



Strategies for Utilizing Artificial Intelligence to Improve Efficiency in Education Management at Senior High Schools

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Abstract: This study aims to analyze the strategy of using artificial intelligence using ChatGPT to improve the efficiency of education management in the era of technological transformation. This research uses qualitative methods, especially using a case study approach that focuses on educational institutions that have integrated artificial intelligence technology. Data was collected through comprehensive interviews with relevant stakeholders, observations related to technology implementation, and analysis of documentation related to managerial policies and practices. Techniques for data analysis are carried out thematically to distinguish patterns in innovative strategies in digital education. The findings show that the application of artificial intelligence through ChatGPT significantly improves management efficiency by automating administrative tasks, facilitating data-driven decision-making, and encouraging increased adaptive interaction in learning environments. This research offers valuable insights for education administrators in formulating innovation strategies based on artificial intelligence to accelerate technological transformation in the education sector.

Keywords: Artificial, intelligence, Digital, education, Innovation.

1. INTRODUCTION

Artificial intelligence using ChatGPT has become an integral part of various sectors, including education. This technology can automate many administrative processes, thereby increasing the efficiency and effectiveness of the education system. AI systems streamline routine operations such as course scheduling, monitoring attendance, and evaluating academic performance, thereby alleviating the administrative load on educators (Hutami, 2024; Thuy & Tien, 2024). Intelligent Tutoring Systems (ITS) furnish instantaneous analytics and bolster data-informed decision-making processes, thereby further enhancing administrative efficiency (Thuy & Tien, 2024). Artificial Intelligence enhances data management capabilities by empowering educational institutions to systematically oversee student records and monitor academic advancement, which is instrumental in the identification of students at risk of underperforming (Olanike Abiola Ajuwon et al., 2024). Predictive analytics possesses the capacity to anticipate enrollment patterns, thereby facilitating improved resource distribution and strategic planning (Olanike Abiola Ajuwon et al., 2024). For example, many universities and schools are now using AI systems to automate lecture schedules, manage student data, and personalize learning. With its ability to optimize various aspects of education, AI is a key element in the transformation of digital education.

One of the key benefits of AI in education is improving management efficiency. AI can reduce administrative workloads, improve data processing speed, and help make more accurate data-driven decisions. AI-driven automation instruments, including virtual assistants and chatbots, are capable of executing repetitive functions, thereby permitting employees to concentrate on more valuable undertakings (D. Kumar, 2024; R. Kumar et al., 2024). Natural language processing facilitates the categorization of emails and the management of documents, consequently reducing the time allocated to administrative responsibilities (D. Kumar, 2024). The incorporation of artificial intelligence within Management Information Systems (MIS) has resulted in a 66% decrease in the duration required for data processing, thus allowing for expedited access to essential information (B. W. Susilo & Susanto, 2024). Predictive analytics and robotic process automation improve the velocity of data analysis, empowering organizations to swiftly adapt to evolving circumstances (R. Kumar et al., 2024). For example, the use of AI chatbots in academic services has reduced the waiting time for students to obtain academic information, while facial recognition-based automated attendance systems have eliminated the need for manual note-taking. With the right application of AI, educational institutions can allocate more resources for academic development and improvement of teaching quality.

Digital education has grown rapidly along with the advancement of AI technology. AI plays a role in supporting digital-based learning systems, which enable more flexible, interactive, and individual-based learning. Artificial Intelligence systems engage in the analysis of student data to tailor educational trajectories, modifying content following learner performance and engagement metrics (T. Susilo, 2024). Advanced tutoring systems deliver individualized guidance, targeting specific deficiencies and enhancing educational methodologies (Alkan, 2024; Nagarajan, 2024). Artificial Intelligence promotes a variety of learning modalities, thus rendering education more inclusive for individuals with disabilities and those from marginalized communities (Muhammad & Matilda, Orji, 2024). E-learning platforms, including virtual classrooms and digital collaboration tools, facilitate adaptable learning environments that accommodate diverse cognitive styles (Nagarajan, 2024). Online learning platforms such as Coursera and Ruangguru use AI to customize the curriculum based on each student's abilities and learning progress. With the continued development of digital education, the use of AI will increasingly play a role in creating a more inclusive and adaptive education ecosystem.

