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EVIDENCE-BASED APPROACHES TO EDUCATIONAL TECHNOLOGY ADOPTION

Sahri Romadon*[1]
MTs NU 24 Darul Ulum, Indonesia
Email: briansyahrina@gmail.com

Mohamad Munief
MTs NU 18 Salafiyah, Indonesia
Email: matematikamunief@gmail.com

Alifatut Tadzkiroh
MTs NU 01 Cepiring, Indonesia
Email: aliftutut430@gmail.com

Marfuah
MTs NU 14 Kaligading, Indonesia
Email: jumalimarfuah@gmail.com

Ahmad Nurhalim
MTs NU 20 Kangkung, Indonesia
Email: wisnuhalim429@gmail.com

Abstract

This study aims to analyze the evidence-based approach to educational technology adoption by examining research findings regarding success factors, benefits, challenges, and implementation strategies within educational settings. A literature review approach was employed to identify, examine, and synthesize relevant research on the utilization of educational technology. The findings indicate that successful adoption is influenced by the quality of empirical evidence, the readiness of educators and learners, digital competence, institutional support, the alignment of technology with pedagogical goals, ease of use, infrastructure availability, and policy support. An evidence-based approach enables educational institutions to select and implement technologies based on proven effectiveness rather than merely on technological trends. Furthermore, continuous evaluation is essential to ensure that technology usage yields tangible impacts on learner engagement, experience, and learning outcomes. Thus, the application of evidence-based approaches can serve as a strategic foundation for institutions to build a technology-enabled learning ecosystem that is effective, adaptive, sustainable, and oriented toward learning needs.

[1] Correspondence author

Keywords: Educational Technology Adoption, Evidence-Based Approach, Digital Transformation, Technology-Based Learning, Learning Effectiveness

INTRODUCTION

The advancement of digital technology has brought about significant changes in various aspects of life, including the delivery of education. The use of educational technology is no longer viewed merely as a supplement to the learning process; rather, it has evolved into a crucial component for achieving educational goals (Escueta et al., 2017). Various forms of technology—such as digital learning platforms, learning management systems, interactive applications, artificial intelligence, learning analytics, digital learning resources, and online collaboration tools—offer educational institutions the opportunity to create learning processes that are more flexible, interactive, and adaptive. This shift has gained momentum alongside the growing need for learning models capable of adapting to the characteristics of learners and the dynamics of the educational environment (Chugh et al., 2023a). However, the mere availability of various technologies does not automatically guarantee a positive impact on the quality of learning.

The adoption of educational technology is fundamentally a complex process involving pedagogical, technological, institutional, and human dimensions. Decisions to adopt a specific technology are often driven by its popularity, emerging digital trends, institutional modernization demands, or perceptions regarding its ease of use. Such conditions can lead to problems if adoption decisions are not grounded in learning needs and empirical evidence regarding the technology's effectiveness (Cukurova et al., 2019a). Technology featuring advanced capabilities is not necessarily aligned with learning objectives, learner characteristics, educator competencies, or an institution's infrastructure. Therefore, the decision-making process for adopting educational technology should be guided by a more systematic, evidence-based approach to ensure that technology investments yield genuinely accountable educational benefits.

An evidence-based approach provides a vital framework for making more rational choices regarding educational technology. This approach positions empirical evidence as a cornerstone of the processes involved in planning, selecting, implementing, and evaluating technology. The evidence in question relates not only to improved learning outcomes but also encompasses learner engagement, the quality of the learning experience, pedagogical effectiveness, resource efficiency, educator readiness, and implementation sustainability (Yan

et al., 2026a). Consequently, technology adoption should not be based solely on the assumption that a specific technology will enhance learning; rather, it requires support from research findings and evaluations that demonstrate the conditions, contexts, and mechanisms enabling that technology to deliver a positive impact.

Challenges in educational technology adoption also stem from the gap between technological innovation and the readiness of educational institutions. Technological advancements occur relatively rapidly, whereas the capacity of educators, learners, and institutions to adapt does not always evolve at the same pace (Fletcher-Watson, 2015). Many educators still face limitations regarding digital competence, difficulties in integrating technology with pedagogical strategies, and time constraints for learning and developing technology-based instructional practices. Meanwhile, learners exhibit varying levels of digital literacy and access to technological devices. Such disparities indicate that successful technology adoption depends not only on the quality of the devices or applications used but also on the readiness of human resources and the learning environment.

