, AI is not merely perceived as an advanced technological tool but also as a strategic instrument with the potential to fundamentally reshape the design, implementation, and evaluation of learning processes.

The digital transformation of education has been further accelerated by global demands for mastery of twenty-first-century skills, such as critical thinking, creativity, collaboration, and digital literacy. AI technologies have emerged as a response to these demands through various educational applications, including intelligent tutoring systems, learning analytics, automated assessment systems, and chatbot-based

virtual assistants. These technologies enable more personalized, adaptive, and data-driven learning experiences that can accommodate individual learners' needs (Holmes et al., 2019). This shift signifies a paradigm change from traditional teacher-centered instructional models toward more flexible and learner-centered approaches.

Within this context, the role of teachers has undergone a fundamental transformation. Teachers are no longer positioned as the sole source of knowledge but rather as learning facilitators, academic mentors, and guides in students' cognitive development. UNESCO (2019) emphasizes that the integration of AI in education should strengthen the role of teachers by providing technological support that enables a deeper understanding of students' learning characteristics. Through AI-assisted data analysis, teachers can identify learning difficulties, design more appropriate instructional strategies, and enhance the quality of pedagogical interactions in the classroom.

The transformation of teachers' roles in the digital era is closely linked to changing expectations of professional competence. Teachers are required not only to master pedagogical and subject-matter competencies but also to develop digital literacy and an understanding of AI-based technologies. Luckin et al. (2016) argue that teachers in the digital age must be able to work alongside intelligent technologies – not as competitors, but as collaborative partners in the learning process. This shift necessitates a reconceptualization of the teaching profession, moving from a predominantly technical role toward a more strategic role focused on fostering human potential.

Despite the significant opportunities offered by AI to enhance educational quality, its implementation continues to face numerous challenges. One of the primary challenges concerns teachers' readiness to adopt AI technologies effectively and responsibly. Several studies indicate that teachers' levels of digital literacy remain uneven, particularly in developing countries, which affects their capacity to integrate AI into instructional practices (Holmes et al., 2019). This competency gap has the potential to hinder the optimal use of AI in education and to widen disparities in educational quality across institutions.

In addition to competency-related issues, challenges also arise from limitations in technological infrastructure and educational policy support. The effective implementation of AI requires access to digital devices, reliable internet connectivity, and sustainable support systems. Without such conditions, AI integration risks becoming merely symbolic innovation with minimal impact on actual teaching and learning practices. Consequently, the transformation of teachers' roles in the digital era cannot be separated from the broader educational system, including policy frameworks, school culture, and institutional support.

Furthermore, the adoption of AI in education raises ethical concerns related to data privacy, surveillance, and the potential dehumanization of learning. AI-based systems that rely on the collection and analysis of student data require serious attention to the protection of personal information and learners' rights. UNESCO (2019) underscores that the development and application of AI in education must be grounded in ethical principles, transparency, and fairness, while preserving the human dimension of education. In this regard, teachers play a crucial role as guardians of moral and ethical values in the use of educational technology.

The transformation of teachers' roles driven by AI also demands a more humanistic pedagogical approach. Although AI can automate various technical aspects of learning, it cannot replace teachers' roles in building emotional connections, instilling character values, and guiding students' social development. Therefore, the role of teachers becomes increasingly strategic in ensuring that technology-based learning remains oriented toward holistic human development. Teachers are expected to integrate AI technologies with learner-centered pedagogical approaches that emphasize human values and social responsibility.

In the context of Indonesian education, the transformation of teachers' roles in the digital era has become increasingly relevant alongside the implementation of educational policies that emphasize digital literacy and technology-based learning. Adaptive curricula that respond to technological advancements require teachers to continuously develop their professional competencies to meet contemporary challenges. However, empirical realities indicate that not all teachers have equal access to training and professional development opportunities related to AI. This condition highlights the importance of empirical studies examining how teachers perceive and respond to the presence of AI in educational practice.

Based on the foregoing discussion, AI can be understood as having significant potential to transform teachers' roles in the digital era, encompassing pedagogical functions, professional identity, and educational responsibilities. Nevertheless, this transformation does not occur automatically; it is influenced by multiple factors, including teachers' competency readiness, policy support, technological infrastructure, and ethical awareness in AI utilization. Therefore, research on Artificial Intelligence and the Transformation of Teachers' Roles in the Digital Era is essential to comprehensively and contextually understand these dynamics.

This study is expected to contribute both theoretically and practically to the development of education in the digital era, particularly in formulating strategies to strengthen teachers' roles amid the rapid advancement of AI technologies. Furthermore, the findings are anticipated to serve as a reference for policymakers and educational practitioners in designing relevant and sustainable teacher professional development programs, ensuring that AI integration in education is conducted effectively, ethically, and humanistically.

METHODOLOGY

This study employed a qualitative approach with a descriptive research design. The qualitative approach was selected because the study aimed to gain an in-depth understanding of the phenomenon of teachers' role transformation in the context of Artificial Intelligence (AI) utilization in the digital era. This approach allows researchers to explore meanings, perceptions, experiences, and perspectives of research participants comprehensively and contextually, in accordance with real conditions in the field (Creswell & Poth, 2018). Through a qualitative approach, the researcher was able to obtain a holistic understanding of how teachers interpret the presence of AI and how such technology influences their professional roles in the teaching and learning process.

