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Artificial Intelligence-Based Digital Transformation Management in Vocational Education: A Juridical Analysis of the Implementation of Academic Digitalization

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Abstract: *The rapid advancement of digital technology has driven higher education institutions, particularly vocational education, to adopt Artificial Intelligence (AI) in academic management and learning systems. While AI offers efficiency and data-driven decision-making, its implementation raises managerial and legal challenges, especially regarding data protection and accountability. This study employed a descriptive qualitative approach using library research. Data were collected from reputable international journals, academic books, policy reports, and Indonesian legal documents related to education management, AI, and digital governance. The analysis was conducted using descriptive-analytical techniques, synthesizing managerial, technological, and legal perspectives. The findings indicate that AI-based digital transformation enhances the effectiveness of vocational education management, including learning personalization, academic evaluation, and administrative services. However, the use of AI also introduces potential risks such as algorithmic bias, over-reliance on digital systems, and vulnerability of students' personal data. From a legal perspective, the implementation of AI in vocational education must be aligned with Indonesian regulations, particularly the Personal Data Protection Act and the Electronic Information and Transactions Act. The study concludes that successful digital transformation in vocational education requires an integrated framework that combines adaptive management, responsible AI use, and robust legal compliance to protect students' rights and ensure sustainable educational governance.*

Key Words: *digital transformation, artificial intelligence, vocational education management, legal perspective, data protection*

Abstrak: *Kemajuan teknologi digital yang pesat telah mendorong institusi pendidikan tinggi, khususnya pendidikan vokasi, untuk mengadopsi Kecerdasan Buatan (AI) dalam manajemen akademik dan sistem pembelajaran. Meskipun AI menawarkan efisiensi dan pengambilan keputusan berbasis data, implementasinya menimbulkan tantangan manajerial dan hukum, terutama terkait perlindungan dan akuntabilitas data. Penelitian ini menggunakan pendekatan kualitatif deskriptif menggunakan penelitian perpustakaan. Data dikumpulkan dari jurnal internasional terkemuka, buku akademik, laporan kebijakan, dan dokumen hukum Indonesia terkait manajemen pendidikan, AI, dan tata kelola digital. Analisis dilakukan dengan menggunakan teknik deskriptif-analitis, mensintesis perspektif manajerial, teknologi, dan hukum. Temuan tersebut menunjukkan bahwa transformasi digital berbasis AI meningkatkan efektivitas manajemen pendidikan vokasi, termasuk personalisasi pembelajaran, evaluasi akademik, dan layanan administrasi. Namun, penggunaan AI juga menimbulkan potensi risiko seperti bias*

algoritmik, ketergantungan yang berlebihan pada sistem digital, dan kerentanan data pribadi siswa. Dari perspektif hukum, penerapan AI dalam pendidikan vokasi harus selaras dengan peraturan Indonesia, khususnya Undang-Undang Perlindungan Data Pribadi dan Undang-Undang Informasi dan Transaksi Elektronik. Studi ini menyimpulkan bahwa transformasi digital yang sukses dalam pendidikan kejuruan membutuhkan kerangka kerja terintegrasi yang menggabungkan manajemen adaptif, penggunaan AI yang bertanggung jawab, dan kepatuhan hukum yang kuat untuk melindungi hak-hak siswa dan memastikan tata kelola pendidikan yang berkelanjutan.

Kata Kunci: *Transformasi Digital, Kecerdasan Buatan, Manajemen Pendidikan Kejuruan, Perspektif Hukum, Perlindungan Data*

INTRODUCTION

Digital transformation has become a strategic agenda for the management of modern organizations, including in the higher education sector, particularly in vocational education. The rapid development of information technology, marked by the presence of Artificial Intelligence (AI), has changed the way educational institutions design academic management systems, learning, and administrative services. AI is no longer seen as just a technical tool, but rather as a strategic instrument that influences managerial decision-making, organizational efficiency, and the quality of educational services. Several international studies show that integrating AI into education can improve learning personalization and institutional management effectiveness (Luckin et al., 2016; Zawacki-Richter et al., 2019).

Vocational education differs from pure academic education, emphasizing job-readiness, practical competence, and alignment with industry needs. Therefore, vocational education management must be more adaptable to the digital transformation. AI has the potential to support competency-based curriculum management, student performance monitoring, and academic service optimization. However, the application of this technology also has complex consequences, particularly regarding institutional readiness, student digital literacy, and the governance of educational institutions (OECD, 2021).

