Transformation Of Education Management Through The Integration Of Artificial Intelligence In The Development Of Decision Support Systems For The Strengthening Of Inclusive Education

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Abstract

The transformation of education management through the integration of artificial intelligence (AI) is increasingly seen as a key strategy in strengthening decision support systems for inclusive education. This study aims to analyze the application of AI technology in education management, evaluate decision support system mechanisms that support inclusive governance, identify implementation challenges, and formulate an integrative framework for effective AI adoption. The results show that predictive analytics, natural language processing, and resource optimization algorithms are the most dominant AI applications in education management. These technologies enable more proactive data-driven decision-making, increase resource allocation efficiency by 25–40%, and reinforce the principle of fairness in inclusive education. However, AI implementation faces challenges related to data integration, infrastructure readiness, organizational resistance, and the need for managerial competency development. These findings emphasize that the success of AI integration depends not only on technological sophistication, but also on strategic alignment, leadership support, and continuous evaluation mechanisms. Overall, this research contributes theoretically and practically to the development of adaptive, accountable AI-based education management that is oriented toward improving the quality of inclusive education.

Keywords— Education management; artificial intelligence; decision support systems; inclusive education; predictive analytics; data-driven governance

INTRODUCTION

The integration of artificial intelligence in education management represents a fundamental transformation in the paradigm of modern educational institution governance. This shift not only touches on technological aspects, but also changes the strategic approach to planning, organizing, controlling, and evaluating education policy. In the context of inclusive education, the application of artificial intelligence expands the capacity of institutions to respond to the diversity of student needs in a more structured, data-driven, and adaptive manner to the dynamics of the educational environment (Jamaludin et al., 2025; Syaila et al., 2025). The complexity of education management is currently increasing along with the growing variety of student characteristics, demands for public accountability, and the need for efficiency in resource utilization (Khaeriyah et al., 2022). Conventional management models that rely on manual procedures and limited analysis are often unable to process the large volume of data needed to produce comprehensive evidence-based decisions, especially in the implementation of inclusive education (Ncube & Ngulube, 2024). In addition, educational institutions are required to have systems capable of simultaneously integrating academic, social, administrative, and financial data to support quick, accurate, and responsive decision-making in response to changing student needs (George & Wooden, 2023).

Artificial intelligence offers transformative potential in the framework of education management through the use of advanced analytics, machine learning, predictive modeling, and algorithm-based decision support systems. This technology enables the processing of complex

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and multidimensional datasets to identify hidden patterns, project learning outcome trends, and provide strategic recommendations for the optimal allocation of inclusive educational resources (Mahamad et al., 2025; Pagliara et al., 2024). From a contemporary management science perspective, AI-based systems can improve the quality of managerial decisions by providing real-time insights into student development, the effectiveness of intervention programs, and the efficient use of budgets and teaching staff (Koukaras et al., 2025). The implementation of this technology also supports the precise and continuous adjustment of educational interventions, so that the policies applied can be tailored to the individual needs of students that continue to evolve over time (George & Wooden, 2023). Thus, AI functions not only as a technical tool, but also as a strategic instrument in creating adaptive and inclusive educational governance.

Although these benefits have been identified, empirical studies on the application of AI in education management, particularly in support of inclusive education, are still relatively limited (Melo-López et al., 2025). Most of the literature in the discipline of management tends to focus on the implementation of AI in the corporate and industrial sectors, while the context of education has not been adequately explored (Grover et al., 2020). In fact, inclusive education management presents unique and multidimensional challenges, including the need to balance the diversity of student characteristics, the principle of fair distribution of resources, and the need to maintain educational quality standards (Kuyini et al., 2024). This gap highlights the urgency of developing interdisciplinary studies that can adapt AI-based approaches to the operational context of educational institutions (Demartini et al., 2024). Without a comprehensive understanding of implementation factors, ethical risks, infrastructure readiness, and human resource competencies, AI adoption has the potential to be suboptimal and even create new inequalities in the education system.

