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Optimization of Artificial Intelligence Utilization to Enhance Teachers' Digital Competence and Learning Innovation in the Society 5.0 Era

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A R T I C L E I N F O

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A B S T R A C T

This study aims to analyze the phenomenon of brainrot resulting from exposure to YouTube Shorts and its impact on the attention and self-regulation of elementary school students, as well as its implications for meaningful learning. The intensive consumption of short-form video content among Generation Alpha is suspected to contribute to a decline in students' ability to focus and regulate their behavior. This research employs a qualitative approach using a literature review method based on various relevant scientific sources. The findings indicate that excessive exposure to short video content contributes to reduced attention span and weakened self-regulation among students. These conditions negatively affect students' engagement and their ability to construct meaningful understanding during the learning process. Therefore, adaptive and creative learning strategies are needed to help restore and optimize students' attention and self-regulation in order to achieve meaningful learning outcomes.

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INTRODUCTION

The development of digital technology in the Society 5.0 era has brought significant changes across various aspects of human life, including the field of education. In this context, technology is utilized to improve the quality of educational services, expand access to learning, and create more flexible and adaptive learning processes. Therefore, understanding the concept of Society 5.0 is essential in addressing the challenges of contemporary developments (Munawir & Pandu).

Society 5.0 emphasizes the integration of technology and human life to create a more effective and efficient society. In the educational context, this concept encourages a transformation from conventional learning approaches to more modern and innovative digital-based learning systems (Sakinnah et al., 2022). This transformation is marked by the increasing use of digital technologies such as Artificial Intelligence (AI), big data, and the Internet of Things (IoT), which enable fast and accurate data processing and support better decision-making (Firdaus et al., 2025).

Despite its advantages, the Society 5.0 era also presents several challenges, including the readiness of human resources to utilize technology, unequal access to digital infrastructure, and the ability to adapt to rapid changes. Therefore, comprehensive preparedness is required, both in terms of individual competencies and systemic support (Amalia et al., 2023).

Artificial Intelligence (AI) is one of the key technological advancements that plays a strategic role in the Society 5.0 era. AI refers to technologies designed to simulate human cognitive abilities, such as learning, analyzing, problem-solving, and decision-making based on available data. Its application has expanded beyond industrial sectors into various fields, including education (Syawadin, 2025). With the advancement of information and communication technology, AI enables the rapid processing of large volumes of data and supports the automation of tasks, thereby improving efficiency and effectiveness (Verawati et al., 2024).

In the field of education, AI has great potential to support the learning process. It can assist in developing instructional materials, providing automated feedback, and analyzing students' learning outcomes. Moreover, AI enables the implementation of adaptive learning, where instructional content can be tailored to the needs and abilities of individual students. This contributes to increased student engagement and improved understanding of learning materials (Sabariah et al., 2024).

However, the implementation of AI in education also faces several challenges. Not all teachers possess the necessary skills to operate such technologies, highlighting the need for continuous training and professional development. Additionally, the availability of infrastructure and access to technology remains a critical factor in supporting successful AI integration (Amalia et al., 2023).

Digital competence refers to the ability to use information and communication technology effectively, efficiently, and responsibly in various activities, including teaching and learning. In the Society 5.0 era, digital

competence is a crucial skill, especially for teachers as key actors in the educational process. This competence encompasses not only technical skills but also the ability to access, manage, and evaluate information obtained through digital technologies (Humaria & Werda).

Teachers' digital competence plays an essential role in creating innovative and relevant learning environments. Teachers are expected to integrate technology into all stages of instruction, including planning, implementation, and evaluation. The use of digital tools can enhance the presentation of learning materials, making them more engaging, interactive, and easier to understand.

In addition to digital competence, teachers are also required to possess pedagogical, professional, social, and personal competencies. Pedagogical competence relates to understanding students' characteristics and managing effective learning processes, while professional competence involves mastery of subject matter. Social and personal competencies relate to communication skills and the ability to serve as role models (Saputri & Wibowo).