In the context of Prasetiya Mandiri Polytechnic, students as direct users of learning systems and digital services are important subjects in this transformation process. The use of digital platforms, learning management systems, and AI-based technology began to be implemented gradually. However, such implementation often emphasizes technical and efficiency aspects, while the managerial dimension and legal certainty have not been comprehensively studied. This condition creates urgency to understand how AI-based digital transformation is managed and what its implications are for students' rights and protection as legal subjects.

The use of AI in education management cannot be separated from legal issues, such as personal data protection, algorithm transparency, and institutional accountability. (Purwanto, Umar, et al., 2024). Students, as users of digital systems, are vulnerable to data misuse, system bias, and unclear legal liability in the event of a violation. (Astirini Swarastuti et al., 2024). Technology law studies confirm that the development of AI often exceeds regulatory readiness, thus potentially creating a legal vacuum (Brownsword, 2019; Floridi et al., 2018). Therefore, the legal perspective is a crucial element in managing the digital transformation of education.

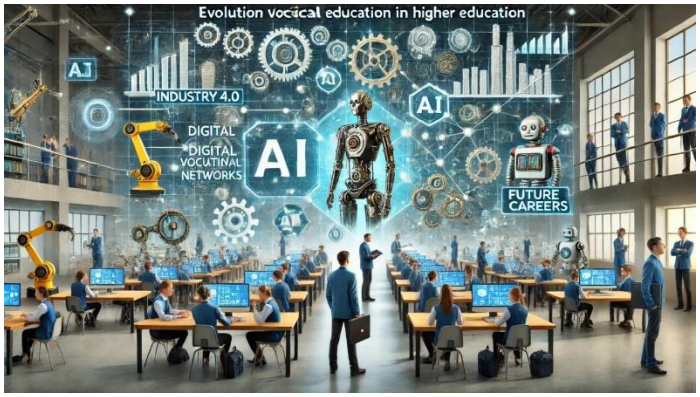

Figure 1. AI 4.0 Transformation

Previous research on AI in education has generally focused on pedagogical and technological aspects, such as the effectiveness of AI-based learning, adaptive learning systems, and learning analytics (Holmes et al., 2019; Zhai et al., 2021). On the other hand, the study of digital education management focuses more on institutional governance and digital leadership (Selwyn, 2016). Meanwhile, legal research on AI tends to address ethical and regulatory issues in general, rather than in the specific context of vocational education. This shows that these studies are still partial and fragmented.

Several national studies (SINTA) have examined the digitalization of higher education and online learning management, but most have not explicitly linked it to AI use and its legal implications. Existing research is generally normative or technical, and does not simultaneously integrate management, technology, and legal perspectives. In addition, there is little research that focuses on vocational education students. (Faridatul Faridatul & M Bambang Purwanto, 2025), even though they are the main actors in the digital transformation ecosystem of education (Vivin Afini, Fitri Nurdianingsih, Ridayani, 2025).

Based on a literature review, there is a research gap in the lack of descriptive studies that integrate AI-based digital transformation management with a legal perspective in the context of vocational education. There has been little research that explicitly describes how students position themselves in AI-based digital management systems and how institutions manage the legal aspects of applying this technology. This gap underscores the need for an interdisciplinary approach that can bridge these three domains.

The novelty *of this research lies in the integrative approach to* education management, AI technology, and legal studies, with a focus on vocational education. This research not only describes the phenomenon of digital transformation but also situates it within the frameworks of management, governance, and legal certainty. By focusing on the students of Prasetiya Mandiri Polytechnic, this study presents a relevant and contextually grounded empirical-descriptive perspective.

The purpose of this study is to describe the concepts and practices of AI-based digital transformation management in vocational education and to analyze its legal implications. The formulation of this research problem includes: (1) how the concept of AI-based digital transformation management in vocational education works; (2) how to use AI in learning management and academic services from the perspective of students; and (3) how the legal perspective views the use of AI in the management of vocational education.