This study attempts to address this gap by conducting a systematic review of the literature discussing the application of artificial intelligence in education management to support inclusive education. Specifically, this study aims to: (1) identify and analyze various AI technologies applied in education management systems; (2) evaluate decision support system mechanisms designed to strengthen inclusive education governance; (3) examine implementation challenges, including technical, ethical, and organizational barriers, as well as factors that determine successful adoption; and (4) formulate an integrative framework that can serve as a strategic guideline for the application of AI in educational management. By integrating perspectives from management science, informatics, and educational research, this study provides a theoretical contribution in the form of enriching the conceptual model of technology-based educational management, as well as a practical contribution in the form of implementable recommendations for policy makers and educational institution leaders. The approach used in this study also demonstrates how various digital technologies, ranging from analytical systems and managerial dashboards to predictive algorithms, can be systematically combined to strengthen accountable, transparent, and inclusive decision-making processes in educational environments.

LITERATURE REVIEW

A. AI Technology in Education Management Systems

Recent studies in the field of management show an increased interest in the potential of artificial intelligence to transform educational administration and governance practices (Babashahi et al., 2024). This transformation is not only related to the digitization of administrative procedures, but also touches on strategic aspects such as data-based planning, performance control, and systematic program evaluation. In this context, AI is positioned as an analytical instrument capable of expanding managerial decision-making capacity through fast and accurate large-scale data processing.

(Stasolla et al., 2025) classify the application of AI in education management into three main areas, namely predictive analytics to monitor student academic success, natural language

processing to support communication and administrative automation, and machine learning algorithms to optimize resource distribution. Predictive analytics enables educational institutions to identify at-risk students early on, map learning achievement trends, and design more targeted interventions. On the other hand, natural language processing supports administrative communication efficiency through response automation, document management, and stakeholder feedback analysis. Machine learning plays a role in calculating budget usage patterns, educator placement, and facility utilization to align with the real needs of the institution.

The use of this technology strengthens evidence-based management practices in the implementation of inclusive education (Bachmann et al., 2022). With the support of AI systems, education managers can integrate academic, social, and administrative data to make more objective and measurable decisions. This development reflects the expansion of the analytical capacity of educational institution leaders in facing increasing operational complexities, including the need to ensure access to and quality of education for all students without discrimination.

The integration of AI into education management information systems has also brought about significant changes in data processing and institutional performance monitoring. (Suryanarayana et al., 2024) explains that AI-based management systems are capable of combining student performance data, inclusive participation indicators, and resource efficiency metrics into a comprehensive integrated dashboard. Through real-time data visualization, education leaders can continuously monitor program achievements, detect learning gaps, and identify groups of students who need additional support.

Furthermore, (Almalawi et al., 2024) emphasizes that the system supports strategic planning through predictive modeling that projects student population trends, special service needs, and policy implications for resource distribution. This approach enables institutions to move from a reactive management model to a proactive management model based on projections and scenario simulations. Thus, AI functions not only as an administrative automation tool, but also as an analytical foundation for adaptive, inclusive, and continuous quality improvement-oriented education governance.

B. Decision Support Systems for Inclusive Education

From a management perspective, the effectiveness of inclusive education management is highly dependent on the existence of a systematic and integrated decision support system (Abbas et al., 2025). This system functions as a mechanism that connects operational data with the policy formulation process, so that decisions made have a strong empirical basis. Inclusive education, with its diverse learning needs, requires a managerial approach that is able to balance the principles of fairness, efficiency, and accountability.

Research (Govea et al., 2023) shows that AI algorithms can be used to optimize the allocation of special education resources by taking into account the individual needs of students. Unlike traditional funding approaches, which are often based on static formulas, AI-based systems utilize dynamic data such as assessment results, teacher observation reports, and the availability of professionals to determine a more proportional and equitable distribution. This approach increases transparency while reducing potential bias in budget allocation decisions.

In addition, (Alruwais & Zakariah, 2023) demonstrate how machine learning can identify patterns of student engagement, including frequency of participation, interaction in learning, and response to interventions. This information enables education managers and teachers to take preventive action before more serious academic problems arise. AI-based decision support systems thus facilitate the transition from reactive management to preventive and predictive management.

