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Artificial Intelligence-Based Learning and Its Impact on Educational Policy and School Management

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ABSTRACT

This research aims to examine the impact of Artificial Intelligence-based learning on education policy and school management, with a focus on how schools adapt to technological disruption. The research method uses a qualitative approach with case studies. Data was collected through semi-structured interviews, participant observation, and document analysis, then analyzed through the stages of data reduction, data presentation, and drawing conclusions. The research results show that Artificial Intelligence-based learning requires transformative policy changes in three main aspects: data use policies, continuous training for teachers, and personalized learning approaches. Effective data management policies are critical to protecting student privacy and supporting adaptive learning based on real-time analytics. Continuous professional development enables teachers to utilize Artificial Intelligence tools effectively, while personalized learning strategies increase student engagement and motivation through an individualized approach. The implications of this research emphasize that the integration of Artificial Intelligence in education must be accompanied by ethical, inclusive and planned policies. The contribution of this research is both theoretical and practical, providing a framework for policy makers to design strategic leadership, stakeholder engagement, and a culture of innovation to realize the maximum potential of Artificial Intelligence in education.

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INTRODUCTION

Technological advances, especially AI, bring great opportunities to improve the quality of education. However, its implementation must be balanced with wise school management policies so that the technology is a tool and supports holistic and ethical educational goals (Buerkle, O'Dell, Matharu, Buerkle, & Ferreira, 2023; Fakhrudin, Probosari, Indriyani, Khasanah, & Utami, 2023). This is because the application of AI in education can affect various aspects, such as learning methods, evaluation, and interactions between educators and students. Without the right policies, there is a risk that AI will only be used technically without considering educational values, potential algorithmic bias, and its impact on student character development (Shabbir, Rizvi, Alam, & Su'ud, 2024). Evidence from various studies reinforces the importance of wise policies in applying AI in education. For example, research by Mulla & Krishnan, (2022) shows that AI in education can improve the efficiency and personalization of learning but also underlines the risk of algorithmic bias that can hinder equal access for all students. Thus, the application of AI in education needs to be accompanied by careful and ethical school management policies (Fatmawati et al., 2024). This approach will ensure that AI improves the effectiveness of learning and strengthens broader educational goals, such as inclusivity, character development, and human values.

The study of the revolution in education policy in the era of AI-based learning has become a focus of various studies, considering that this technology significantly impacts school governance and management (Fedele, Punzi, & Tramacere, 2024). Research on the application of AI in education policy in different countries shows that the right policy can support the successful implementation of AI for more effective and inclusive learning. For example, a study by Salhab, (2024) highlighted that adopting AI in education needs to be accompanied by policies that protect student data privacy and regulate the ethical use of data in the school system. Research by Kapadia, Desai, & Parikh, (2020) found that managing AI-based learning systems in schools requires policies that pay attention to accessibility so that all students get equal learning opportunities without a digital divide. Ladachart, Khamlarsai, & Phothong, (2022) stated that good school policies on using AI can facilitate improved teacher performance through ongoing training that helps them understand the best way to use AI in teaching and learning activities. On the other hand, Maulidiya, Nugroho, Santoso, & Hasibuan, (2024) that education policies responsive to AI technology can create a more flexible learning environment that is responsive to student needs, especially in terms of learning personalization. These studies emphasize the importance of education policies that support innovation and balance technology and ethics so that AI-based learning can truly support educational goals holistically.

This study aims to address a gap in existing research on the transformation of education policies in the era of AI-based learning. While previous studies have

primarily concentrated on the technical aspects of AI or its direct effects on learning outcomes, few have examined how educational policies can strategically incorporate AI innovations to enhance school management. The novelty of this research lies in its exploration of how policies can guide the integration of AI to not only improve learning personalization and reduce accessibility gaps but also ensure ethical balance and prevent biases in AI algorithms. By emphasizing the role of school management in adapting to technological advancements, this study offers a comprehensive perspective on creating inclusive, adaptive, and forward-thinking education policies that align AI implementation with long-term educational goals.