The results of this study's discussion are expected to provide a conceptual overview of the relationship between the effectiveness of digital management. (Satriah et al., 2025), the use of AI (Purwanto, Yuliana, et al., 2024), and legal certainty in vocational education (Marzuki & Sh, 2020). These findings can serve as the basis for developing institutional policies at Prasetiya Mandiri Polytechnic and as a reference for further research at other vocational universities. Thus, this research makes a strategic contribution at both the academic and practical levels to the sustainable, law-abiding digital transformation of education.

METHODOLOGY

This study uses a qualitative descriptive research design with a library research approach. This approach was chosen because the main objective of the research is to describe, understand, and interpret the phenomenon of Artificial Intelligence (AI)-based digital transformation management in vocational education from a legal perspective, without conducting hypothesis testing or statistical measurements. Qualitative descriptive research enables researchers to explain phenomena in depth using relevant conceptual and normative data.

The literature review approach is used to examine concepts, theories, policies, and regulations related to education management, digital transformation, AI, and legal aspects of education. This approach is relevant because the issue of AI in education is a multidisciplinary phenomenon that requires a strong conceptual and normative understanding. Thus, this study places scientific literature and legal documents as the primary sources in building the analytical framework.

The data sources in this study include both primary and secondary data. Primary data were obtained from reputable scientific literature, including Scopus- and Web of Science-indexed journal articles, academic books, and international reports that discuss education management, AI, and digital transformation. The literature was chosen because it is scientifically valid and directly relevant to the research's focus.

Secondary data includes supporting documents such as education policies, reports on vocational education institutions, and laws and regulations related to information technology, higher education, and data protection. In addition, the context of Prasetiya Mandiri Polytechnic students is used as an empirical-descriptive background to strengthen the analysis, without making it an object of survey or experiment.

Table. Stages of Research: Data Collection and Processing

Research Stage	Focus of Activities	Implementation Procedure	Criteria / Instruments	Output
Literature Collection	Search for journals, books, and legal documents.	(1) Searching international journals indexed by Scopus and Web of Science, as well as national journals indexed by SINTA. (2) Collecting academic books	Structured keywords (digital transformation, AI in education, education management, legal perspective on AI); the reputation of the	A collection of primary data sources (journals, scientific books) and secondary data (legal documents, education policies).

		related to education management, digital transformation, and Artificial Intelligence. (3) Identify legal documents and education policies relevant to technology and AI.	source; Relevance of the topic.	
Data Selection and Classification	Literature screening and grouping	(1) Selecting literature based on suitability with the focus of the research. (2) Eliminate irrelevant or duplicate sources. (3) Classify literature into main study themes.	Relevance of substance; year of publication; suitability of the vocational education context; linkage with management, AI, and legal aspects.	The data is structured based on the study category: (a) Digital transformation management, (b) Implementation of AI in vocational education, and (c) Legal perspective of the use of AI.

Data collection was conducted through document analysis and a systematic literature review. Documentation studies involve collecting and reviewing written documents relevant to the research topic, including scientific papers and legal regulations. The literature search was conducted systematically using keywords such as digital transformation, artificial intelligence in education, education management, and the legal perspective on AI.

The literature obtained was then selected based on specific criteria, including the relevance of the topic, the year of publication, and the source's reputation. This selection process aims to ensure that the data used truly supports the analysis and reflects the latest developments in AI studies, education management, and law. The selected literature is then classified by theme to facilitate analysis.

The data analysis technique used is descriptive-analytical analysis. This analysis is carried out by describing the data collected, then interpreting it systematically in line with the research focus. The stages of analysis include data reduction, data presentation, and the drawing of conclusions. Data reduction is carried out by selecting information relevant to AI-based digital transformation management and legal perspectives.

Furthermore, the reduced data is presented in narrative descriptions and a thematic synthesis to examine the relationships among management, AI technology, and legal aspects. Conclusions are drawn inductively by emphasizing the conceptual patterns that emerge from the analysis. Through this technique, the research is expected to produce a comprehensive picture of the practice and implications of AI-based digital transformation in vocational education.