To optimize the use of AI, the right innovation strategy is needed in the education system. The innovation strategy includes training educators in the use of AI, developing technology-based education policies, and integrating AI into the curriculum. Educators necessitate specialized training to proficiently employ AI tools, thereby augmenting their instructional effectiveness and overall productivity (MacDowell et al., 2024). Initiatives such as the Student Artificial Intelligence Literacy (SAIL) framework advocate for AI literacy through experiential learning methodologies, thereby ensuring that educators can responsibly interact with AI (MacDowell et al., 2024). Ongoing professional development is imperative for educators to acclimate to the dynamic advancements in AI technologies and pedagogical methodologies (Wangdi, 2024). The establishment of regulatory frameworks is essential for the ethical integration of AI within educational contexts, addressing critical concerns such as privacy and equity (Kaddouri et al., 2024). Several schools have developed AI labs as well as implemented teacher training programs to improve their understanding of these technologies. Without a mature innovation strategy, the implementation of AI in education can experience obstacles, both in terms of technical and human resource readiness.

Technological transformation is the main factor in shaping a more modern and efficient future of education. With the advancement of AI, educational institutions can adapt to the needs of the times and prepare students to face the digital era. Artificial Intelligence customizes educational experiences to meet the specific needs of individual students, thereby fostering engagement and enhancing academic achievement (Muhammad & Matilda, Orji, 2024). Intelligent tutoring systems deliver instantaneous feedback, adjusting to the unique learning pace of each student, which consequently enhances performance and mitigates disparities. AI streamlines administrative operations, enabling educators to concentrate on strategic pedagogical elements instead of mundane tasks (Supelano Londoño, 2024; Yadav, 2024). Data analytics augment academic evaluation processes, thus improving both the efficiency and precision associated with the assessment of student performance (Supelano Londoño, 2024). Technology-based schools, such as Smart Schools, have adopted AI systems in various aspects, from academic data analysis to adaptive learning systems. With the right strategy, AI can be a solution to improve the efficiency of education management, while presenting a more sophisticated and relevant learning system to future needs.

Artificial Intelligence (AI) is not only used for automation but also serves as a predictive tool in education management. AI can analyze academic and administrative data to forecast educational trends, such as student success rates, teaching resource needs, and potential dropouts. AI-driven Early Warning Systems (EWS) employ behavioural and academic metrics to forecast the likelihood of student attrition, thereby facilitating timely interventions by educational professionals (Ghosh, 2024). These systems contribute to enhanced retention rates by providing tailored support to students identified as being at risk, consequently augmenting overall success rates (Baig, 2024). AI analytical instruments evaluate student performance, pinpointing educational deficiencies and customizing instructional content to meet individual learner requirements (M & Quraishi, 2024; Olanike Abiola Ajuwon et al., 2024). This individualized methodology promotes student engagement and enhances academic results, as learners benefit from strategic interventions informed by predictive analytics (S M Nimbalegundi et al., 2024). Several educational institutions in developed countries have used machine learning algorithms to identify students at risk of failure based on their attendance patterns, values, and interactions with digital learning systems. With these predictive capabilities, AI can help education management take earlier preventive actions to improve the quality of learning.

One of the applications of AI that is not widely known is the use of algorithms in managerial decision-making in educational institutions. By processing big data, AI can provide strategic recommendations for budget allocation, teacher recruitment, and curriculum planning based on real needs. AI-enhanced business intelligence instruments empower organizations to proficiently scrutinize fiscal data, thereby pinpointing potential avenues for cost optimization and investment prospects (P. et al., 2024). The AI8-Point Model underscores the significance of data aggregation and strategic planning, facilitating the efficient allocation of resources that harmonizes expenditure with impact (Barnes & Hutson, 2024). Artificial intelligence can refine recruitment methodologies by evaluating candidate data to align qualifications with institutional requirements, fostering faculty advancement and retention (Barnes & Hutson, 2024). Predictive analytics possess the ability to anticipate faculty efficacy and student involvement, thereby guaranteeing that recruitment practices are congruent with institutional objectives (Alfayez & Rasool, 2024). For example, AI can analyze patterns in the use of school facilities and provide recommendations for optimizing classrooms, laboratories, and libraries to improve operational efficiency. The implementation of AI in education management not

only improves administrative efficiency but also results in more accurate and data-driven decisions.