The conclusion of the above study shows that the application of AI technology in education not only brings significant opportunities to improve the quality of learning but also requires a planned and strategic policy in school management (Wisfar Agustini, 2022; Hasanah, Munawwaroh, Azizah, Hasanah, & Mundiri, 2024). This argument is based on the fact that without a clear policy, the use of AI can potentially create gaps in access to education and the risk of algorithmic bias that can affect fairness in learning. Therefore, education policymakers need to develop a framework that facilitates the adoption of technology and integrates ethical and inclusive principles in every aspect of its implementation (Khusnu Alif, Azatil Isma, Aisyah Yope, & Harviani, 2024). Thus, the revolution in education policy in the era of AI-based learning can achieve a more holistic goal: creating an adaptive, responsive learning environment that can prepare students to face challenges in an increasingly complex world.

RESEARCH METHOD

This study focuses on the unit of analysis in the form of educational institutions, especially schools that have or are implementing artificial intelligence (AI)-based policies in management and learning, namely MAN 1 Probolinggo. Was chosen as the focus of this study due to its active implementation of AI-based policies in management and learning. As a school at the forefront of AI integration, it provides a valuable example for examining how AI influences educational policies and practices. This makes it an ideal setting to explore the implications of AI adoption in school management and its potential to improve learning outcomes, as well as offering insights for the development of adaptive and inclusive educational policies. The policy's direct subjects are the principal, teachers, administrative staff, students, and parents. Information from these sources is expected to provide a comprehensive understanding of the impact of AI-based education policies on school management practices and the quality of learning at the institutional level. This study uses a qualitative design with a case study approach, which was chosen to allow researchers to examine complex phenomena in different schools in depth. This approach is appropriate because the study aims to explore an in-depth understanding of the implications

of implementing AI policies in the context of education. The operationalization of this design involves intensive data collection from various sources in the field, then analyzing the patterns and trends that emerge from implementing the policy to understand the impact in depth.

Data collection was conducted through several main techniques: in-depth interviews (semi-structured), participant observation, and documentation. The semi-structured interview technique allows researchers to dig up more flexible information from various informants, such as teachers, students, and technology practitioners, focusing on their experiences and views regarding the implementation of technology in learning. Participatory observation was carried out directly at an educational institution, MAN 1 Probolinggo, to observe the dynamics of AI use in the classroom environment and interactions between students and teachers. In addition, secondary data was collected through various sources of documentation, including academic documents, previous research reports, and relevant literature, to enrich and provide context to the main findings. Combining these techniques aims to obtain comprehensive and in-depth data so that the analysis can reflect the phenomenon holistically.

In this study, data analysis was carried out using stages (B Miles, Matthew, 2014) through three stages, namely 1) Data Reduction. Data is categorized, directed, clarified, and organized at this stage, and irrelevant data is removed. This process helps simplify the focus obtained so it is easier to analyze; 2) Data Presentation. The reduced data is then presented in various forms, such as matrices, graphs, charts, and networks. This presentation aims to visualize the data to make it easier to understand and further analyze, and 3) Conclusion Drawing. Based on the data that has been presented, the researcher makes conclusions. This process involves interpreting data and generating new ideas or understandings that have not existed before, contributing to the knowledge or theory being studied. The study results are expected to provide in-depth insight into the role of independent learning in improving critical thinking skills in the context of continuing education.

RESULT AND DISCUSSION

In the era of AI-based learning, strengthening education policies is critical to effectively integrating this technology into educational institutions. Training programs for educators to use AI in teaching and provide adequate technological infrastructure are essential to ensure successful implementation. In addition, creating a culture of collaboration between educators and students by involving students in decision-making regarding the use of AI can increase a sense of ownership and responsibility for the learning process. By focusing on developing the necessary skills and competencies, adaptive policies are expected to improve the quality of learning and prepare students to face future challenges. The results of the presentation of several vital indicators in the study are as follows:

Result

Data Usage Policy

Data usage policies are an essential aspect of the education policy revolution in the era of AI-based learning, as data can be the basis for developing more effective and personalized learning approaches. These policies govern how student data is collected, managed, and used to improve the learning experience. For example, careful data analysis can help educators design appropriate interventions based on individual student needs. By leveraging data, schools can identify patterns and trends in student performance, allowing them to implement teaching strategies more tailored to each student's needs. As conveyed by the Principal of MAN 1 Probolinggo, Mrs. Rahma, she explained, "The data usage policy in our school is critical. We implement a data management system to collect real-time student progress information. For example, we found that some students struggled in certain subjects. With this data, we can design more targeted remedial programs, provide additional support, and adjust our teaching methods.

