

Analysis of AI Governance in Education Transformation in Indonesia: Opportunities and Challenges

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Abstract

Artificial Intelligence constitutes a fundamental aspect of modern digital society, necessitating not fear or avoidance, but comprehensive understanding and appropriate governance. However, the development of Artificial Intelligence can be understood as a double-edged phenomenon: while it offers significant benefits, its application also entails substantial and inherent risks. This study examines the implementation of AI policies in Indonesian education and the factors influencing them, based on Edward III's policy implementation theory. This study adopts a qualitative research approach based on document analysis, followed by a systematic data analysis procedure encompassing data reduction, data display, verification, and the formulation of conclusions. The study finds that although policies supporting AI implementation have been established, policy communication remains unclear among institutions, and human resources and infrastructure are insufficient. Effective implementation of AI in learning necessitates the alignment of stakeholders' attitudes with shared objectives, as well as the development of a streamlined bureaucratic structure that supports efficient policy execution. Therefore, the recommendation that can be proposed in this context, where the government serves as the primary actor in the governance of AI implementation, is the need for stronger integration, particularly among institutions, enhancement of resource capacity, and the sustained implementation of digital literacy initiatives.

Keywords: *AI Governance, Digital Literacy, Education Reform, Public Policy*

Introduction

Sustainable The development of digital technology nowadays has brought about profound changes in various aspects of human life, including education, psychology, bureaucracy, and even science. One of the greatest leaps in digital transformation is the emergence and adoption of Artificial Intelligence (AI). AI is a system designed to mimic human abilities such as recognizing patterns, learning from experience, and making decisions, as defined by Stuart Russell & Peter Norvig in their book, "The job of AI is to design an agent program that implements the agent function, Agent program the mapping from percepts to actions" (Russel & Norvig, 2022). Indonesia, as a large nation with a rich population and diverse cultural life, can achieve Golden Indonesia 2045 by implementing AI in various sectors. This is because technology was created to help make human work easier. AI enables more adaptive, personalized, and data-driven learning systems, thereby significantly improving the quality of education.

Review of Related Literature

The development of AI is likened to two sides of a coin: on the one hand, AI can increase the effectiveness and productivity of teaching and learning through adaptive systems that tailor materials to individual needs. AI technology enables large-scale personalized learning, a feat difficult to achieve through conventional methods. Furthermore, AI also expands access to learning resources, enabling students from diverse backgrounds to receive a quality education (Pomsta, Holmes, & Nemorin, 2023). As a step in responding to the development of AI in Indonesian education, the Government ratified Ministerial Regulation Number 13 of 2025 concerning Amendments to the Regulation of the Minister of Education, Culture, Research, and Technology Number 12 of 2024 concerning the Curriculum in Early Childhood Education, Elementary Education, and Secondary Education so that digital literacy in coding technology and AI begins early through students' basic education. This regulation stipulates a learning approach strengthened by encouraging in-depth learning that focuses on a comprehensive understanding of concepts, the development of critical thinking skills, and reflection in the learning process. The establishment of this regulation is a strategic step to ensure that national education policies remain aligned with the dynamics of the times and the needs of Indonesian students in the future, in producing graduates who are superior and relevant to the demands of the times (Minister of Education, 2025).

However, the various benefits of AI are also accompanied by concerns about its negative impacts. Uncontrolled use of AI can shift students' cognitive processes from deep thinking to simply receiving instant results. This has the potential to diminish critical thinking skills, creativity, and independent learning. Furthermore, the use of AI can also raise ethical issues, such as plagiarism, algorithmic bias, and misuse of personal data (Sharples, 2023). In response to this, the government through Government Regulation Number 17 of 2025 concerning the Governance of Electronic Systems for Child Protection or known as PP TUNAS by the Ministry of Communication and Digital, aims to prevent exposure to harmful content and data exploitation, against the backdrop of increasing internet use by children in Indonesia. In addition, PP TUNAS is a strategic response from the government to systematically address this issue by strengthening government collaboration with all digital stakeholders. Its derivative regulations are formed, namely Ministerial Regulation Number 9 of 2026, which limits the use of social media for children under the age of 16.