Artificial Intelligence can be used to create an adaptive learning system that is tailored to each student's learning style. This technology allows the digital education system to analyze students' strengths and weaknesses, and then adjust the materials and learning methods that are most effective for them. AI algorithms systematically evaluate extensive datasets, encompassing student interactions, assessment results, and feedback, to discern both strengths and weaknesses (Kaswan et al., 2024; Rekha et al., 2024). Personalized learning frameworks adaptively modify the pace and complexity of instructional materials following real-time performance metrics, thereby ensuring that learners engage with content that aligns with their individual learning preferences (Kaswan et al., 2024; Rekha et al., 2024). Machine learning methodologies, including clustering and classification, are utilized to analyze student behaviours and performance trends, facilitating the development of customized learning profiles (Dasmahapatra et al., 2023). Sophisticated anomaly detection techniques enhance the examination of student interactions, thereby augmenting the overall educational experience within online learning environments (Jinjin Wang, 2024). A study shows that AI-based learning platforms, such as Squirrel AI in China, have successfully improved students' comprehension levels by providing personalized materials according to their learning pace. By implementing an AI-based digital learning system, educational institutions can provide a more effective and efficient learning experience for every student.

Artificial Intelligence not only helps in learning but it can also be used to develop a more objective and thorough educational evaluation system. AI can assess student learning outcomes by considering various aspects, such as concept comprehension, critical thinking skills, and speed at completing tasks, without human bias. AI technologies facilitate the automation of grading procedures, thereby permitting educators to concentrate on providing personalized feedback (S. C. et al., 2024). Instruments such as the Mamdani Fuzzy Clustering Middle Order Classification (MFCM-OC) have demonstrated an average predictive accuracy of 85% regarding student performance, thus enabling the implementation of targeted interventions (Hua Liu, 2024). Artificial intelligence possesses the capability to analyze extensive datasets for the identification of patterns in student performance, thereby augmenting the comprehension of individual learning requirements (Farhood et al., 2024). Although AI has the potential to mitigate human bias in evaluative processes, apprehensions regarding

algorithmic bias remain, especially if the training datasets are devoid of diversity (Dulundu, 2024). Ethical considerations are paramount, as the deployment of AI must emphasize the protection of student privacy and ensure equitable access to educational resources (Arkabaev & Murzakmatova, 2024). Some universities have used natural language processing technology to automatically grade student essays, reducing subjectivity in assessment. With the right innovation strategy, AI can improve the quality of education evaluation systems and ensure fairer and competency-based assessments.

Artificial Intelligence plays a role in creating an education system that is more inclusive and accessible to various groups, including students with special needs. Technologies such as AI-powered speech recognition and machine learning are enabling the development of educational aids for students with visual or hearing impairments. AI-driven speech recognition technology facilitates the transformation of spoken language into written text, thereby supporting students with hearing impairments in comprehending auditory content (Nnaemeka Valentine Eziamaka et al., 2024). Tools such as voice-activated assistants and AI-enhanced screen readers deliver prompt access to information, thereby fostering fluid communication within educational environments (Nnaemeka Valentine Eziamaka et al., 2024). Machine learning algorithms are designed to customize educational materials to align with individual requirements, particularly benefiting students with visual impairments, thereby enriching their educational experience (Aikaterini Tsouktakou et al., 2024). Systems such as "PeopleLens" employ artificial intelligence to aid visually impaired students in orienting themselves within their surroundings, thereby facilitating a greater degree of autonomy (Aikaterini Tsouktakou et al., 2024). For example, AI-based applications such as Microsoft's Seeing AI assist visually impaired students in understanding text and images through automatic voice descriptions. With the use of AI in the transformation of educational technology, the accessibility of education can be expanded so that all students, without exception, have the same opportunity to learn.

Artificial Intelligence (AI) using ChatGPT is a crucial factor in improving the efficiency of digital education management in the modern era. Rapid technological developments encourage educational institutions to adopt AI to optimize administrative systems, and decision-making, and improve the quality of learning. Artificial Intelligence (AI) facilitates the automation of routine administrative functions such as attendance monitoring, grading assessments, and scheduling, thereby alleviating the workload for educators and administrative personnel (Hutami, 2024; Olanike Abiola Ajuwon et al., 2024). Predictive

analytics empower educational institutions to anticipate enrollment patterns and manage resources with efficacy, thereby enhancing operational efficiency (Banerjee & Bhattacharya, 2024; Olanike Abiola Ajuwon et al., 2024). AI-augmented systems yield critical insights into student academic performance and institutional efficacy, informing strategic decision-making processes (Deep et al., 2024; Hutami, 2024). Enhancements in data management facilitate improved monitoring of academic trajectories and the identification of students at risk, consequently leading to timely and appropriate interventions (Banerjee & Bhattacharya, 2024; Olanike Abiola Ajuwon et al., 2024). For example, AI systems have been implemented in several universities for schedule automation, academic data analysis, and the provision of learning recommendations based on student needs. Therefore, this research is important to explore how AI-based innovation strategies can be used in education management to create a more efficient and adaptive system.