From the informant's statement above, it can be concluded that data usage policy is a crucial factor in education development in the era of AI-based learning because data serves as the basis for creating a more effective and personalized learning approach. This policy explains the collection, management, and use of student data to improve the learning experience. With proper analysis, educators can design interventions that suit each student's needs and detect patterns and trends in their performance. For example, schools implementing a data management system can identify students with difficulty in certain subjects and design more focused remedial programs, improving learning outcomes and curriculum relevance.

Table 1. Data Usage Policy Indicators

Indicator	Implementation
Personal Data Protection	1) There are rules that explain the rights and privacy of students, teachers and school staff regarding the collection, storage and use of personal data. 2) Policies on how personal data is collected, for example, what types of data may be collected and the methods used to protect it. 3) Procedures for data accessibility and access permissions, both at the school level and at third parties, such as technology providers or governments.
Transparency in Data Usage	A policy of transparency to stakeholders (students, parents, teachers) about what data is collected, how it is used, and by whom.
Data Security and Technology	Data security protocols to prevent unauthorized access, leakage, and manipulation of data by unauthorized parties.
Data Access and Management by	Terms and conditions of cooperation with third parties, such as agreements regarding limitations on data use, destruction of data

Third Parties	if the cooperation ends, and provisions for reporting data misuse.
Accountability and Sanctions	The responsibility of educational institutions in managing data, including the appointment of special officers or units responsible for data usage policies.

From Table 1 above, it can be understood that the personal data protection policy in an AI-based educational environment includes essential rules that protect the rights and privacy of students, teachers, and school staff regarding collecting, storing, and using personal data. This policy stipulates the types of data that can be collected and the methods of protecting them, including data access procedures that can only be accessed by authorized parties, internal and external, such as technology providers or governments. Transparency in data management is a priority so that stakeholders, such as students, parents, and teachers, understand the types of data collected, their purposes, and who accesses them. Security protocols are implemented to protect data from illegal access, leakage, and manipulation. In addition, the terms of cooperation with third parties are regulated with clear sanctions, including agreements regarding limitations on use, data destruction when cooperation ends, and reporting of data misuse. Educational institutions are also fully responsible for data management, appointing special officers or authorized units to ensure that each policy is followed and can be accounted for.

Based on the data results above, the conclusion of this study confirms that data usage policies play a central role in AI-based education, where data serves as the basis for creating a more personalized and adaptive learning approach. By the theory of data-driven education, this policy not only regulates the collection and use of data but also protects the rights and privacy of students, teachers, and staff. This policy explains the methods of collecting, managing, and using student data to design educational interventions tailored to individual needs, which aligns with adaptive learning theory. With strong privacy protection and data management transparency, schools can design specific remedial programs, detect student performance patterns, and adjust the curriculum to be more relevant and practical. This approach gives new meaning to efforts to improve student engagement and learning outcomes through comprehensive data analysis in AI-based education.

Training and Professional Development

They are developing ongoing training programs for educators to utilize AI in learning and teaching so that they can use this technology effectively. Policies supporting this Training should include ongoing programs focusing on understanding AI tools, adaptive teaching techniques, and using data to inform teaching practices. Through appropriate Training, educators can improve their competency in designing more interactive and personalized learning experiences so that students can achieve better learning outcomes. In an interview with a

professional development coordinator at MAN 1 Probolinggo, he stated, "Training and professional development is an integral part of our strategy to integrate AI into education. We hold regular workshops that equip teachers with knowledge about various AI tools and how to use them in learning. Thus, ongoing Training and professional development can improve educators' ability to use AI effectively and support successful learning in the modern era.