RESULT AND DISCUSSION

Implementation of Artificial Intelligence in Vocational Education Management

Table 2. Implementation of Artificial Intelligence in Vocational Education Management

Management Aspects	Forms of AI Implementation	Main Functions	Impact on Students	Potential Challenges
Learning Management	AI-based Learning Management System (LMS)	Personalize materials, learning recommendations, and progress monitoring	Access to learning is more flexible, and according to individual needs	Reliance on digital systems
Academic Evaluation	Learning analytics & predictive analytics	Performance analysis, early detection of learning difficulties	Faster and data-driven academic feedback	Potential algorithm bias
Administrative Services	Academic chatbot & service automation	Quick response to student administrative needs	Service efficiency and ease of access to information	Lack of human interaction
Decision Making	AI-based decision support system	Provision of data for academic planning	Academic policies are more targeted	System transparency and accountability

Table 2 shows that the implementation of Artificial Intelligence in vocational education management encompasses various strategic aspects, including learning and evaluation, administrative services, and institutional decision-making. AI not only serves as a technical tool but is also an integral part of the education management system, directly influencing the student learning experience. Through AI-based LMSs and learning analytics, institutions can continuously monitor student progress and provide more targeted academic interventions.

Nevertheless, the table also indicates that potential challenges always accompany any benefit of AI. Dependence on digital systems, algorithm bias, and reduced human interaction are issues that need to be managed seriously. This emphasizes that implementing AI in vocational education must be accompanied by a clear managerial and ethical framework so that technology truly supports educational goals rather than creating new problems.

Legal Perspective on the Utilization of AI in Vocational Education

The use of Artificial Intelligence (AI) in vocational education management cannot be separated from the legal framework that regulates the use of information technology and the protection of the rights of educational subjects. AI operates by collecting, processing, and analyzing large amounts of data, most of which comes from students' personal data. Therefore, the application of AI in the educational environment must be understood not only as a managerial innovation but also as a legal activity with

normative consequences. Floridi et al. (2018) emphasized that the development and use of AI must be grounded in ethical principles, accountability, and the protection of individual rights.

Table 3. Normative Framework for the Utilization of Artificial Intelligence in Vocational Education

Legal Aspects	Normative Principles	Implications in Vocational Education	Potential Legal Risks
Personal Data Protection	Right to data privacy and security	Secure and limited management of student academic data	Data leaks, misuse of information
System Transparency	Openness of processes and algorithms	Students understand how AI systems work	Algorithmic results are inexplicable
Accountability	Institutional responsibility	Institutions are responsible for the impact of using AI	Ambiguity of legal liability
Justice & Non-Discrimination	Equality of legal treatment	AI systems are not biased against students' backgrounds	Algorithmic bias and systemic discrimination
Educational Ethics	Humanistic value protection	AI supports, not replaces, the role of educators	Dehumanization of the educational process

Table 3 shows that the use of AI in vocational education is in a direct wedge between technological innovation and fundamental legal principles. Every AI implementation imposes a legal obligation on educational institutions to protect students' rights, especially regarding data privacy and security. The principles of transparency and accountability are key to ensuring that the use of AI does not create legal uncertainty or injustice in academic decision-making.

In addition, the table confirms that legal risks are not only technical, but also ethical and social. Algorithmic bias, lack of transparency, and weak institutional accountability can lead to violations of students' rights. This strengthens the argument that the application of AI in vocational education should be within a clear legal governance framework and oriented towards the protection of educational subjects.

From a legal perspective, protecting students' personal data is the most crucial issue in the use of AI in vocational education. AI systems require academic data, learning behaviors, and even individual student preferences to generate recommendations and analysis. Brownsword (2019) emphasized that technological developments often outpace regulatory preparedness, so educational institutions need to be proactive in developing internal policies to ensure students' legal protection.

In addition to data protection, AI system transparency is an equally important legal principle. Academic decisions generated by AI systems—such as performance evaluations or academic recommendations—must be explainable and accountable. Bennett Moses (2017) stated that AI-based systems that lack transparency have the potential to cause injustice and undermine public trust in institutions. In the context of vocational education, an unclear algorithmic process can be detrimental to students,

both academically and administratively.

The accountability aspect is also a significant concern in the study of AI law. When academic decisions are made or influenced by AI systems, the question of who is responsible for their impact becomes particularly relevant. Floridi et al. (2018) emphasized that legal responsibility cannot be entirely transferred to the technological system, but remains with the institution as the manager of education. Therefore, vocational education management must establish a mechanism to monitor and evaluate the use of AI.