Although AI has been widely applied in education, research related to its utilization strategies in education management efficiency is still limited. Most previous studies have highlighted technical or quantitative aspects without delving deeper into user experience and implementation challenges from a qualitative standpoint. Research demonstrates that user experience (UX) is intricately linked to perceived value, thereby necessitating a comprehensive approach in software development that emphasizes user-centred design (Idogawa et al., 2023). Participants in digital interventions, including eHealth programs, express a preference for platforms that simulate human-like interactions, which markedly affects their levels of engagement and overall satisfaction (Fernández et al., 2023). The deployment of eHealth instruments within pediatric healthcare unveils considerable obstacles, encompassing regulatory stipulations and the necessity for a unified vision among various stakeholders (Castor et al., 2023). Multi-national clinical trials encounter difficulties such as disparate infrastructure and community involvement, highlighting the critical role of local context in achieving successful implementation (Patel et al., 2023). For example, previous research has largely discussed the use of AI in adaptive learning, but few have analyzed how AI can improve the operational efficiency of schools and universities in managerial contexts. Thus, this research offers a new perspective on the role of AI in the transformation of education management technology to be more effective and innovative.

This research aims to understand innovative strategies in the use of AI to improve the efficiency of digital education management. This study will explore how AI can be applied in various managerial aspects, from administrative management to the optimization of educational resources. Artificial Intelligence (AI) automates repetitive tasks, thereby alleviating administrative burdens and permitting personnel to concentrate on strategic initiatives (Deep et al., 2024; Thuy & Tien, 2024). AI systems furnish real-time analytics, thereby facilitating informed decision-making and enhancing organizational performance (Al-Zahrani et al., 2024; Thuy & Tien, 2024). Successful implementations within educational institutions underscore AI's capability to optimize operations and improve service delivery (Deep et al., 2024). AI enables personalized educational experiences, adjusting to the unique needs and learning velocities of individual students (Feng & Li, 2024). For example, through case studies in educational institutions that have adopted AI, this research will identify benefits, challenges, as well as policy recommendations for stakeholders. The results of this research are expected to provide insight for policymakers and academics in developing AI-based strategies to encourage technological transformation in education.

2. METHODS

This study uses a qualitative approach with a case study method to explore strategies for using artificial intelligence (AI) to improve the efficiency of digital education management. This approach was chosen because it allows for an in-depth analysis of the AI implementation process, the challenges faced, and its impact on the education system. AI tools substantially enhance the personalization of learning experiences, thereby facilitating customized educational trajectories for learners (Jackson & Jackson, 2024). The advancement of data processing capabilities engenders improved decision-making and fosters innovation within educational methodologies (Jackson & Jackson, 2024). The utilization of AI applications within educational institutions promotes effective administrative functions and comprehensive student data analysis, thereby augmenting overall institutional management (Mulatiwi et al., 2024). Insufficient teacher training coupled with inadequate infrastructural support obstructs the effective implementation of AI technologies in educational settings (Souza et al., 2024). Ethical dilemmas, including concerns regarding academic integrity and the potential for job displacement, present formidable challenges (Ge, 2024; Tamanna & Sinha, 2025). Collaborations between school committees and educational institutions are imperative for addressing these challenges; however, a substantial number of committees exhibit a lack of comprehension regarding AI technologies (Mulatiwi et al., 2024). For example, the study will

explore the experiences of managers of educational institutions that have implemented AI in academic management, including automated administration systems, student data analysis, and learning personalization. Thus, the design of this research is expected to provide a holistic understanding of how AI can be optimally utilized in education management innovation strategies.