Objectives

More specifically, the Joint Decree of 7 (seven) Ministers concerning Guidelines for the Utilization of Artificial Intelligence in Educational Units was ratified on March 12, 2026. This Joint Decree was signed by the Ministry of Primary and Secondary Education, the Ministry of Higher Education, Science, and Technology, the Ministry of Communication and Digital, the Ministry of Religious Affairs, the Ministry of Home Affairs, the Ministry of Women's Empowerment and Child Protection, and the National Population and Family Planning Agency. This Joint Decree regulates the use of AI to support learning, but does not replace students' thinking skills and does not pose risks such as dependency, negative content, etc. More broadly, the Indonesian government is not yet prepared in terms of human resources or infrastructure to support the implementation of AI in education in Indonesia. Based on Edward III's theory, communication, resources, disposition, and bureaucratic structure are interrelated and influence policy implementation. Therefore, this study aims to answer the question of how AI policy is implemented in Indonesian education and the factors that influence it.

Methodology

This research uses a post-positivist paradigm. This paradigm is considered because it can describe and provide a specific, in-depth understanding of the context for addressing the implementation of AI policy, especially the education aspects in Indonesia. The post-positivist approach uses a theoretical framework as a reference and particular measurement to determine the cause and effect of an event (Creswell, 2014). In this research, the theory used is Policy Implementation by Edward III (1969). The data collection technique in this study was qualitative, using secondary data from literature reviews of various previous documents, such as related regulations, reports, and previous research published in national and international journals relevant to this research. Qualitative data collection enables researchers to understand the implementation processes of AI in Indonesian education rather than simply relying on numbers or statistics. The data analysis technique uses an interactive data model to reduce and categorize the data. Irrelevant data are removed, then data are presented in the form of writing, images, tables, and graphs, after which data verification is carried out for appropriate decision-making (Miles, 2014).

Artificial intelligence, or AI, is a system designed to mimic human abilities such as pattern recognition, learning from experience, and decision-making. This technology is not alive or thinking like humans, but it is capable of processing large amounts of data to complete specific tasks, thereby helping to improve work efficiency and learning (Hermanto et al, 2024). According to the 2024 Job Trends Index released by Microsoft and LinkedIn, 92% of the workforce in Indonesia has used generative AI in various professional tasks, while 93% expressed interest in developing AI skills to increase their productivity. AI is a reality of today's digital life, not to be feared, avoided, or opposed, but to be understood and managed. By understanding and learning about it, we can develop intelligent and critical users, not just passive consumers of technology (ICT Watch, 2025).

Analysis

All forms of technological innovation must comply with human rights. AI that is discriminatory, exploitative, or that restricts social space is unacceptable. Therefore, every country needs a legal and ethical framework that protects all digital citizens. Neighbouring Singapore is a good example of this. The Singaporean government adopts a controlled integration approach, where AI is not strictly restricted, but its use is regulated through strengthening digital literacy and technological ethics. Students are encouraged to actively use AI, but with a thorough understanding of the risks and responsibilities of its use (Lee, Koh, & Looi, 2023). On the other hand, Finland places digital literacy as a key foundation through its AI for Citizens program, demonstrating that the primary focus is not on restricting technology but rather on increasing public understanding of AI. This approach has proven effective in creating an adaptive and responsible education ecosystem (Mertala, Fagerlund, & Calderon, 2022). Meanwhile, China has adopted a strategy of strict state control. In this case, although AI is widely integrated into the education system, its use is monitored through strong regulations and sophisticated supporting infrastructure (Yang & Peters, 2026).

Looking back at Indonesian history, the government has issued various policies such as the 2020 National AI Strategy as a national strategic direction, Law No. 27 of 2022 concerning Personal Data Protection, the 2023 AI Ethics Guidelines of the Ministry of

Communication and Information Technology, and the 2025–2030 National AI Roadmap Plan. More specifically, in the education sector, the Government ratified a learning curriculum policy in 2025 that encourages AI integration as part of efforts to increase the global competitiveness of human resources in Indonesia. However, the Government understands that AI also has negative impacts where uncontrolled use of AI can damage the learning process itself, so the government subsequently issued the PP TUNAS policy and the Joint Decree of 7 Ministers in 2026 that limit the use of AI in the learning process. This policy emphasises the importance of supervision, age-based restrictions, and a prohibition on the use of AI as a tool to complete learning tasks instantly. These two policies appear contradictory, with one encouraging and the other restricting. However, this can be understood as a balancing act between innovation and protection. Strengthening the use of AI through the teaching and learning curriculum represents a push to innovate and adapt to digital transformation, while the PP TUNAS and the Joint Decree of the Seven Ministers demonstrate the responsibility to protect students from the negative impacts of technology. Therefore, digital literacy is the right solution for understanding AI to prevent unintended consequences.