The integration of digital competence with overall teacher competencies is essential in responding to technological advancements in the Society 5.0 era (Prasetio, 2021). Teachers with strong digital competence are better equipped to adapt to changes and utilize technology to improve the quality of learning. Furthermore, technological mastery supports the development of creative and relevant learning innovations (Hartanti et al., 2024).

In this regard, learning innovation represents the practical implementation of teachers' competencies. It involves the development and application of creative and varied strategies, methods, and learning media to enhance the teaching and learning process. Teachers are expected to design learning experiences that not only attract students' attention but also encourage active participation and engagement (Parsinem, 2024).

The use of digital technology in learning innovation enables more interactive and accessible content delivery. It also creates a more enjoyable learning environment and supports deeper understanding of the material. Innovative teachers continuously adapt their teaching approaches to align with technological developments and students' needs (Rahayu et al., 2025).

Therefore, an integrated approach is needed that combines the utilization of Artificial Intelligence, the enhancement of teachers' digital competence, and the development of learning innovation within a comprehensive framework. This approach not only focuses on the general use of technology but also emphasizes the optimization of AI as a strategic tool to improve teachers' digital competence and foster more effective, adaptive, and innovative learning.

LITERATURE REVIEW

In addition to digital competence, teachers are also required to possess professional, pedagogical, social, and personal competencies that collectively support the implementation of effective learning. Pedagogical competence refers to the teacher's ability to understand students' characteristics and manage the learning process effectively. Professional competence relates to

mastery of subject matter, while social and personal competencies are associated with teachers' attitudes and behaviors in interacting with students and the broader educational environment. The integration of digital competence with overall teacher competencies is essential in responding to technological advancements in the Society 5.0 era (Prasetio, 2021). Teachers with strong digital competence are better able to adapt to changes and utilize technology to enhance the quality of learning. Furthermore, technological proficiency supports teachers in developing more creative and relevant learning innovations tailored to students' needs (Hartanti et al., 2024).

In line with this, learning innovation represents a concrete manifestation of teachers' competencies. It involves efforts to design and implement diverse, creative, and effective strategies, methods, and instructional media to improve the quality of the teaching and learning process. Teachers are expected to create learning experiences that are not only engaging but also capable of encouraging active participation and student involvement (Parsinem, 2024).

The use of digital technology in learning innovation enables teachers to present instructional materials in a more interactive and accessible manner. Moreover, it contributes to the creation of a more enjoyable learning environment and supports deeper student understanding of the material. Innovative teachers continuously strive to adapt their teaching approaches in accordance with technological advancements and students' evolving needs (Rahayu et al., 2025).

METHODOLOGY

This study employs a qualitative approach using a library research design. The purpose of this research is to comprehensively examine various concepts, theories, and previous studies related to the utilization of Artificial Intelligence in enhancing teachers' digital competence and learning innovation in the Society 5.0 era. The research is conducted systematically through several stages, including problem identification, literature search, data collection, data analysis, and conclusion drawing.

The population of this study consists of all relevant literature sources related to the research topic, including scientific journals, books, conference proceedings, and other scholarly articles discussing Artificial Intelligence, digital competence, teacher competence, and learning innovation. The sample is determined using a purposive sampling technique, in which literature sources are selected based on specific criteria, such as relevance to the research topic, content suitability, year of publication (preferably within the last ten years), and source credibility. This ensures that the selected sources effectively support and strengthen the research analysis.

Data collection is carried out through a documentation study technique. The researcher gathers data by exploring various literature sources from journal databases such as Google Scholar, national journal portals, and other credible academic sources. The data collection process involves reading, noting, and identifying important information relevant to the research focus. The research instrument used is a documentation sheet, which functions as a tool to record, classify, and organize data obtained from various sources.

The data analysis technique used in this study is descriptive qualitative analysis. The analysis process involves several stages: data reduction, data display, and conclusion drawing. In the data reduction stage, the researcher selects and focuses on data relevant to the research objectives. In the data display stage, the selected data are systematically organized into descriptive narratives. The final stage involves drawing conclusions by interpreting the analyzed data to address the research questions. The analysis process is conducted iteratively to ensure the accuracy and consistency of the data.