Furthermore, the legal perspective also demands that the application of AI in vocational education still uphold the ethical and humanistic values of education. Vocational education not only aims to produce a skilled workforce but also to shape students' character and integrity. UNESCO (2021) emphasizes that AI in education must be developed responsibly and human-centered. Thus, the legal and ethical framework is an important foundation for AI-based digital transformation to provide sustainable benefits for vocational education.

Synthesis of Management, Technology, and Law in Vocational Education

The synthesis between education management, the use of Artificial Intelligence (AI), and legal perspectives shows that digital transformation in vocational education cannot be carried out partially. Management plays a role as a strategic management framework, AI as a technological instrument to strengthen efficiency and effectiveness, and law as a normative foundation that ensures the protection of rights and certainty for all stakeholders, especially students. Without a balanced synthesis, digital transformation can lead to an imbalance between technological innovation and legal protection.

In the context of vocational education, digital transformation management functions to guide the use of AI in harmony with institutional goals and the needs of the world of work. AI provides data-driven support for learning, evaluation, and academic services, while the law ensures that the entire process runs ethically, transparently, and responsibly. (Budiyanto et al., 2024). Floridi et al. (2018) emphasized that the success of AI implementation depends heavily on strong *governance* and legal principles.

Table 4. Conceptual Model of Management Synthesis–AI–Law in Education Vokasi

Dimensions	Key Focus	Role in Vocational Education	Regulatory Basis
Educational Management	Planning, organizing, supervision	Determine the direction of digital transformation and AI use policies	Internal policies of the institution
Artificial Intelligence	Automation, analytics, and personalization	Supporting competency-based learning and academic services	Principles of AI ethics and governance
Law	Protection of rights and legal certainty	Ensuring data security and fairness for students	Law No. 27 of 2022 (PDP Law); Law No. 11 of 2008 jo. Law No. 19 of 2016 (ITE Law)
Students	Legal subjects & system users	Beneficiaries as well as protected parties	Data privacy and security rights

Vocational Institutions	System Responsible	Be responsible for the impact of using AI	Institutional accountability

Table 4 illustrates that the relationships among management, AI, and law are complementary and inseparable. Management functions as a strategic controller, AI as an operational tool, and law as a normative safeguard. Students are placed as the main subjects, not only users of technology but also parties whose rights must be protected. This model confirms that successful digital transformation is human-centered.

This conceptual model also shows that vocational education institutions play a central role in ensuring a balance between innovation and legal compliance. Institutions cannot hand over complete responsibility to AI systems; instead, they must provide policies, oversight mechanisms, and ongoing evaluation. This aligns with the view of Brownsword (2019), who emphasizes the importance of institutional accountability in the use of advanced technology.

In the context of Indonesian law, the use of AI in vocational education must refer to Law Number 27 of 2022 concerning Personal Data Protection (PDP Law). This law emphasizes that personal data is the right of data subjects and must be protected, including student academic data processed by AI systems. Educational institutions, as data controllers, have a legal obligation to ensure the security, confidentiality, and lawful use of data for educational purposes.

In addition, Law Number 11 of 2008 concerning Information and Electronic Transactions, as amended by Law Number 19 of 2016 (ITE Law), is an important legal basis for implementing electronic systems in the educational environment. The ITE Law requires electronic system operators, including vocational education institutions, to ensure the reliability, security, and accountability of the digital systems they use. In the context of AI, this provision reinforces the institution's obligation to prevent misuse of the system and to protect students from losses resulting from technological failures.

Thus, the synthesis of management–AI–law in vocational education must be achieved through adaptive, technology-based, and law-abiding institutional policies. The conceptual model offered in this study views the law not as an obstacle to innovation, but as a foundation that ensures AI-based digital transformation occurs in a fair, safe, and sustainable manner. This finding can be a strategic reference for the Prasetiya Mandiri Polytechnic and other vocational education institutions in designing responsible digital transformation governance.

Discussion

Digital transformation management in vocational education cannot be understood solely as a process of information technology adoption, but rather as a paradigm shift in institutional management as a whole. Digital transformation demands a restructuring of how institutions plan, organize, implement, and evaluate academic and non-academic activities. From a management perspective, technology serves as an enabler, changing work patterns, decision-making processes, and coordination mechanisms across units. Selwyn (2016) emphasized that educational technology should be an integral part of the management systems of educational organizations, not just a stand-alone technical instrument.