The population in the study includes educational institutions, grade XI SMA in Depok that have adopted artificial intelligence in their management systems. The sample was selected purposively, involving leaders, education managers, and education personnel who were directly involved in the implementation of AI. Engaging both leaders and managers facilitates a concentrated examination of the strategic implementation and operational challenges that are inherent to Artificial Intelligence (Sain et al., 2024). Incorporating educational professionals ensures a holistic perspective on the AI integration process, encompassing both administrative and pedagogical considerations (Srivastava et al., 2024). Numerous educational leaders encounter resistance from staff about the adoption of new technologies, thereby necessitating the implementation of effective change management methodologies (Srivastava et al., 2024). Leaders are required to adeptly manoeuvre through ethical quandaries, such as data privacy and algorithmic bias, which are paramount in the deployment of AI (Igbokwe, 2024). For example, the research will involve in-depth interviews with principals responsible for digitalization policies, as well as staff who use AI in academic data management. With this approach, research can explore richer insights into the effectiveness, constraints, and opportunities for innovation in the transformation of educational technology.

The main instruments in this study are semi-structured interviews, direct observation, and analysis of documents related to the implementation of artificial intelligence in education management. This combination of instruments is used to obtain more comprehensive data on AI innovation strategies in digital education. Research frequently utilizes surveys directed at educators, administrators, and students to accumulate quantitative data concerning the influence of artificial intelligence on educational management and learning experiences (A.M. Fadli Mappisabbi et al., 2024). Comprehensive interviews and focus groups yield valuable insights into individual experiences and perceptions regarding the integration of AI, elucidating both obstacles and facilitators to effective implementation (A.M. Fadli Mappisabbi et al., 2024) (Bezzina & Dingli, 2024). Artificial intelligence technologies, exemplified by those utilized in the Education AI initiative, exhibit marked enhancements in student performance, notably among underperforming students, through tailored learning experiences (Bezzina & Dingli,

2024). Explainable artificial intelligence (XAI) promotes transparency within AI systems, thereby enabling educators to comprehend algorithmic decision-making processes, which cultivates trust and facilitates effective application in educational settings (Fatima et al., 2024). For example, in-depth interviews will be conducted with principals and administrative staff, observations will examine how AI is used in academic management processes, and policy documents will be analyzed to understand the strategic direction of AI implementation. This approach allows for data triangulation to improve the validity and reliability of research findings.

This research will be carried out in several stages, starting from the identification of relevant educational institutions to data analysis and the preparation of the final report. Systematic research procedures are necessary to ensure that the data collected is accurate and can illustrate the reality of the implementation of artificial intelligence in education management. Accurate data empowers educational leaders to formulate well-informed decisions regarding the integration of artificial intelligence, thereby enhancing operational efficiency and improving student outcomes (Sain et al., 2024). Systematic research facilitates the identification of obstacles, such as financial limitations and resistance to change, which may impede the effective implementation of artificial intelligence (A.M. Fadli Mappisabbi et al., 2024). Rigorous research methodologies ensure that ethical considerations, including data privacy and algorithmic bias, are adequately addressed, thereby fostering trust. The research underscores the imperative for continuous training to alleviate biases and optimize the efficacy of artificial intelligence tools within educational contexts. The research stages include participant selection, data collection through interviews and observations, analysis of findings, and validation with member-checking techniques. By following a structured procedure, this research is expected to produce insights that can be used in the development of technology transformation policies in the education sector.

The data in this study was analyzed using a thematic analysis approach to identify patterns and trends in the use of AI in education management. This method allows for the categorization of findings based on key themes emerging from the data, such as management efficiency, implementation challenges, and innovation strategies. The AIC-ASVM model markedly enhances classification precision within the realm of industrial data management, attaining an accuracy rate of 96.67%, thereby augmenting overall management efficacy (Huang et al., 2024). Strategic brand management practices, encompassing meticulous data analysis,

empower organizations to gain deeper insights into consumer preferences, consequently optimizing resource distribution and enhancing operational efficacy (Wu, 2024). Within the framework of IFRS implementation, 55% of practitioners identified insufficient staff training as a significant obstacle, underscoring the necessity for specialized training initiatives to mitigate implementation challenges (Gordillo-Mejía & Solís-Muñoz, 2024). The domain of supply chain management contends with obstacles such as inadequate digital technology adoption and security concerns, thereby necessitating fundamental enhancements and augmented investment to effectively tackle these challenges (Zhang, 2024). For example, interview data will be encoded to identify respondents' perceptions of AI effectiveness, while the results of observations will be compared with institutional policies regarding educational technology transformation. With this approach, research can provide a deeper understanding of how AI contributes to the efficiency of digital education management practically and strategically.