To ensure data validity, this study applies source triangulation by comparing information from various literature sources. Additionally, the researcher conducts repeated checks on the collected data to ensure its consistency with the research context. Therefore, the findings of this study can be scientifically justified.

RESULT AND DISCUSSION

The findings of this study were obtained through the analysis of various literature sources relevant to the utilization of Artificial Intelligence in enhancing teachers' digital competence and learning innovation in the Society 5.0 era. The analysis was conducted using a descriptive qualitative approach by categorizing the data into three main focuses: the use of Artificial Intelligence in learning, teachers' digital competence, and learning innovation.

The results indicate that the use of Artificial Intelligence in education contributes significantly to improving the effectiveness and efficiency of the learning process. Artificial Intelligence enables the automation of instructional material development, the creation of assessment items, and the provision of feedback to students. Furthermore, this technology can analyze learning outcome data more quickly and accurately, allowing teachers to gain deeper insights into students' levels of understanding. This demonstrates that Artificial Intelligence plays a key role in creating adaptive and student-centered learning environments.

In terms of digital competence, the findings reveal that teachers' level of digital competence is a determining factor in the successful integration of technology in learning. Teachers with strong digital competence are more capable of optimally integrating technology into their teaching practices. This competence includes the ability to use digital media, manage technology-based learning environments, and utilize digital platforms to support the teaching and learning process. Therefore, teachers' digital competence plays a strategic role in supporting educational transformation in the Society 5.0 era.

Regarding learning innovation, the results show that the use of Artificial Intelligence encourages the development of innovative learning practices. These innovations are reflected in the use of varied instructional methods, interactive learning media, and increased student engagement in the learning process. Innovative learning not only enhances students' interest but also improves their conceptual understanding more deeply.

Additionally, the analysis reveals a strong interrelationship between the use of Artificial Intelligence, teachers' digital competence, and learning

innovation. These three aspects are interconnected and form an integrated learning system. The optimal use of Artificial Intelligence enhances teachers' digital competence, which in turn promotes the development of more effective and relevant learning innovations.

Table 1. Analysis of Artificial Intelligence Utilization in Learning

No	Aspect	Key Indicators	Findings
1	Artificial Intelligence	Automation, data analysis, adaptive learning	Improves efficiency, assessment accuracy, and learning personalization
2	Digital Competence	Technology use, digital classroom management	Enhances teachers' ability to integrate technology in instruction
3	Learning Innovation	Varied methods, interactive media	Promotes creative, interactive learning and increases participation

Based on the table above, it can be concluded that the utilization of Artificial Intelligence has a positive impact on improving teachers' digital competence and learning innovation. Artificial Intelligence functions not only as a supporting tool but also as a driving force in educational transformation. Teachers' digital competence serves as a key supporting factor in optimizing technology use, while learning innovation represents the tangible outcome of technology integration in the learning process.

Overall, the findings suggest that optimizing the use of Artificial Intelligence has great potential to improve the quality of education. With adequate digital competence, teachers are able to create more innovative, effective, and relevant learning experiences aligned with the demands of the Society 5.0 era.

The use of Artificial Intelligence (AI) in learning has been shown to significantly contribute to the improvement of teachers' digital competence. The findings indicate that AI enables teachers to enhance their ability to operate educational technologies, such as AI-based applications, automated assessment systems, and digital learning management tools. This is consistent with previous studies stating that the use of AI in education improves teachers' technological skills and effectiveness in instructional processes (Sabariah et al., 2023).

However, in practice, many teachers still face challenges in mastering digital technologies, resulting in suboptimal use of AI. Nonetheless, training and continuous professional support have proven effective in improving teachers' readiness to integrate technology into their teaching. This suggests that the development of digital competence depends not only on the availability of technology but also on teachers' willingness and readiness to continuously learn and adapt.

Furthermore, the implementation of AI promotes innovation in learning. AI enables adaptive and personalized learning, where instructional materials can be tailored to students' needs, abilities, and learning styles. This is

supported by studies indicating that AI enhances student engagement and learning outcomes through individualized and adaptive learning approaches (Syawaudin et al., 2023).

