



Orchestrating Educational Innovation in the Digital Era: A Literature Review on School Implementation Strategies and Challenges

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Abstract

Digital transformation has fundamentally reshaped educational systems, requiring schools to adopt effective innovation management practices to improve learning quality and institutional performance. This study aims to analyze educational innovation management in the context of digital transformation by examining implementation strategies, identifying the factors supporting successful innovation, exploring barriers encountered by schools, and synthesizing effective management practices based on recent research. The study employed a qualitative approach using a Systematic Literature Review (SLR). Relevant articles published between 2022 and 2026 were systematically collected from Google Scholar and Garuda databases and analyzed through content analysis. The findings reveal that successful educational innovation management depends on integrating top-down policy direction with bottom-up stakeholder participation, supported by strategic planning, innovative leadership, teacher digital competence, technological infrastructure, and organizational collaboration. However, the implementation process continues to face challenges, including limited digital competencies, inadequate technological infrastructure, resistance to organizational change, and financial constraints. The study implies that effective educational innovation management requires a balanced combination of policy support, institutional capacity, and stakeholder engagement to establish adaptive, sustainable, and high-quality educational systems capable of responding to the demands of continuous digital transformation.

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INTRODUCTION

Digital transformation has become one of the most influential forces shaping contemporary society, fundamentally changing how people communicate, work, access information, and acquire knowledge. In the education sector, this transformation has created unprecedented opportunities to improve learning quality, institutional effectiveness, and educational accessibility through the integration of digital technologies. Schools are increasingly expected to develop adaptive learning environments that prepare students with competencies required for the twenty-first century while responding to rapidly evolving technological advancements (Habsy et al., 2024). The widespread adoption of online learning platforms, digital devices, and educational applications demonstrates that technology is no longer an optional supplement but an essential component of modern educational practice (Djani, 2020). Furthermore, digital transformation has expanded opportunities for personalized learning, collaborative knowledge construction, and flexible educational delivery, enabling schools to respond more effectively to diverse learner needs (Stevens et al., 2024; Munfiatik, 2023). These developments indicate that managing educational innovation has become a strategic necessity for ensuring that educational institutions remain relevant, resilient, and capable of delivering sustainable improvements in educational quality.

Despite the growing adoption of digital technologies in education, many schools continue to encounter substantial challenges in managing innovation effectively. Digital transformation extends beyond the simple adoption of technological tools and requires comprehensive organizational change involving leadership, curriculum development, teacher professional competence, and institutional governance (Alfiana, 2021). Educational innovation has therefore become an essential mechanism through which schools redesign teaching practices, strengthen management systems, improve educator competencies, and create learning environments that better address societal and student needs (Nurhasanah et al., 2025; Ferdino et al., 2025). However, the successful implementation of innovation depends heavily on systematic innovation management that guides the processes of planning, organizing, implementing, monitoring, and evaluating institutional change (Jelantik & Gunawan, 2023). Previous studies also emphasize that effective innovation management enables schools to optimize organizational resources while maintaining alignment with educational objectives (Yusuf et al., 2021; Rubia-avi, 2023). Consequently, ineffective management rather than technological limitations alone frequently becomes the primary obstacle preventing educational innovation from achieving sustainable outcomes.

Existing literature has extensively examined educational innovation from diverse perspectives, including curriculum reform, digital learning integration, teacher professional development, educational leadership, and technology-enhanced learning environments. Many studies have demonstrated that educational innovation contributes significantly to improving instructional quality and institutional performance when supported by appropriate technological and organizational conditions (Pankaew & Chanowan, S., 2025). Other researchers have explored different implementation approaches, highlighting that top-down strategies generally emphasize policy direction and institutional regulation, whereas bottom-up approaches encourage teacher initiative, collaborative decision-making, and locally

driven innovation (Sharma et al., 2023; Riezanova, 2023). The literature also recognizes that both approaches possess distinct advantages and limitations that influence innovation effectiveness in different educational contexts (Ferdinan, B., 2021). Furthermore, recent studies consistently report that innovation implementation continues to encounter barriers related to limited digital competence, unequal technological infrastructure, organizational culture, financial constraints, and resistance to change, all of which reduce schools' capacity to achieve sustainable digital transformation (Rubalcaba, 2022; Supardi, S., Idris, A., 2025).