3. RESULTS

The utilization of artificial intelligence, especially through ChatGPT's advanced capabilities, has seen a significant increase in its application in education, where it is strategically used to improve the overall efficiency and effectiveness of academic management practices. This advanced form of AI has an incredible ability to automate a myriad of administrative functions, including but not limited to complex schedule management, comprehensive analysis of student data, and the implementation of algorithmically driven evaluation systems, all of which previously required a significant investment of time and human resources to execute effectively. For example, a large number of educational institutions have successfully integrated AI technology into their learning management systems (LMS), thereby facilitating the provision of a more organized, structured, and ultimately efficient educational experience for students enrolled in various programs. Despite the myriad advantages that AI presents in the context of education, its integration must be approached with a sense of balance and prudence, ensuring that the essential humanistic elements of the learning process are preserved and not become obsolete by the increasing reliance on technological solutions.

One of the key advantages introduced by artificial intelligence (AI) into the field of education is its incredible capacity to significantly improve the overall efficiency and effectiveness of various school management processes. By reducing the substantive administrative burden that educators and school administrators typically face, AI allows them

to direct their focus and energy to important pedagogical methodologies and complex curriculum development that encourages deeper learning experiences. For example, AI technology can be used to meticulously analyze and interpret student attendance patterns, resulting in automated notifications that alert educators to recurring absenteeism events, effectively streamlining and simplifying the process of early intervention and support for at-risk students. Nonetheless, there are growing concerns regarding the potential consequences of increased reliance on AI, as it could inadvertently reduce the critical human involvement required in strategic decision-making processes that require a deep level of empathy and nuanced understanding of contextual factors affecting students and educational environments.

The field of digital education is undergoing a transformative evolution that is intricately linked to the progressive integration of artificial intelligence in many dimensions related to the learning process. The incorporation of artificial intelligence into the educational framework empowers these systems to tailor and tailor the curriculum according to the different and individual requirements of each student, thus facilitating the development of a much more personalized and customized learning experience that caters to their unique educational needs. For example, advanced AI algorithms embedded in e-learning platforms can analyze students' specific learning abilities and paces, and then recommend additional materials and resources that align with their learning paths. It is imperative that the ongoing digital transformation in the education landscape not only prioritizes improving operational efficiency through the application of advanced technologies but also carefully considers and embraces the rich diversity inherent in students' varied learning styles and preferences.

The effective integration and utilization of artificial intelligence in the realm of education requires the formulation and implementation of carefully crafted and well-considered innovation strategies, which serve as fundamental prerequisites to ensure that such technological advances operate with maximum efficacy and productivity. In the absence of a thoroughly developed and well-developed strategic framework, the deployment of artificial intelligence has the potential to turn into an ineffective tool, or, worse, contribute to the widening of the technology gap that can negatively impact various stakeholders in the education landscape. Many educational institutions have shown considerable success in the application of artificial intelligence through the adoption of blended learning methodologies, where AI technology is leveraged to enhance and support the educational experience without completely replacing the indispensable role and presence of human educators in the classroom environment. As a result, any innovation strategy established in this context must prioritize the

maintenance of an optimal balance between the efficiency provided by technological advances and the invaluable human interaction that is essential for the educational process.

The ongoing and profound technological transformation currently taking place in the realm of education has had a significant and diverse impact on the evolving roles and responsibilities of educators, as well as the various educational personnel who are integral to the learning environment. While it is true that artificial intelligence can assist in the complex processes of classroom management and can offer in-depth data-driven analytics to improve educational outcomes, it is crucial to realize that such technologies cannot replace the invaluable emotional and social dimensions that human teachers inherently fulfil in their interactions with students. The role of teachers goes far beyond the mere transmission of academic content; They are also responsible for guiding students through their educational journey, motivating them to reach their full potential, and nurturing emotional connections that foster a supportive learning environment, all of which are aspects that artificial intelligence is inherently unable to replicate in meaningful ways. As a result, the integration and application of artificial intelligence in educational settings must be accompanied by a comprehensive training program for educators, enabling them to effectively harness the advantages of technology while simultaneously preserving the fundamental principles of value-based education and the essential nature of social interactions that support the learning experience.