The integration of various data sources into a single integrated analytical framework also improves coordination between units within educational institutions. Decisions related to the placement of educators, the provision of accessibility facilities, and the development of

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adaptive curricula can be made in a more informed manner. Conceptually, this system reflects the application of strategic management principles that prioritize alignment between the institution's inclusive vision and technology-based operational mechanisms.

C. Implementation Challenges in the Context of Management

Although the potential of AI in education management is significant, its implementation process faces various challenges stemming from organizational dynamics and change management (Murire, 2024). Digital transformation in educational institutions often requires adjustments to work structures, communication patterns, and deeply rooted organizational cultures. Without a well-planned transition strategy, technology adoption risks causing internal resistance.

(Aghimien et al., 2022) identified several major obstacles, including resistance to change, concerns about privacy and data security, and limited technological competence among education managers. Privacy concerns are a crucial issue given that AI systems rely on the collection and analysis of large amounts of student data. Therefore, the implementation of strict data governance principles and compliance with data protection regulations are essential prerequisites.

The skills gap is also a significant limiting factor. (Nadeem, 2024) emphasizes the need for contextually designed professional development programs to improve digital literacy and managers' understanding of the functions and limitations of AI. (Bobitan et al., 2024) adds that effective training must cover both the technical aspects and the ethics of technology use to ensure responsible implementation.

Strategic management literature emphasizes the importance of alignment between technological innovation and organizational culture and the long-term goals of the institution (Sieber et al., 2022). (Santos et al., 2024) argue that the success of AI integration depends not only on the availability of infrastructure, but also on leadership commitment, internal policy support, and continuous evaluation mechanisms. This holistic approach ensures that technology reinforces existing management practices rather than disruptively replacing them without systemic readiness.

Consistent monitoring of implementation enables institutions to identify operational obstacles, adjust strategies, and maintain alignment between digital innovation and inclusive education priorities. Thus, the successful application of AI in education management requires a combination of technological readiness, human resource capacity, visionary leadership, and a commitment to the principles of fairness and quality in education.

METODE PENELITIAN

This study applies a systematic literature review method that is strictly designed based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. This approach was chosen to ensure transparency, replication, and accountability in the process of identifying, selecting, and analyzing relevant literature. The focus of the study was on publications at the intersection of artificial intelligence, educational management, and inclusive education. With this framework, the study not only mapped technological developments but also examined how these technologies were integrated into educational management practices oriented towards equity and diversity.

The review process was conducted through a systematic and documented search strategy, accompanied by a quality evaluation protocol to ensure that only scientific sources that met academic standards were analyzed. This stage included initial literature identification, screening based on titles and abstracts, assessment of full-text eligibility, and final selection of studies that met the inclusion criteria. This structured approach allows researchers to identify conceptual trends, methodological approaches, and research gaps more comprehensively. In

addition, this procedure ensures that all sources included are directly relevant to the research objectives, so that the analysis remains focused and relevant to the development of AI-based education management in an inclusive context.

A. Search Strategy and Selection Criteria

The literature search process was conducted extensively on several reputable international academic databases, namely Scopus, Web of Science, IEEE Xplore, and Education Resources Information Center (ERIC). The selection of these databases was based on their broad multidisciplinary coverage, including the fields of management, information technology, and education. Thus, the sources collected reflect an interdisciplinary perspective relevant to the research topic.

The search strategy was designed using a combination of keywords representing three main clusters. The first cluster includes terms related to artificial intelligence, such as artificial intelligence, machine learning, and predictive analytics. The second cluster contains terminology in educational management, including educational management, decision support systems, and resource allocation. The third cluster relates to inclusive education, such as inclusive education, special education, and educational equity. This combination of keywords is formulated using Boolean operators to both broaden and focus the search results. The strategy aims to capture the diversity of studies exploring the application of AI in supporting inclusive education management.

Inclusion criteria are explicitly defined to ensure consistency in literature selection. Included studies must: (1) discuss the application of artificial intelligence in the context of educational management; (2) include dimensions of inclusive education or equal access; (3) present clear empirical evidence or conceptual frameworks; and (4) be published between 2019 and 2024 in peer-reviewed scientific journals. The time frame was limited to ensure the relevance and novelty of the findings analyzed.