Observation results at MAN 1 Probolinggo show that training and professional development for educators have been ongoing, focusing on improving digital competency and adapting learning technology. Teachers participate in training programs that cover basic digital literacy, the use of online learning platforms, and the application of data-based technology in classroom management. Each training session is designed practically, allowing teachers to practice new skills in authentic learning situations. In addition, management support is seen in providing adequate facilities, such as computer rooms and internet access, as well as incentive policies that motivate teachers to continue improving their abilities. This creates a conducive environment for continuous professional development and enhances the quality of teaching at MAN 1 Probolinggo.

The results of the informant's statement above show that a continuous training program for educators has been designed to strengthen the understanding of AI technology in teaching practices. This program includes regular training on mastering digital tools, adaptive learning techniques, and data analysis to support a more responsive learning process. Each training session allows participants to apply new skills in real educational scenarios, strengthening their ability to create a more interactive and personalized learning experience for students. Institutional support through the provision of adequate technological facilities and incentive policies ensures the sustainability and effectiveness of the program, creating conditions that encourage improved teaching quality in the digital era.

Figure 1. Professional Development

The figure above shows that training and professional development in the digital era aims to improve the competence of educators through mastery of relevant digital skills and adaptation to learning technology. The training

program is designed sustainably, allowing participants to practice skills in authentic contexts and follow independent learning tailored to individual needs. The effectiveness of the training is assessed through various methods, such as competency tests and feedback, to ensure a positive impact on performance and learning outcomes. Strong management support, from the provision of resources to incentive policies, strengthens the institution's commitment to continuous development and innovation in educational practices.

The conclusion of this study confirms the importance of ongoing training programs to support educators' mastery of AI technology in the teaching process, which aligns with adaptive learning theory and the concept of technology-based education. These findings show similarities with previous studies that emphasize the role of digital technology in enriching the learning experience, especially in terms of personalization and interactivity. However, the results of this study also highlight differences in implementing a more comprehensive support system, such as the provision of institutional facilities and incentives, which are rarely found in previous studies. In a broader context, these results indicate that solid institutional support for professional development can accelerate the adoption of AI in education, creating a more responsive and effective learning ecosystem. An important lesson from this study is that using AI in education requires integrating technological skills with adaptive learning approaches and ongoing managerial support.

Personal Learning Approach

Policies supporting a more personalized and adaptive learning approach allow students to learn according to their individual needs and learning styles, increasing their engagement and motivation in the learning process. This approach utilizes technology, such as AI-based learning systems, to analyze student data to create more appropriate teaching materials and methods. With personalization, students can learn most effectively and feel more valued and heard in their learning journey. This study found that a personalized learning approach can significantly improve student learning outcomes. The results of an interview with a teacher at MAN 1 Probolinggo stated, “By implementing a personalized learning approach, I can adjust the material to the abilities and interests of each student. I use AI tools to analyze student progress, and this helps me provide more precise and faster feedback. As a result, students who previously had difficulty understanding the material now show rapid progress.”

Another perspective from a teacher at MAN 1 Probolinggo said, "By implementing personalized learning, I can adjust the material to the abilities and interests of each student, using AI tools to analyze their progress. This allows me to provide more precise and faster feedback. As a result, students who previously struggled are now showing significant improvements." Meanwhile, a grade X teacher added, "AI has helped me map students' strengths and weaknesses in more detail so that I can prepare appropriate interventions for each.

The statements of several informants above indicate that implementing AI-based personalized learning in schools has significantly impacted students' academic development, especially in terms of learning engagement and motivation. AI technology enables teachers to deeply analyze the strengths and weaknesses of each student, which facilitates the design of materials and interventions tailored to individual needs so that the learning process becomes more effective and responsive. In addition, this approach accelerates the process of providing relevant feedback, allowing teachers to adjust teaching strategies to align with student progress immediately. As a result, students who previously had difficulties can show rapid progress, feel more appreciated, and increase their confidence in achieving optimal learning outcomes.