Although previous studies have substantially advanced the understanding of educational innovation, the existing body of literature remains fragmented in explaining how innovation should be strategically managed during digital transformation. Most studies concentrate on specific dimensions of innovation, such as curriculum development, technology integration, digital learning effectiveness, or teacher competency improvement, without comprehensively examining the managerial processes that determine whether innovation can be sustained across educational institutions (Pankaew & Chanowan, S., 2025). Similarly, investigations into digital transformation frequently emphasize technological adoption while providing limited discussion of planning, organizational coordination, resource management, leadership, and evaluation mechanisms that support successful implementation. Consequently, educational innovation management is often treated as a supporting element rather than the central driver of organizational transformation (Kustomo, 2025). This fragmented perspective creates a significant research gap because schools require integrated management frameworks capable of coordinating technological, organizational, and human resource dimensions simultaneously. Furthermore, limited attention has been devoted to understanding how innovation strategies and implementation barriers interact throughout the digital transformation process (Singun, 2025).

Addressing this gap requires a broader perspective that positions educational innovation management as a comprehensive organizational process rather than merely a technological intervention. The novelty of this study lies in its integrated synthesis of innovation implementation strategies, managerial practices, enabling factors, and implementation barriers within the context of digital transformation. Unlike previous studies that predominantly evaluate isolated innovations or measure the effectiveness of particular technologies, this study examines how innovation is planned, organized, implemented, and sustained through complementary management approaches supported by leadership, human resources, organizational culture, and technological infrastructure. Such an integrative perspective is increasingly important because digital transformation continues to reshape educational governance and institutional decision-making at multiple levels (Freser, 2025). By synthesizing recent evidence, this study provides a more comprehensive conceptual understanding of educational innovation management that can strengthen institutional readiness for continuous change while supporting adaptive and sustainable educational development (Akhmad, 2025).

Based on these considerations, this study aims to analyze educational innovation management in the context of digital transformation through a literature review approach. Specifically, the study examines innovation implementation strategies adopted by schools, identifies the organizational and contextual factors

supporting successful implementation, explores the barriers that hinder innovation processes, and synthesizes evidence into a comprehensive management perspective. The underlying argument of this study is that successful digital transformation cannot be achieved solely through technological investment but requires systematic innovation management integrating strategic leadership, organizational capacity, stakeholder participation, and continuous evaluation. A literature-based approach enables the synthesis of diverse empirical findings and conceptual developments to generate a comprehensive understanding of educational innovation management in contemporary educational settings (Sugiarti et al., 2025). Therefore, this study contributes theoretically by enriching the discourse on innovation management in education and practically by providing evidence-based recommendations for policymakers, school leaders, and educators seeking to implement sustainable educational innovation in the digital era.

RESEARCH METHOD

This study employed a qualitative approach with a literature review to examine educational innovation management in the face of digital transformation, specifically regarding implementation strategies and obstacles in schools. The literature review method was used to gain a comprehensive understanding through the analysis of various research findings and relevant scientific sources (Waruwu, 2023). Research data was obtained from scientific journal articles accessed through Google Scholar and Garuda using keywords related to educational innovation management, digital transformation, innovation implementation, and obstacles to educational innovation. The literature used was limited to articles published between 2022 and 2026 and relevant to the research focus.

Data analysis was conducted using content analysis techniques, which aim to systematically identify, categorize, and interpret various research findings (Nurhayati, 2023). The selected literature was then classified based on main themes: educational innovation management, innovation implementation strategies, top-down and bottom-up approaches, and obstacles to innovation in schools. The results of the analysis are presented descriptively to obtain a comprehensive picture of educational innovation management strategies in the face of digital transformation. The literature synthesis process is carried out to find patterns, relationships, and trends in research findings so that conclusions can be drawn that are in accordance with the study objectives (Mardhotillah, 2023).

RESULT AND DISCUSSION

The Concept of Educational Innovation Management in the Era of Digital Transformation

Digital transformation has driven significant changes in the education system, encompassing aspects of learning, school management, and human resource development. These changes require educational institutions to adapt to rapid and continuous technological developments. This adaptability is inseparable from the implementation of innovations designed to improve the effectiveness and quality of educational services. Educational innovation focuses not only on the use of technology but also encompasses updates to learning methods, evaluation systems, school governance, and educator competency development. This demonstrates that

innovation is a crucial factor in supporting the success of digital transformation in the educational environment.

Educational innovation management is a process involving the planning, organization, implementation, and evaluation of various forms of innovation aimed at improving the quality of education. This concept positions innovation as part of an organizational strategy that must be managed systematically to produce sustainable change (Anwar et al., 2025). The success of educational innovation is influenced by the institution's ability to identify the need for change, manage resources, and create an organizational culture that supports creativity and continuous learning (Danganan & Gamboa, 2025). The role of innovation management is becoming increasingly important because schools are not only required to keep up with technological developments but also to effectively integrate these technologies into educational practices (Liu, 2025). The existence of a sound management system enables the innovation process to be more focused and aligned with the desired educational goals.