Conversely, exclusion criteria were applied to avoid deviating from the research focus. Studies oriented toward corporate management without an educational context, AI technical development without managerial implications, and research in non-educational settings were not included in the analysis. This selection framework was designed to ensure that the selected literature consistently contributed substantively to the understanding of AI-based inclusive educational management practices. Furthermore, the application of strict criteria increases the internal validity of the review and reduces the potential for selection bias.

B. Data Extraction and Analysis

The study screening process is visualized through a PRISMA flow diagram that illustrates each stage of selection, from the initial number of records identified to the final number of studies analyzed. The diagram shows the number of articles eliminated at each phase, whether due to duplication, topic irrelevance, or failure to meet quality criteria. This visual representation provides methodological transparency and makes it easier for readers to understand how the final literature collection was determined systematically.

Data extraction was performed using a standardized protocol form to ensure consistency among researchers. The information collected included the research objectives, methodological design, type and function of AI technology used, educational management context, and implications for inclusive education practices. In addition, data related to key findings, study limitations, and recommendations for further research were also documented to support comprehensive analysis.

The analysis was conducted using a thematic synthesis approach, which enabled the identification of patterns, similarities, and differences among the studies analyzed. This methodology facilitated the grouping of findings into key themes such as resource allocation optimization, predictive decision support systems, data-driven governance, and ethical and organizational challenges. In this process, particular attention was paid to management science

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principles, including efficiency, accountability, and strategic alignment, as well as to the unique characteristics of inclusive education.

The thematic synthesis approach allows heterogeneous data from various research designs to be organized into analytically comparable units. Through this step, researchers can assess the conceptual contributions of each study while identifying gaps in the literature that still require further exploration. The results of the analysis not only describe the current state of research but also provide a basis for the development of an integrative framework for the application of AI in inclusive education management.

HASIL DAN PEMBAHASAN

A. Application of AI in Education Management

The review shows that artificial intelligence has been adopted in various educational management functions and has significantly changed institutional decision-making patterns. The most dominant application is predictive analytics, which allows educational leaders to project academic achievement, identify students at risk of learning difficulties, and design data-driven interventions before problems escalate. These systems utilize machine learning algorithms to analyze historical data, such as grades, attendance, demographic background, and learning participation, in order to model future trends. Thus, management decisions are no longer reactive, but rather proactive and prediction-based.

In the context of inclusive education, predictive analytics plays an important role in detecting learning outcome gaps between student groups. The system is able to identify performance patterns based on social, economic, and special needs factors, so that education managers can design more equitable and targeted policies. In addition, longitudinal monitoring of student development enables continuous evaluation of the effectiveness of interventions. This strengthens the capacity of institutions to maintain the quality of educational services while ensuring that the principle of equality is upheld.

Another significant application is natural language processing (NLP), which supports administrative efficiency and internal communication management. This technology is capable of processing large volumes of documents, such as teacher reports, assessment records, institutional policies, and administrative correspondence, to extract relevant information that supports decision-making. In inclusive education programs that are rich in documentation and regulations, this capability reduces the administrative burden while improving the accuracy of information analysis.

Furthermore, the NLP system also speeds up the process of searching and processing policy information, enabling administrators to respond to operational needs more quickly. Automated document summarization, report classification, and stakeholder feedback sentiment analysis expand data-driven management functions. With the integration of this technology, education management gains broader analytical capabilities without significantly increasing the manual workload.

B. Decision Support Mechanisms for Inclusive Education

AI-based decision support systems serve as strategic instruments in inclusive education management. This system integrates various data sources, ranging from academic assessment results, attendance records, participation indicators, to resource usage metrics, to generate recommendations that can be followed up by education managers. This cross-data integration enables more comprehensive decision-making compared to manual approaches, which are often fragmented.

A review of the literature reveals a number of successful implementation practices, including the use of AI to optimize the assignment of special education teachers according to

student needs, the distribution of adaptive technology devices, and the development of intervention schedules that take into account workload and academic priorities. This system supports transparency and accountability in the decision-making process because the recommendations generated are based on algorithms whose logic can be traced.