Findings and Discussion

Digital literacy encompasses not only technical skills but also an ethical, critical, and responsible understanding of technology use. In the context of AI, digital literacy is key to mitigating risks without stifling innovation. AI literacy extends beyond simply knowing the technology; it encompasses understanding, critical judgment, and the ability to make informed decisions when using AI. This is part of the digital literacy that every member of society, especially teachers in education, must possess, who will educate the nation's children. In today's era, children are active users of digital technology, including AI. However, they are also the most vulnerable group to manipulation, privacy violations, and exposure to inappropriate content. Digital education about AI has been proven to have a positive impact by improving overall digital literacy, so that students are not just passive users of technology but can ethically and productively utilise it in their lives and are able to adapt to the ever-evolving digital world. Most teachers agree on the implementation of AI in the elementary school curriculum because they recognize the potential of AI and coding to improve critical thinking, creativity, and problem-solving skills in students (Putri, et al., 2025).

Further analysis of AI policy in Indonesian education was conducted using the theoretical framework of policy implementation from George C. Edward III, where 4 (four) variables determine the success of a policy implementation, namely communication, resources, disposition and bureaucratic structure (Edward III, 1980). In terms of communication, AI policy and discourse in Indonesian education, especially about AI, are developing a lot at the level of ministries/institutions, academia, and public discourse, but the government is still not integrated. This is evident from each ministry/institution issuing its own policy, and there is no single national policy that comprehensively regulates the stages of AI development that must be passed, for example, with the existence of AI curriculum policies and AI restriction regulations that create unclear information on whether AI education is implemented for students or not. The communication aspect is still not optimal, so AI adoption tends to be slow and uneven. Second, the resource aspect is crucial for the success of the policy, but in the Indonesian context, it is a major weakness. Although supporting resources are available, they are not yet fully distributed. Implementing AI requires adequate digital infrastructure, devices, connectivity, and, most importantly, human competency. However, the reality on the ground shows significant

budget inefficiencies and gaps in digital infrastructure, both between regions and educational institutions. Many schools lack stable internet access or adequate devices. Furthermore, limited human resources are also a challenge, with teachers lacking sufficient AI literacy and limited expertise in this field. Furthermore, with restrictions on AI in education, even schools with adequate resources are not always able to freely implement AI due to regulations regarding age, duration, and type of use.

Third, disposition is important because the attitudes of policy implementers influence the policy itself. The attitudes of those implementing AI policies in education are divided into pros and cons. On the one hand, AI is accepted because it facilitates teaching and learning processes, such as material development and evaluation, and primarily improves digital literacy. However, on the other hand, there are also opponents due to concerns about declining learning quality, the loss of the teacher's role, ethical issues such as plagiarism, and other potential risks. This is also evidenced by the AI curriculum policy that encourages, and the Joint Decree of 7 ministers that limits the use of AI. Finally, the bureaucratic structure surrounding AI implementation in Indonesia needs improvement. The complex relationship between the central and regional governments within the Indonesian education system, coupled with the numerous authorised institutions, has resulted in a complex bureaucracy. Regulations related to AI in education are still developing and have not been fully implemented, and there is a lack of clear and aligned standard operating procedures (SOPs), such as the Joint Decree of the Seven Ministers, which emphasises restrictions on education, the education sector, and the digital sector, while focusing on risk mitigation. From Edward III's perspective, this bureaucratic structure will result in inconsistent implementation and be difficult to control. Based on Edward III's theory, the implementation of AI in Indonesian education is actually in an unstable transitional phase. While AI already exists and is regulated in policy, implementation remains hampered by a lack of synchronisation between communication, resources, disposition, and bureaucratic structure. This suggests that the primary problem lies not with the technology itself, but rather with the capacity of the government system that governs national governance, including education.

Conclusion

The development of AI is like a double-edged sword, bringing both benefits and risks. Therefore, it must be supported by adequate digital literacy in the community. Focusing on developing digital literacy in AI is crucial, as the public not only understands the technology technically but also critically understands its ethical, social, and legal aspects, as well as its ability to adapt to the technology. However, in this case, the government is the primary actor in AI implementation governance. Integration, particularly between institutions, is necessary to ensure alignment and consistency. Furthermore, resources must be strengthened, including qualified and competent human resources and adequate and equitable digital infrastructure. Finally, digital literacy must continue to be implemented with the aim of empowering the public to face global challenges.

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