The development of digital technology has given rise to an increasingly diverse range of educational innovations. The use of online learning platforms, learning management systems, interactive learning media, and artificial intelligence are just a few examples of innovations widely implemented in schools. These innovations provide opportunities for schools to improve the accessibility, flexibility, and quality of learning (Nirsal, 2025). The use of technology also enables personalized learning that better suits students' needs (Jarkawi & Hartanto, 2025). The effectiveness of these innovations depends heavily on the school's ability to manage the change process in a planned and sustainable manner.

Successful management of educational innovation requires the involvement of various parties within the education ecosystem. The principal acts as a change leader responsible for directing and facilitating the innovation process (Mehmood et al., 2025). Teachers act as implementers and developers of innovation, interacting directly with students during the learning process (Hasmirati, 2026). Support from the government, parents, and the community is also crucial in creating a conducive environment for innovation implementation. Collaboration among these stakeholders is a crucial foundation for building a culture of innovation that can support sustainable digital transformation.

Educational Innovation Implementation Strategy in Schools

Implementing educational innovation is the process of applying new ideas, methods, or technologies aimed at improving the quality of education delivery. The success of innovation implementation is determined not only by the quality of the innovation developed, but also by the organization's readiness to manage the changes that occur. Schools, as educational organizations, need a clear strategy so that innovations can be implemented effectively and have a positive impact on learning (Qurtubi, 2024). An appropriate implementation strategy enables various innovation programs to run according to their stated objectives (Carmo et al., 2025). This process also helps schools minimize the risk of failure in implementing innovations.

Careful planning is a crucial first step in implementing educational innovation. Schools need to identify needs based on the conditions and problems faced before determining the type of innovation to be implemented. The results of this identification form the basis for developing innovation programs that are appropriate

to the characteristics of students, teachers, and the school environment (Yuna et al., 2025). Good planning also includes setting goals, providing resources, and developing indicators of innovation success (Sismanto et al., 2024). A clear plan will facilitate schools in implementing and evaluating innovation programs on an ongoing basis.

Strengthening human resource capacity is a crucial strategy in supporting the implementation of educational innovation. Teachers, as the primary implementers of innovation, need to have adequate competencies to adapt to various changes (Solahudin et al., 2025). Training programs, mentoring, and ongoing professional development are efforts that can be undertaken to improve teacher readiness to implement innovation (Quaicoe et al., 2023). Competency improvement is not only related to technical skills in using technology, but also encompasses pedagogical and managerial capabilities (Novriyanto & Jaenudin, 2026). The availability of competent human resources will increase the chances of innovation success in the school environment.

The use of digital technology is also a crucial part of the strategy for implementing educational innovation. Various digital learning platforms enable a more flexible and interactive learning process. Technology helps teachers develop more creative learning methods and facilitates student access to learning resources (Luo, 2025). The appropriate use of technology can increase the effectiveness of learning while expanding learning opportunities for students. A school's ability to integrate technology into the learning process is one indicator of the successful implementation of educational innovation in the digital era.

Top-Down and Bottom-Up Approaches in Implementing Educational Innovation

The implementation of educational innovation in schools is generally carried out through top-down and bottom-up approaches. The top-down approach is innovation originating from government or educational authority policies, which are then implemented by schools as implementers. Various programs such as school digitalization, new curriculum implementation, and strengthening teachers' digital competencies are examples of innovations often developed through this approach (Zogopoulos & Panagiotopoulos, 2025). The top-down approach has the advantage of clear policy direction and strong regulatory support (Mustafa, 2025). The existence of structured policies allows innovation to be implemented more widely and standardized.

The bottom-up approach is innovation that arises from the needs and initiatives of the school community, particularly the principal and teachers. Innovations developed through this approach are usually more appropriate to the real conditions and needs faced by the school (Baharuddin et al., 2024). Teachers have the opportunity to develop various innovative learning strategies tailored to the characteristics of students and the learning environment (Cruz & Paglinawan, 2025). This approach also encourages creativity and the active participation of the entire school community in the change process (Dacholfany et al., 2024). The acceptance rate of innovation tends to be higher because the development process involves those who will implement the innovation.