The type of research adopted was descriptive qualitative research. Descriptive research seeks to systematically and factually describe the phenomena under investigation without manipulating variables (Sugiyono, 2022). In this study, the described phenomena included forms of AI utilization in instructional practices, changes in teachers' roles, as well as supporting and inhibiting factors affecting the transformation of teachers' roles in the digital era. This research was not intended to test hypotheses but rather to provide an in-depth empirical portrayal of the realities of AI-based educational practices.

The study was conducted in educational institutions that have implemented digital technologies in the learning process, including primary schools, secondary schools, and madrasahs, depending on the research context. The research subjects consisted of teachers who had experience using or interacting with AI-based technologies in teaching and learning activities, such as digital learning platforms, AI-driven applications, or technology-assisted assessment systems. The selection of research participants was carried out using purposive sampling, a technique in which informants are chosen based on specific criteria relevant to the research objectives (Miles et al., 2014). These criteria included actively teaching teachers, experience in using digital technologies, and willingness to provide in-depth information.

Data collection techniques in this study included in-depth interviews, observations, and documentation. In-depth interviews served as the primary data collection method to explore teachers' perceptions, understanding, and experiences related to AI utilization and changes in their professional roles. The interviews were conducted using a semi-structured format, allowing the researcher to follow an interview guide while maintaining flexibility to explore emerging issues during the interview process (Creswell & Poth, 2018). Observations were conducted to directly examine technology-based instructional practices and teacher-student interactions within the context of AI utilization. Documentation was used to complement the data through the collection of learning documents, school policies, instructional modules, and records of digital learning activities.

Data analysis was conducted using the interactive analysis model proposed by Miles, Huberman, and Saldaña (2014), which consists of three main stages: data reduction, data display, and conclusion drawing. Data reduction involved selecting, focusing, and simplifying data obtained from interviews, observations, and documentation to ensure relevance to the research focus. Data display was presented in the form of systematic descriptive narratives to facilitate the identification of patterns and relationships among the findings. The final stage involved drawing and verifying conclusions through in-depth interpretation of the data to produce credible and scientifically accountable research findings.

The trustworthiness of the data was ensured through triangulation techniques. Triangulation was carried out by comparing data obtained from different sources and data collection methods, such as contrasting interview results with observations and documentation (Moleong, 2021). In addition to source and method triangulation, member checking was conducted by confirming research findings with participants to ensure that the data accurately reflected their experiences and perspectives. This procedure was implemented to enhance the credibility and reliability of the research findings.

This study was conducted in accordance with established research ethics principles. The researcher ensured that all participants provided informed consent prior to data collection. Participants' identities were kept confidential, and all collected data were used solely for academic purposes. Furthermore, the researcher maintained objectivity and scientific integrity throughout all stages of the research process to ensure that the findings did not cause harm to any parties and upheld the principles of academic ethics.

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

Based on the findings of this study on Artificial Intelligence and the Transformation of Teachers' Roles in the Digital Era, it can be concluded that the utilization of AI in education has brought significant changes to teachers' roles in the teaching and learning process. Teachers no longer function solely as transmitters of knowledge but have undergone a role transformation into facilitators, mentors, and learning guides who focus on the holistic development of students' potential. The presence of AI supports teachers in improving work efficiency, particularly in administrative and evaluative tasks, thereby providing greater opportunities for teachers to concentrate on pedagogical interactions and more meaningful learning support.

The findings also reveal that teachers' understanding and readiness to use AI vary considerably. While some teachers have applied AI technologies in practical ways within instructional activities, conceptual and pedagogical understanding of AI integration remains uneven. This condition indicates that the transformation of teachers' roles in the digital era is influenced not only by the availability of technology but also by digital literacy competencies, attitudes toward innovation, and systemic educational support, including policies, professional training, and technological infrastructure.

In addition to offering opportunities, the integration of AI in learning also presents challenges, particularly related to limited digital competencies, insufficient continuous professional development, and concerns regarding the potential reduction of humanistic interactions in education. Therefore, AI should be positioned as a supportive tool that strengthens teachers' roles rather than replacing educators. With sustained professional development and adaptive educational policies, the integration of AI in education can be

implemented effectively, ethically, and in alignment with human-centered values. This conclusion underscores that the successful utilization of AI in education is highly dependent on teachers' readiness as the primary agents of learning transformation in the digital era.

REFERENCE

- Creswell, J. W., & Poth, C. N. (2018). *Qualitative inquiry and research design: Choosing among five approaches* (4th ed.). SAGE Publications.
- Holmes, W., Bialik, M., & Fadel, C. (2019). *Artificial intelligence in education: Promises and implications for teaching and learning*. Center for Curriculum Redesign.
- Luckin, R., Holmes, W., Griffiths, M., & Forcier, L. B. (2016). *Intelligence unleashed: An argument for AI in education*. Pearson Education.
- Miles, M. B., Huberman, A. M., & Saldaña, J. (2014). *Qualitative data analysis: A methods sourcebook* (3rd ed.). SAGE Publications.
- Moleong, L. J. (2021). *Metodologi penelitian kualitatif* (Edisi revisi). PT Remaja Rosdakarya.
- Russell, S. J., & Norvig, P. (2021). *Artificial intelligence: A modern approach* (4th ed.). Pearson.
- Sugiyono. (2022). *Metode penelitian kualitatif*. Alfabeta.
- UNESCO. (2019). *Artificial intelligence in education: Challenges and opportunities for sustainable development*. UNESCO Publishing.