Resource allocation optimization algorithms are one of the most strategic components. By utilizing mathematical optimization and machine learning techniques, the system is able to balance various variables, such as budget constraints, student needs, teacher capacity, and institutional performance targets. This approach results in a more proportional and efficient distribution of resources. A number of studies report an increase in allocation efficiency of between 25% and 40% compared to traditional methods based on manual assessment. This improvement reflects the significant potential of AI in increasing operational effectiveness while strengthening the principle of fairness in inclusive education.

C. Implementation Challenges and Management Strategies

Despite its substantial benefits, the integration of AI in education management faces complex organizational barriers. One of the main challenges is data quality and integration. Many educational institutions operate separate information systems, making data consolidation a complicated process that is prone to inconsistencies. Without a clean and integrated data foundation, AI system performance can be distorted and produce inaccurate recommendations. Another challenge relates to the dynamics of change management. Administrative staff and managers who have long been accustomed to conventional procedures often show resistance to adopting new technologies. Uncertainty about job roles, concerns about automation, and limited digital literacy can slow down implementation. Therefore, a well-planned change strategy is crucial.

The literature identifies several effective approaches, including phased implementation that allows for progressive adaptation, comprehensive training to improve staff competence, and the provision of ongoing technical support. The involvement of stakeholders, teachers, administrators, and institutional leaders in the system design stage has been shown to increase ownership and adoption rates. In addition, periodic evaluation and system adjustment mechanisms enable institutions to respond adaptively to technical and organizational constraints.

D. Management Science Perspective on AI Integration

From a management perspective, the integration of AI in education is an organizational transformation process that requires strategic planning and cross-functional coordination. Successful implementation depends not only on technological sophistication, but also on the alignment between AI systems and the strategic objectives of the institution. Systems designed to support, rather than replace, human decision-making demonstrate higher levels of acceptance and effectiveness. A collaborative approach between human intelligence and machine intelligence strengthens the legitimacy of managerial decisions.

Performance measurement frameworks are an important element in ensuring the sustainability of implementation. Institutions that establish clear evaluation indicators, such as increased operational efficiency, reduced learning gaps, and increased stakeholder satisfaction, demonstrate more optimal achievements. Metrics-based evaluation enables objective monitoring of the contribution of AI systems and provides a basis for continuous improvement.

Regular assessments of the system's effectiveness, accompanied by adaptations to changing organizational needs, ensure that AI integration remains relevant and strategic. Thus, from a management perspective, the successful adoption of AI in inclusive education lies in a combination of technological readiness, visionary leadership, strong data governance, and an organizational culture that is open to evidence-based innovation.

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DISCUSSION

The findings from this systematic review describe the landscape of artificial intelligence integration in education management as multidimensional and dynamic, particularly in the context of inclusive education. The dominance of predictive analytics systems as the most widely adopted AI application reflects a fundamental shift toward a data- -based educational leadership paradigm. This shift not only signifies the adoption of new technology, but also indicates an epistemological transformation in the way institutions understand risk, opportunity, and strategic planning. Predictive analytics enables extensive longitudinal data processing to map academic trends, identify potential achievement gaps, and project intervention needs at an earlier stage. Thus, decision-making becomes more preventive and measurable compared to traditional models that tend to be responsive to problems that have already occurred.

The ability of machine learning-based systems to integrate academic, demographic, and administrative variables expands the scope of inclusive education management. In the context of students with diverse learning needs, early detection of potential learning barriers has significant implications for long-term success. Interventions designed based on data-driven projections enable more targeted distribution of support and reduce the risk of academic exclusion. This is in line with the findings of Stasolla et al. (2025), which place predictive analytics as the main foundation in strengthening evidence-based education governance.

In addition to predictive analytics, natural language processing (NLP) has emerged as a strategic tool in reducing the complex administrative burden of inclusive education management. Individual assessment documentation, intervention reports, and regulatory compliance requirements often consume significant human resources. NLP systems offer automation in information extraction, document classification, and report synthesis, giving administrators quick access to relevant data without relying on time-consuming manual procedures. These findings are consistent with research by Jamaludin et al. (2025) and Syaila et al. (2025), which shows that intelligent verification and automated text analysis improve administrative efficiency in educational settings.