Beyond user-related factors, the availability of infrastructure and institutional support are aspects that cannot be overlooked. Internet access, digital devices, technical support systems, data security, system maintenance, and institutional policies constitute vital components of the educational technology adoption ecosystem. Technology proven effective in one environment may not necessarily yield the same impact when implemented in a setting with different infrastructure conditions, organizational cultures, or user characteristics. Therefore, empirical evidence must be understood within its specific context. It is insufficient for educational institutions merely to know whether a technology is effective; they must also understand the conditions under which it works, the user groups for whom it is suitable, the learning objectives it serves, and the support required for its optimal implementation (Wedlock & Trahan, 2019).

Another increasingly significant issue is the tendency of educational institutions to adopt technology driven by pressures to innovate and demands for digital transformation (Delcker et al., 2025). This phenomenon can lead to "technology adoption without pedagogical alignment"—instances where technology use is not fully integrated with learning objectives and strategies. Under such conditions, technology may serve merely as a medium for content delivery without meaningfully enhancing the quality of the learning experience. Furthermore, improperly designed technology use can increase educators'

workloads, heighten the complexity of the learning process, or create an over-reliance on digital systems (Kuromiya et al., 2020). Therefore, the guiding principle for adopting educational technology should not be the modernity of the technology itself, but rather the extent to which it addresses learning challenges and delivers measurable added value.

An evidence-based approach is increasingly relevant, as it enables educational institutions to continuously evaluate the effectiveness of technology. Such evaluations can be conducted by synthesizing various information sources, including research findings, learning data, the experiences of educators and learners, and institutional assessments. The systematic use of data helps decision-makers identify technologies that offer tangible benefits and distinguish them from those that are merely enjoying a fleeting trend (Rahman & Hossain, 2025). Consequently, decisions regarding technology investment and implementation can be made more efficiently and grounded in a stronger academic basis. This approach also fosters a culture of decision-making in education that is more reflective, critical, and focused on quality improvement.

Given these circumstances, the study of evidence-based approaches to educational technology adoption holds great relevance in the current educational landscape. Such study is essential for understanding how empirical evidence can serve as a foundation for selecting, implementing, and evaluating educational technology. It is also crucial for identifying the factors that facilitate successful adoption, including digital competence, pedagogical alignment, institutional support, infrastructure readiness, ease of use, and evaluation mechanisms. By understanding the interrelationships among these factors, educational institutions can avoid adoption decisions driven merely by trends and instead align them with genuine learning needs.

This study aims to synthesize research findings regarding evidence-based approaches to educational technology adoption, specifically focusing on success factors, benefits, challenges, and implementation strategies. It is expected to make a conceptual contribution by reinforcing the understanding of the importance of empirical evidence in educational technology decision-making. From a practical standpoint, the findings can serve as a reference for educators, administrators, and policymakers in designing technology adoption strategies that are more effective, adaptive, inclusive, and sustainable. Consequently, digital transformation in education will not be limited to the mere use of technology but will be directed toward creating learning processes

that genuinely benefit learners and foster the continuous improvement of educational quality.

RESEARCH METHOD

This study employs a literature review method, analyzing various relevant scholarly articles regarding evidence-based approaches to educational technology adoption. Literature was gathered through searches of academic databases using keywords such as "evidence-based approaches," "educational technology adoption," and "digital learning." The data were analyzed descriptively by identifying, categorizing, and synthesizing findings to examine success factors, benefits, challenges, and implementation strategies for evidence-based educational technology.

RESULT AND DISCUSSION

An Evidence-Based Approach to Educational Technology Adoption

An evidence-based approach to educational technology adoption is a decision-making process that relies on research findings and empirical data to determine which technologies to use in instruction. This approach emerged in response to the growing number of available educational technologies, noting that not all of them are equally effective (Mustafa & Noorhidawati, 2020). In an educational context, decisions regarding technology use should not be based solely on popularity, digital trends, or the perception that a specific technology is more modern; rather, they must consider evidence regarding its benefits for the learning process and outcomes. Thus, an evidence-based approach helps educational institutions select technologies in a manner that is rational, measurable, and aligned with user needs.

Empirical evidence regarding educational technology adoption can be derived from various sources, such as prior research, program evaluations, learning activity data, user experiences, and measurements of learning outcomes. These diverse sources provide insight into a technology's effectiveness within a specific context (Stother et al., 2019). For instance, the use of a digital learning platform can be assessed based on learner engagement levels, interaction quality, competency attainment, ease of access, and the educator's ability to integrate the platform into instructional strategies. Consequently, the evidence used should not be limited to a single indicator but should be viewed holistically, ensuring that adoption decisions objectively reflect both the benefits and limitations of the technology.