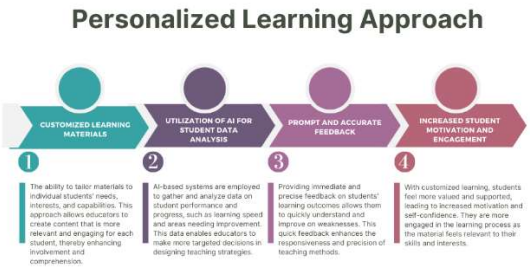

Figure 2. Personal Learning Approach

The results of this finding show that the personal learning approach can create a learning environment that is more focused and responsive to students' individual needs. Adjusting the material according to the potential and preferences of each student, this approach allows for a significant increase in student engagement and understanding. Using AI-based systems to analyze student data also provides a strong foundation for educators to determine more targeted teaching strategies. In addition, providing fast and accurate feedback helps students immediately identify areas that need improvement, thus accelerating the effective learning process. This positively impacts student motivation and confidence, as students feel that the learning process depends on their abilities and interests, increasing their engagement in the learning process.

Discussion

Integration of Data Usage Policy in School Management

The revolution in education policy in the era of AI-based learning emphasizes the importance of effective data management (Munawwaroh & Putri, 2024; El Ouahabi, El Bouzaidi, Chaiba, Hamdaoui, & Erragragui, 2024). Schools are faced with the challenge of integrating data usage policies to support informed decision-making processes. AI technology enables the collection, analysis, and utilization of student data in real time, including academic track records, learning preferences, and engagement levels (Mundiri et al., 2023; Alfarizi & Ikasari, 2023). With strong policies related to privacy protection and data ethics, schools can leverage data to improve management effectiveness, such

as student-needs-based class scheduling, teacher performance evaluation, and more adaptive curriculum planning.

However, the implementation of this policy requires readiness in terms of technological infrastructure and digital literacy of educators and school management (Zamroni, Baharun, Hefniy, Bali, & Hasanah, 2020). The policy must be holistic, including data security risk management and ensuring transparency in the use of AI technology to support the learning process (Kajiwara, Matsuoka, & Shinbo, 2023).

Developing Teacher Competence through AI Technology-Based Training

The implementation of AI-based learning requires the role of teachers not only as facilitators, but also as innovators who are able to integrate technology into the teaching process(Munawwaroh, Qushwa, & Baharun, 2024; Rozi, Salsabila, & Ayuba, 2024). Therefore, education policy must prioritize training and professional development that focuses on AI (Vecchiarini & Somià, 2023). This training includes mastery of AI-based platforms, such as adaptive learning systems, educational chatbots, and learning analytics (El Koshiry, Eliwa, Abd El-Hafeez, & Shams, 2023)..

In addition, AI-based training also allows teachers to develop data analysis skills to understand students' unique needs (Kulsum, 2024; Baharun, 2021). For example, AI can help teachers identify students who need special interventions and design personalized learning approaches (El Ouahabi et al., 2024; Munawwaroh, 2024). Education policies that support this training not only improve the quality of teaching but also ensure schools' readiness to face future technological challenges (Bhutoria, 2022; El-Islamy, Susilawati, & Abidin, 2023).

This research makes a significant contribution to the development of education policy in the digital era, especially in integrating AI technology strategically and ethically in the school environment. The findings of this research expand understanding of how data use policies, teacher training, and personalized learning approaches can improve the effectiveness of educational management and the quality of learning. Theoretically, this study enriches the literature on technology-based educational governance. Practically, the results provide concrete guidance for policy makers and school leaders in designing adaptive and inclusive strategies to address the challenges of digital transformation in the education sector.

CONCLUSION

The integration of Artificial Intelligence (AI)-based learning requires comprehensive education policy updates, especially in aspects of data governance, teacher training, and personalized learning approaches. An important finding of this study is that the purposeful and ethical application of AI can improve the effectiveness of school management as well as the quality and relevance of learning. The implication is that education policies must be prepared

adaptively by taking into account the principles of inclusivity, data security and institutional readiness. Scientifically, this research enriches the study of technology-based education policy, while practically providing strategic guidance for schools and policy makers in designing an educational ecosystem that is responsive to digital transformation. The strength of this research lies in its in-depth case study approach at one pioneering institution, however the limitation is the limited scope so the results cannot yet be widely generalized. Therefore, further research is recommended to involve more institutions with different characteristics, as well as using a quantitative approach to more comprehensively measure the effectiveness of AI policies in the education sector.

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