The effectiveness of educational innovation implementation cannot rely on a single approach. Top-down and bottom-up approaches need to be combined in a balanced manner for optimal innovation (Putra et al., 2025). Government policies can

provide clear direction and support, while school-based initiatives allow innovation to be tailored to local needs (D.S et al., 2024). The synergy of these two approaches will result in a more adaptive, participatory, and sustainable innovation process (Elkordy & Iovinelli, 2021). Collaboration between stakeholders is key to achieving successful educational innovation in the era of digital transformation.

Barriers to Implementing Educational Innovation in Schools

Although educational innovation offers numerous benefits in improving the quality of learning, its implementation still faces numerous obstacles. One of the most frequently encountered obstacles is the limited digital competence of educators. Not all teachers possess the same ability to utilize technology as a learning tool (Gkrimpizi et al., 2023). These differences in digital literacy levels cause innovation adoption to occur at varying speeds in each school (Qureshi & Baig, 2025). This situation indicates that improving teacher competence is an urgent need to support the digital transformation of education.

The availability of technological infrastructure also poses a challenge that impacts the successful implementation of educational innovation. Many schools still face limited internet access, digital devices, and technology-based learning support facilities (Onan, 2024). This situation prevents the optimal use of digital innovation. The infrastructure gap between urban and rural areas also widens the gap in the quality of educational services (Holilah & Hajjaj, 2024). These obstacles demonstrate that digital transformation requires adequate support facilities for innovation to be effective.

An organizational culture that is less supportive of change can also hinder the implementation of educational innovation. Some educators and education personnel still show resistance to change because they feel comfortable with long-established work methods (Dhaniel et al., 2024). Concerns about increased workloads or the inability to operate technology are often reasons for resistance to innovation (Amiri, 2025). This situation can hinder the change process and delay the achievement of innovation goals. Building an organizational culture open to change is a crucial step in overcoming these obstacles.

Funding limitations also impact the sustainability of educational innovation programs. Implementing innovation often requires significant investment in technological equipment, human resource training, and the development of other supporting systems (Sliwka et al., 2023). Schools with limited budgets tend to struggle to sustain innovation programs over the long term (Okunlola, 2024). This challenge demonstrates that adequate financial support is a crucial prerequisite for successful digital transformation in the education sector. The availability of sustainable funding sources will help schools develop innovation more optimally.

Strategy for Strengthening Educational Innovation Management

Strengthening educational innovation management requires leadership capable of driving positive change. School principals play a strategic role in developing an innovation vision, mobilizing resources, and creating an environment conducive to the development of new ideas (Mexhuani, 2024). Innovative leadership will foster an organizational culture open to learning and change (Brunetti et al., 2020). Leadership support can also increase teacher motivation to participate in various innovation

programs (Diener & Špaček, 2021). The role of the principal is crucial in ensuring the sustainability of digital transformation in the school environment.

Continuous improvement of human resource competencies is necessary to support the success of educational innovation. Training programs, workshops, learning communities, and professional mentoring can be a means to enhance teachers' abilities in managing innovation-based learning (Galvis & Carvajal, 2022). Competency development focuses not only on technological mastery but also encompasses critical thinking, creativity, collaboration, and problem-solving skills (Cheng & Wang, 2023). These abilities are necessary for teachers to design learning that is relevant to the needs of students in the digital age (Fenwick et al., 2024). Investing in human resource development is a strategic step in building a culture of sustainable innovation.

Collaboration between schools, the government, the community, and various education partners is a crucial factor in strengthening the implementation of educational innovation. Strong cooperation allows for the availability of resources, funding, and access to various good practices that schools can adapt (S.Pettalongi, 2025). Utilizing collaborative networks also helps schools find solutions to various challenges faced in the innovation process. A collaborative environment will accelerate the exchange of knowledge and experience between stakeholders. Strengthening collaboration is one strategy that can improve the effectiveness of educational innovation management in the face of digital transformation.

CONCLUSION

This study demonstrates that successful educational innovation in the era of digital transformation depends not merely on technology adoption but on effective innovation management that integrates strategic planning, leadership, organizational capacity, and stakeholder participation. The findings highlight that combining top-down policy direction with bottom-up school initiatives creates a more adaptive, participatory, and sustainable innovation process while addressing barriers related to digital competence, infrastructure, funding, and resistance to change. The study contributes to the literature by providing a comprehensive synthesis of educational innovation management and proposing an integrated perspective that links implementation strategies, enabling factors, and organizational challenges. Nevertheless, the study is limited by its reliance on published literature and the diversity of educational contexts represented in the reviewed studies. Future research should empirically validate the proposed management framework across different educational levels and examine its long-term influence on digital transformation, institutional effectiveness, and educational quality.

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