The use of empirical evidence also plays a crucial role in mitigating the risk of poor decision-making. Educational institutions often face pressure to keep pace with technological advancements to avoid falling behind in the digital transformation. However, adopting technology without adequate assessment can lead to the inefficient use of resources. Expensive technologies with complex features do not necessarily yield better learning outcomes if they do not align with learner characteristics or support pedagogical goals. An evidence-based approach enables decision-makers to consider the relationship between technology investment and the resulting educational benefits (Chugh et al., 2023b). In this way, adoption decisions can be directed toward technologies that offer tangible added value to the learning process. The alignment between technology and learning objectives is a crucial principle in evidence-based approaches. Technology should be selected for its ability to support designed learning methods and activities, rather than merely for its attractive features. Learning objectives should serve as the starting point for determining the type of technology to be used. For instance, if the goal is to develop problem-solving skills, the chosen technology should facilitate activities that allow learners to explore problems, receive feedback, and formulate solution strategies. Conversely, if technology is used solely for one-way information delivery, the potential for interactivity and collaboration may not be fully realized (Wang & Shin, 2022).

This alignment also requires consideration of learner characteristics. Different groups of learners possess varying needs, digital competencies, learning experiences, and levels of access to technology (Mohammadi et al., 2018). Technology that proves effective for one group may not yield the same results for another. Therefore, empirical evidence must be interpreted with the implementation context in mind. Educational institutions need to identify user characteristics before deciding which technology to adopt. Such considerations are vital to ensure that the technology does not create new barriers to learning, particularly for learners with limited access to devices or internet connectivity.

Beyond the needs of learners, educator readiness is a crucial component of an evidence-based approach. Educators act not merely as technology users but also as designers of learning experiences. Even effective technology may yield suboptimal results if educators lack the competence to integrate it with pedagogical approaches. Therefore, evidence regarding technology's effectiveness must be weighed alongside educators' readiness levels and digital competencies. Professional development, training, mentoring, and

opportunities for pedagogical experimentation can strengthen educators' ability to use technology meaningfully (Yan et al., 2026b).

An evidence-based approach also necessitates an evaluation process following technology implementation. Technology adoption is not a decision that concludes the moment a platform or device is put into use. Technology effectiveness requires periodic monitoring to determine whether established goals are truly being met. Evaluation can be conducted by examining changes in learning outcomes, learner engagement, the quality of learning interactions, user satisfaction, and the efficiency of the learning process. The resulting data can then serve as a basis for maintaining, refining, expanding, or even discontinuing the use of specific technologies. This process transforms technology adoption into a cycle of continuous improvement rather than a one-time implementation activity (Cukurova et al., 2019b).

At the institutional level, adopting an evidence-based approach can enhance the quality of decision-making regarding digital transformation. Educational leaders can utilize research findings and internal data to prioritize technology investments, formulate policies, provide training, and develop appropriate infrastructure. This approach also fosters a culture of critical decision-making, as every technological innovation requires consideration of its objectives, benefits, risks, and sustainability. Consequently, technology is positioned as a tool for achieving educational goals rather than an end in itself.

Success Factors and Challenges in Educational Technology Adoption

The successful adoption of educational technology is not determined solely by the availability of devices or the sophistication of applications; rather, it results from the interaction of various factors related to people, pedagogy, infrastructure, and institutions. Technology yields benefits when users possess the ability to utilize it and institutions provide an environment that supports the implementation process (Granić, 2022). Therefore, technology adoption must be viewed as a process of systemic change in learning, rather than merely the procurement of digital devices. Understanding the enabling factors and barriers is crucial to ensuring that the implemented technology genuinely enhances the quality of the learning process and outcomes.

Educators' digital competence is a primary factor influencing the success of technology integration in learning. Educators need the ability not only to operate devices but also to select, evaluate, and integrate technology in alignment with learning objectives. Mastery of technology without pedagogical understanding can result in digital devices simply replacing conventional

methods without bringing about meaningful changes to the learning experience (Feng et al., 2025). Consequently, digital competence must be developed continuously through training, mentoring, hands-on practice, and professional development tailored to learning needs.