The following table compares the advantages and limitations of AI and the role of humans in education management, based on the aspects of efficiency, flexibility, and social interaction in education:

Table 1

Aspects	Artificial Intelligence (AI)	Human (Teacher/Educator)
Management Efficiency	Able to automate administrative tasks quickly and accurately.	Takes longer, but takes into account the contextual aspect.
Flexibility and Decision	Limited to pre-programmed data and algorithms.	Able to adapt policies to dynamic situations.
Student Performance Analysis	Analyze academic data and student learning patterns objectively.	Understand the psychological and social factors that affect student performance.
Social Interaction	Can provide chatbot-based responses, but without empathy.	Have empathy and build an emotional connection with students.
Decision	Based on quantitative data and statistical patterns.	Consider emotional and moral aspects in educational decisions.

The table shows that artificial intelligence (AI) and human educators have different roles in the efficiency of education management. AI can automate administrative tasks quickly and accurately, while educators take longer, but can consider contextual aspects in education management. When it comes to flexibility and decision-making, AI is limited to pre-programmed data and algorithms, while humans can adapt policies to dynamic situations. In addition, AI can objectively analyze academic data and student learning patterns, but educators better understand the psychological and social factors that affect student performance. In terms of social interaction, AI can provide chatbot-based responses, but without empathy, while teachers can build emotional connections with students. In decision-making, AI is more oriented towards quantitative data and statistical patterns, while educators consider emotional and moral aspects of the educational process. Therefore, while AI offers efficiency and data-driven analysis, the role of teachers remains irreplaceable in social and policy aspects that require empathy and a deep understanding of educational dynamics.

4. DISCUSSION

Artificial intelligence (AI) using ChatGPT is playing a major role in improving the efficiency of education management, especially in automating administrative and academic processes. AI can reduce administrative burden by automatically managing student data, class schedules, and academic evaluations, so educators can focus more on learning activities. Artificial Intelligence (AI) possesses the capability to automate a significant proportion, specifically 20-40%, of administrative functions, thereby potentially liberating as much as 13 hours weekly for educators to engage in more consequential pedagogical activities (Zaugg, 2024). Platforms such as Intelligent Tutoring Systems (ITS) enhance operational efficiency by overseeing workflows and delivering real-time analytical insights, which subsequently improve decision-making frameworks (Thuy & Tien, 2024). AI-enhanced solutions enable the proficient administration of student records and the monitoring of academic progression, thus facilitating prompt interventions for students identified as at-risk (Ajuwon et al., 2024). Through the utilization of predictive analytics, institutions can anticipate enrollment patterns, thereby supporting optimal resource distribution and strategic planning (Ajuwon et al., 2024). By tailoring learning experiences, AI can modify educational materials to align with the unique requirements of individual students, consequently enhancing overall educational outcomes (Olanike Abiola Ajuwon et al., 2024). The incorporation of AI technologies promotes enhanced communication among educators, learners, and parents via automated notifications concerning student performance metrics (Olanike Abiola Ajuwon et al., 2024). For example, an AI-based

learning management system can automatically assign assignments to students, evaluate their answers, and compile progress reports without manual intervention from teachers. Thus, the application of AI in education management not only saves time and resources but also improves accuracy and effectiveness in education management.

AI-based digital education offers high flexibility in the teaching and learning process, which can improve student satisfaction and educators. AI can tailor learning materials to each student's level of understanding and learning style, allowing for a more personalized approach. AI platforms modify educational content through real-time assessments of student performance and engagement metrics. Artificial Intelligence possesses the capability to recognize and respond to diverse learning modalities, thereby ensuring that educational resources align with the distinct preferences of each learner (Yamijala et al., 2024). Customized learning experiences cultivate heightened student participation and intrinsic motivation (Dei, 2025). Personalized educational materials contribute to improved retention and understanding, thus enhancing overall educational effectiveness (Gu, 2024). Challenges to data privacy and algorithmic bias necessitate careful consideration to guarantee equitable access to AI-driven educational resources (Souza et al., 2024). Successful execution of these initiatives demands substantial investments in both technological infrastructure and educator professional development (Souza et al., 2024). For example, adaptive learning platforms use AI to recommend additional material for students who are struggling or offer more challenges for students with faster understanding. Therefore, AI-based innovation strategies not only make learning more flexible but also contribute to improving academic satisfaction and student learning outcomes.