In the context of vocational education, digital transformation has a higher urgency than general academic education because of its orientation on job readiness and

industrial needs. Digitalization enables vocational institutions to manage competency-based curricula more flexibly, monitor student learning outcomes in real time, and accelerate the delivery of academic and administrative services. With the support of digital systems, vocational institutions can improve operational efficiency while maintaining the relevance of learning to the development of the world of work. This aligns with the OECD's (2021) view, which emphasizes that digital transformation in education must be directed at strengthening the link between education and labor-market needs.

Furthermore, digital transformation management also demands changes in the institutional decision-making process. Digital systems and data-driven technologies enable vocational education leaders to make more objective, evidence-based decisions. Information on student performance, learning effectiveness, and lecturer performance can be systematically analyzed to support strategic planning. Zawacki-Richter et al. (2019) stated that integrating digital technology and artificial intelligence in higher education offers significant opportunities to strengthen institutional management through comprehensive data analysis.

However, the success of digital transformation management depends heavily on the readiness of human resources and organizational culture. Digital transformation is not only a problem of technological infrastructure. (Hidayad et al., 2024), but also involves changes in attitudes, competencies, and mindsets of the entire academic community (Irawan et al., 2024). Without the readiness of lecturers, education staff, and students, digital technology may not be used optimally. Selwyn (2016) emphasized that resistance to change is the main challenge in the digital transformation of education, so visionary and participatory managerial leadership is needed.

Thus, digital transformation management in vocational education must be understood as an ongoing process that integrates policies, technology, human resources, and organizational culture. This transformation is not the final goal, but a strategic means to improve the quality of education and the competitiveness of graduates. The OECD (2021) emphasizes that educational institutions that can manage digital transformation holistically will be better prepared to navigate the dynamics of social and economic change. Therefore, a systemic and adaptive managerial approach is the primary key to the success of digital transformation in vocational education.

The use of Artificial Intelligence in vocational education management basically aims to increase the efficiency and effectiveness of institutional management. AI enables academic and administrative processes to be carried out more quickly, accurately, and more seamlessly. Zawacki-Richter et al. (2019) emphasized that AI in higher education has the potential to strengthen management functions through large-scale data analysis that was previously difficult to do manually. In the context of vocational education, this ability is essential for monitoring students' achievement of competencies on an ongoing basis.

From a student's perspective, the implementation of AI provides a more personalized and adaptive learning experience. AI-based systems can adapt learning materials to individual students' abilities and needs. Holmes et al. (2019) stated that AI can improve the quality of learning when used as a support for the pedagogical process, rather than as a substitute for educators' roles. Thus, students remain active subjects in learning, while technology serves as a facilitator.

Nonetheless, the use of AI in vocational education management also presents

risks that cannot be ignored. One of the main issues is the potential for algorithmic bias that can affect student performance assessments. AI systems designed without considering the diversity of student backgrounds may result in unfair decisions. Therefore, vocational education institutions need to ensure that the AI systems used are transparent and can be audited academically and ethically.

In addition, over-reliance on AI systems can reduce the humanistic dimension of vocational education. Vocational education is not only oriented towards mastering technical skills, but also the formation of character and work ethic. Therefore, the application of AI in vocational education management must be managed proportionately and oriented towards students' interests. This approach aligns with the views of Holmes et al. (2019), who emphasize the importance of balancing technological innovation and pedagogical values in education.

CONCLUSION

This study concludes that Artificial Intelligence-based digital transformation management in vocational education is a strategic process that is not only oriented towards technology adoption, but also demands a balanced integration between managerial, technological, and legal aspects. The use of AI has been proven to improve the efficiency of learning management and academic services, as well as enable more accurate, data-driven decision-making tailored to student needs. However, the implementation of AI also presents normative challenges, particularly regarding personal data protection, system transparency, and institutional accountability, thereby requiring a law-abiding governance framework. In the context of Indonesian law, the enactment of Law Number 27 of 2022 concerning the Protection of Personal Data and Law Number 11 of 2008 jo. Law Number 19 of 2016 concerning Information and Electronic Transactions is an important foundation for ensuring that the digital transformation of vocational education occurs ethically, safely, and sustainably. Therefore, this study confirms that the success of AI-based digital transformation in vocational education can be achieved only through adaptive management synthesis, the responsible use of technology, and compliance with legal principles that protect students' rights as the main subject of education.

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