In practice, AI-based learning innovation is reflected in the use of interactive media, automated assessment systems, and instant feedback mechanisms. Additionally, AI reduces teachers' administrative workload through task automation, allowing them to focus more on meaningful interactions with students (Sabariah et al., 2023). This presents a significant opportunity to improve the quality of education by creating more engaging, effective, and student-centered learning environments.

Despite these advantages, the implementation of Artificial Intelligence in education also faces several challenges. Not all teachers have the necessary skills to operate such technologies, highlighting the need for continuous training and mentoring. Moreover, infrastructure availability and access to technology remain critical factors in supporting successful AI implementation (Amalia et al., 2023).

In real-world contexts, limited internet access and technological facilities remain major barriers to AI implementation in schools. Additionally, concerns regarding reduced social interaction and increased dependence on technology have also emerged. These concerns align with studies suggesting that technological advancement in the Society 5.0 era must be balanced with human readiness to avoid negative impacts on learning processes (Sakinnah et al., 2022).

From the researcher's perspective, these challenges indicate that the implementation of AI in education must be supported by appropriate policies, continuous professional development, and the strengthening of teachers' roles as facilitators. Teachers cannot be replaced by technology; instead, they must collaborate with it to create more innovative and human-centered learning environments.

Furthermore, in the context of the Society 5.0 era, teachers are required to possess digital competence, creativity, and adaptability to technological advancements. This aligns with studies emphasizing that educators must have strong digital literacy to effectively address the challenges of digital-era learning (Hartanti et al., 2023).

In conclusion, optimizing the use of Artificial Intelligence in education has great potential to enhance teachers' digital competence and learning innovation. However, its successful implementation depends on teachers' readiness, infrastructure availability, and supportive educational policies. Therefore, synergy among technology, educators, and the education system is essential to ensure the optimal and sustainable use of Artificial Intelligence in learning.

CONCLUSIONS AND RECOMMENDATIONS

Based on the findings and discussion, it can be concluded that the utilization of Artificial Intelligence plays a significant role in enhancing teachers' digital competence and learning innovation in the Society 5.0 era.

Artificial Intelligence supports the learning process through the automation of instructional material development, assessment, and analysis of learning outcomes, making learning more effective, efficient, and adaptive. Teachers' digital competence is a key factor in determining the success of technology integration, as teachers with strong digital skills are better able to optimally incorporate technology into their teaching practices. Furthermore, the use of Artificial Intelligence promotes the development of more interactive, varied, and student-centered learning innovations. However, its implementation still faces several challenges, including limited teacher competence, insufficient training, and unequal access to technological infrastructure.

Based on these conclusions, it is recommended that teachers continuously improve their digital competence through ongoing training and professional development. Educational institutions should provide adequate facilities and infrastructure to support the effective use of technology in learning. In addition, supportive policies are needed to strengthen digital literacy and encourage the responsible and ethical use of Artificial Intelligence. Future research is expected to explore this topic further through empirical or field-based studies in order to obtain more comprehensive findings.

FURTHER STUDY

The findings of this study provide a foundational understanding of the role of Artificial Intelligence in enhancing teachers' digital competence and learning innovation in the Society 5.0 era. However, further research is needed to expand and deepen these findings. Future studies are recommended to adopt empirical approaches, such as experimental or field-based research, to examine the direct impact of Artificial Intelligence implementation on teaching practices and student learning outcomes.

In addition, subsequent research could explore the effectiveness of specific Artificial Intelligence tools and platforms in supporting different learning contexts and educational levels. Comparative studies across regions or educational systems may also provide insights into how contextual factors, such as infrastructure availability and policy support, influence the success of Artificial Intelligence integration.

Moreover, future research should investigate the long-term impact of Artificial Intelligence on teachers' professional development, including changes in pedagogical practices, digital literacy, and teacher roles in technology-enhanced learning environments. It is also important to examine ethical considerations, such as data privacy, algorithmic bias, and the balance between technology use and human interaction in education.

Finally, interdisciplinary research that integrates perspectives from education, technology, psychology, and policy studies is highly encouraged to develop a more comprehensive framework for optimizing Artificial Intelligence in education. Such efforts will contribute to the creation of sustainable, inclusive, and human-centered learning systems in the Society 5.0 era.

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