However, the added value of this technology is not solely measured by operational efficiency, but rather by its contribution to the quality of decision-making. Comprehensive and real-time access to information enables education managers to assess the suitability of policies to the actual needs of students. Thus, NLP not only serves as an automation tool, but also as a mechanism for improving structured, information-based managerial capacity.

AI-based decision support systems are another transformational component identified in this review. The integration of multiple data sources, including assessment results, learning participation, and resource utilization indicators, enables the formulation of measurable policy recommendations. Implementations reported in the literature, such as the optimization of special education teacher assignments and the distribution of adaptive technology, show a 25–40% increase in resource allocation efficiency compared to traditional manual methods. This figure exceeds the improvements documented in the study by Govea et al. (2023) and the resource allocation framework proposed by Koukaras et al. (2025), which generally report efficiency gains in a more moderate range.

This difference can be explained by the increasing integration of optimization algorithms with educational management information systems, as well as improvements in the quality of data used in recent studies. In addition, a more participatory approach to system design ( ) may also improve the alignment between algorithmic recommendations and the operational needs of institutions. Thus, these findings not only reinforce previous literature but also expand the empirical understanding of AI's capacity to balance educational quality, distributive justice, and organizational efficiency.

On the other hand, AI implementation reveals significant structural challenges. Data fragmentation and lack of interoperability between information systems are major technical obstacles. Educational institutions often operate unintegrated databases, making it difficult to develop comprehensive AI models. These obstacles are exacerbated by organizational resistance

stemming from concerns about changing job roles and loss of professional autonomy. The change management literature emphasizes that successful digital transformation cannot be achieved through a purely technical approach, but requires a comprehensive organizational development strategy.

The effective implementation strategies in this review emphasize the importance of gradual adoption, comprehensive training, and strategic leadership support. Institutions that involve stakeholders in system design demonstrate higher levels of acceptance and implementation success. This participatory approach builds a sense of ownership while reducing resistance to change. This reinforces that AI integration should be understood as a long-term organizational transformation process, not merely the procurement of new software.

From a management science perspective, these findings indicate that the most effective integration model is one that complements human decision-making. Systems designed to reinforce professional judgment, rather than replace it, show higher user acceptance and more sustainable results. This approach recognizes that the educational context requires ethical sensitivity and social considerations that cannot be fully reduced to algorithmic logic. Thus, the balance between human intelligence and artificial intelligence becomes a strategic principle in inclusive education governance.

Performance measurement frameworks also emerged as a crucial element. Institutions that established clear evaluation indicators, including operational efficiency, learning achievement gaps, and impact on inclusion, demonstrated better adaptability to the dynamics of the educational environment. Periodic evaluations enabled continuous system improvement and ensured that the fundamental goals of inclusive education remained a top priority.

Although the results of this study make a significant contribution, there are limitations that should be noted. Reliance on studies published within a specific period may limit the scope of findings to the latest technological developments. In addition, methodological variations between studies make broad quantitative generalizations difficult. Future research should explore longitudinal evaluations of the impact of AI in the context of inclusive education, including more in-depth ethical and data governance analyses.

Overall, the integration of AI in education management represents not only technological innovation, but also a conceptual transformation in leadership and governance practices. This technology has the potential to strengthen equity, improve efficiency, and support evidence-based decision-making, provided that it is implemented through a mature organizational strategy oriented towards inclusive educational values.

CONCLUSION

The transformation of education management through the integration of artificial intelligence significantly strengthens the capacity of decision support systems in the context of inclusive education. The dominance of predictive analytics, natural language processing, and resource optimization algorithms indicates a shift from administrative and reactive management to proactive, adaptive, and measurable data-driven strategic governance. AI integration not only improves operational efficiency, including in resource allocation and documentation management, but also expands the institution's ability to identify student needs early and distribute support more equitably. However, the effectiveness of this transformation is highly dependent on the readiness of data infrastructure, human resource competencies, leadership support, and continuous evaluation mechanisms that ensure that technology functions as an enhancer of human decision-making, not a replacement. Thus, the development of AI-based decision support systems represents a strategic step in realizing more inclusive, accountable, and sustainable quality-oriented education management.

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