Learners also play a pivotal role in the success of technology adoption. Factors such as digital literacy levels, independent learning skills, adaptability, and prior experience with technology influence the quality of technology utilization in learning. Learners with adequate digital skills are generally better equipped to access learning resources, communicate online, use educational applications, and manage digital information. Conversely, limited digital literacy can turn technology into a hindrance during the learning process. Therefore, the implementation of technology must be accompanied by efforts to strengthen digital literacy, enabling learners to use technology effectively, critically, and responsibly (Ahmad et al., 2023).

Infrastructure readiness is another critical factor determining the success of educational technology adoption. Infrastructure encompasses the availability of devices, internet connectivity, digital learning systems, technical support, and other supporting facilities. Well-designed technology cannot be utilized optimally if users face unstable internet connections, device limitations, or systems prone to frequent disruptions. Such conditions can diminish user motivation and create disparities in the learning experience. Therefore, educational institutions must ensure that technology investments are accompanied by adequate infrastructure planning and ongoing system maintenance (Fatima & Qasmi, 2026).

Institutional support is also a crucial factor in the successful adoption of technology. Educational institutions need to provide policies, budgets, training, technical assistance, and an organizational environment that encourages educators to use technology innovatively. Leadership support can boost educators' confidence in trying new teaching approaches and mitigate obstacles that arise during the implementation process. Conversely, if the burden of technology adoption falls solely on educators without organizational support, the integration process may become inconsistent and difficult to sustain in the long term (Hannache-Heurteloup & Moustaghfir, 2020).

Pedagogical suitability is an equally important aspect. Technology should be employed because it bears a clear relationship to learning objectives and enhances pedagogical activities. Selecting technology requires consideration of the material type, learner characteristics, teaching methods, forms of interaction, and the competencies to be achieved. Technology that is easy to

use but irrelevant to learning needs does not necessarily yield optimal benefits. Conversely, technology aligned with pedagogical goals can help create a learning environment that is more interactive, collaborative, personalized, and responsive to learner needs (Hannache-Heurteloup & Moustaghfir, 2020).

Ease of use also influences technology acceptance among educators and learners. Excessively complex systems can increase the user's cognitive load and trigger resistance to change. Users are more likely to accept technology featuring simple interfaces, clear navigation, relevant functions, and adequate support. However, ease of use cannot be the sole criterion for selecting technology; it must be balanced with pedagogical effectiveness, security, accessibility, service quality, and the resulting learning benefits.

In practice, the adoption of educational technology faces various challenges. A common challenge is resistance to change. Some educators may feel comfortable with established teaching methods and thus require time to adapt to new technologies. Resistance may also stem from concerns regarding increased workloads, a lack of technical skills, or negative past experiences with digital systems. These challenges can be mitigated through open communication, continuous training, technical support, and the involvement of educators in technology-related decision-making processes.

The digital divide—or disparities in technology access—is another issue requiring attention. Not all learners possess the devices, internet connections, or learning environments necessary to utilize technology optimally. Such disparities can lead to unequal opportunities to benefit from digital learning. Therefore, technology adoption strategies must prioritize inclusivity and accessibility. Educational institutions need to provide alternatives and support that enable all learners to access equitable learning experiences (Moya & Camacho, 2021).

Another challenge concerns the sustainability of technology use. Adoption driven solely by specific projects or trends may cease once funding, programs, or institutional attention wanes. Ensuring the sustainable use of technology requires long-term planning that encompasses financing, infrastructure maintenance, user competency development, effectiveness evaluation, and system updates. Periodic evaluations are also essential to determine whether the technology remains relevant to evolving learning needs and user circumstances (Alojail et al., 2023).

Strategies for Effective and Sustainable Educational Technology Implementation

Implementing educational technology effectively requires a strategy that goes beyond mere technology selection; it must also consider learning needs, user readiness, institutional conditions, and the sustainability of the implementation (Chugh et al., 2023c). Technology should be chosen based on evidence of its effectiveness and its alignment with learning objectives. Educational institutions need to identify learning challenges before deciding which technologies to employ. With this approach, technology serves as a means to address learning needs rather than merely acting as a symbol of educational modernization. Selecting the right technology can also mitigate the risk of investing in systems that lack relevance or prove difficult for educators and learners to use (Niederhauser et al., 2018).