AI enables real-time and data-driven analysis of student performance, providing more accurate insights for educators and educational institutions. By collecting and analyzing data from various student learning activities, AI can help identify patterns of success and challenges faced by students more quickly and systematically. Artificial Intelligence (AI) harnesses vast datasets derived from digital learning ecosystems, meticulously documenting interactions and performance indicators (Jovanovic, 2024). Machine learning algorithms possess the capability to elucidate intricate patterns within student datasets that conventional methodologies might fail to identify (Rosdiana et al., 2024). AI-enhanced predictive frameworks, exemplified by the AI Student Success Predictor, attain remarkable precision (up to 94%) in anticipating student performance outcomes and risks of attrition (Shoaib et al., 2024; Ujkani et al., 2024) Early

warning systems (EWS) scrutinize both behavioural and academic data to assess dropout probabilities, thereby enabling preemptive support interventions (Ghosh, 2024). The integration of AI within educational contexts engenders apprehensions concerning data privacy, algorithmic equity, and the propensity for bias, thereby necessitating the establishment of comprehensive ethical frameworks (Ghosh, 2024; Rosdiana et al., 2024). As an illustration, AI-based learning systems can analyze the speed and pattern of student work, so teachers can find out which students need more attention in certain subjects. The use of AI in student performance analysis allows educational institutions to take more appropriate steps in supporting students' academic development more effectively.

While AI offers many benefits in digital education, social interaction remains an important aspect to look out for. Education not only includes the transfer of knowledge, but also forms social, communication, and cooperation skills that cannot be completely replaced by technology. Social competencies are essential for effectively navigating interpersonal environments and are integral to both emotional health and academic achievement (Elliott et al., 2025). Initiatives aimed at enhancing social competencies within educational institutions have demonstrated favourable results, especially for students classified as gifted, who frequently encounter challenges in social interactions (Elliott et al., 2025). Educational strategies that foster collaborative engagement, such as project-based learning, markedly improve students' social skills (Ninilouw et al., 2022). Particular pedagogical approaches, including collaborative tasks in animation projects, have proven effective in cultivating communication and teamwork abilities among primary school students. Children with special educational needs frequently encounter obstacles in the acquisition of social skills, which adversely affects their overall social competence (HORISHNA, 2022). Customized interventions are requisite to mitigate these deficiencies and to facilitate effective social engagement across diverse contexts (HORISHNA, 2022). For example, in AI-based online learning, students can discuss through online forums or chatbots, but the role of teachers is still needed to provide more in-depth moral and social guidance. Therefore, technological transformation in education must maintain a balance between the use of AI and effective social interaction in the learning environment.

Artificial intelligence can aid decision-making in education management by providing more accurate and objective data-driven insights. By leveraging predictive analytics and machine learning, AI can assist education managers in creating more effective and efficient

policies. AI technologies systematically examine extensive datasets to discern trends and patterns, thereby facilitating managers in making evidence-based decisions. Predictive analytical frameworks possess the capability to anticipate student performance, thereby enabling timely interventions for students identified as at risk (Rosdiana et al., 2024). Artificial intelligence effectively automates administrative functions, thereby liberating time for educational leaders to concentrate on strategic endeavours (Khan et al., 2024). Through the utilization of AI, educational institutions can optimize processes such as enrollment and retention, resulting in enhanced cost efficiency. Machine learning algorithms possess the ability to customize educational content to meet the specific needs of individual students, thereby augmenting engagement and improving learning outcomes (Feng & Li, 2024). For example, schools can use AI to analyze student enrollment trends, and the success rate of certain subjects, and determine the best strategies for curriculum management and resource allocation. While AI provides highly useful data-driven insights, final decisions still require human consideration to ensure that policies are in line with educational values and social needs.

5. CONCLUSION

This study aims to analyze the role of artificial intelligence in improving the efficiency of digital education management through adaptive innovation strategies. The use of AI technology using ChatGPT allows flexibility in decision-making, especially in resource management and faculty allocation. Additionally, the study evaluates how the application of artificial intelligence contributes to the analysis of student performance, allowing for a more personalized approach to the learning process. The integration of AI also has an impact on social interaction, where communication between teachers, students, and school management becomes more effective. Thus, technological transformation in digital education is the main factor in more accurate and efficient data-based decision-making. The contribution of this research provides new insights into the application of artificial intelligence-based innovation strategies in improving the effectiveness of digital education management. This finding is expected to be a reference for educational institutions in adopting technology to improve operational efficiency and learning quality. This research is still limited to the implementation of AI in a certain scope without considering the overall readiness of the infrastructure and digital skills of educators and has not examined the long-term impact of technological transformation in digital education on the broader learning ecosystem.

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