An implementation strategy can begin by mapping user needs and characteristics. Educators need to understand the desired competencies, learner characteristics, the nature of learning activities, and available resources. Based on these needs, institutions can compare various technological alternatives by considering evidence of effectiveness, ease of use, accessibility, security, cost, and integration capabilities with existing learning systems. A systematic selection process fosters objective adoption decisions and reduces the tendency to adopt technology solely due to popularity or digital trends (Burbules et al., 2020).

Technology deployment should also be carried out in stages to allow users time to adapt. Limited-scale implementation can serve as an initial phase to test the technology's suitability for the learning environment. Results from this initial phase can then inform improvements before the technology is rolled out more widely. This strategy enables institutions to identify technical and pedagogical issues early on and reduces the risk of implementation failure. Furthermore, involving educators and learners in the pilot phase provides direct insights into the user experience insights that may not always be captured through data-driven evaluations alone (Makinde et al., 2024).

Developing user competence is a crucial component of a sustainable implementation strategy. Educators require training that covers not only technical aspects but also methods for integrating technology with pedagogical strategies. Ongoing training helps educators understand when and how to use technology effectively within the learning process. Learners also need to strengthen their digital literacy so they can use technology responsibly to seek information, communicate, collaborate, and complete learning tasks

(Ye et al., 2024). Thus, successful implementation depends not only on the technology itself but also on the human capacity to utilize it effectively.

Continuous impact evaluation is a crucial strategy for ensuring that technology delivers tangible benefits. Evaluations should employ relevant indicators, such as changes in learning outcomes, student engagement levels, interaction quality, user satisfaction, learning efficiency, and the technology's capacity to support competency achievement (Sugiardi & Mujahidin, 2025). Evaluation should not be limited to the end of a program but should be integrated into the entire implementation process. Insights gained from evaluations can determine whether the technology should be retained, improved, further developed, or replaced with a more suitable alternative.

Leveraging learning data can enhance evaluation and decision-making processes. Data generated through digital platforms provides information on student activity, participation patterns, task progress, use of learning resources, and learning achievements. When analyzed correctly, this data helps educators identify student needs and provide more appropriate interventions. Institutions can also use the data to evaluate the technology's effectiveness at the program or organizational level (Hsieh, 2022). However, data utilization must be conducted responsibly, with due regard for security, privacy, transparency, and alignment with educational objectives.

The sustainability of technology implementation also requires robust institutional support. Institutions must establish clear policies regarding technology use, allocate budgets for maintenance, strengthen technical support, and ensure infrastructure availability. Technology successfully implemented in the short term may encounter issues if resources for maintenance and development are lacking. Therefore, technology planning must account for the system lifecycle, hardware upgrade requirements, user competency development, and potential shifts in learning needs. Consistent institutional support fosters an environment where technological innovation can evolve in a purposeful manner.

Developing a digital education ecosystem also requires an adaptive approach. This ecosystem encompasses the interconnections among educators, learners, institutions, infrastructure, learning platforms, policies, and digital resources. Each component must be developed in an integrated fashion to prevent disparities between technological capabilities and user readiness. An adaptive ecosystem enables institutions to respond to technological advancements while maintaining a focus on educational needs. In this context, technological innovation must be coupled with continuous

evaluation and reflection to ensure that changes remain aligned with learning objectives (Sabiteka et al., 2025).

The primary focus of technology implementation must remain on enhancing learning outcomes. Technology usage cannot be deemed successful simply due to high adoption rates or the utilization of numerous features. Success is better measured by the extent to which technology assists learners in comprehending material, improving skills, increasing engagement, and achieving established competencies. Consequently, success indicators should be defined during the planning stage to allow for a more objective measurement of the technology's impact. This principle aligns with an evidence-based approach that grounds decision-making in empirical results.

CONCLUSION

This research indicates that the adoption of educational technology requires an evidence-based approach that considers technological effectiveness, learning needs, user characteristics, and institutional readiness. A review of the literature reveals that successful adoption is influenced by the digital competence of educators and learners, infrastructure readiness, institutional support, pedagogical alignment, and ease of use. Therefore, the selection of technology should not merely follow digital trends but must be grounded in empirical evidence and alignment with learning objectives.

Effective implementation of educational technology requires a systematic and sustainable strategy involving needs assessment, evidence-based technology selection, user competency enhancement, impact evaluation, and the utilization of learning data. Institutional support and the development of an adaptive digital education ecosystem are also essential for maximizing the benefits of technology. Thus, adopting an evidence-based approach can assist educational institutions in developing technology use that is more effective, relevant, and inclusive, while focusing on improving the quality of education and learner outcomes.

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