

## STRATEGIES OF IMPLEMENTATION OF EDUCATION TECHNOLOGY IN MADRASAH

**Siti Maryam** \*<sup>1</sup>

Universitas Islam Zainul Hasan Genggong Probolinggo  
[mmery9988@gmail.com](mailto:mmery9988@gmail.com)

**Haya**

STIB Banyuwangi  
[hayaudin1974@gmail.com](mailto:hayaudin1974@gmail.com)

**Hosaini**

Universitas Bondowoso  
[hosaini2612@gmail.com](mailto:hosaini2612@gmail.com)

### Abstract

The research aims to investigate the strategy of implementation of educational technology in Madrasah, its models and challenges. This research uses literary research methods by searching for references that match the context of the research. Research results show that major obstacles to the implementation of educational technology include inadequate technological infrastructure, a lack of technological literacy among teachers and students, and budget constraints. However, several effective strategies have been identified to address these challenges, including teacher capacity development through technology training, collaboration with stakeholders for resource support, and the use of open-source technology as a cost-effective solution. The research emphasizes the importance of a holistic approach in the planning and implementation of educational technology in the madrasah, which not only focuses on the technical aspects, but also on the development of the competence of teachers and students, as well as adaptation to local social and economic conditions. So, the findings of this research require policies that support the integration of educational technology in the madrasah and closer cooperation between governments, educational institutions, and communities to maximize the benefits of technology in learning.

**Keywords:** Strategy, Implementation, Technology, Education, Madrasah.

### Introduction

The integration of technology into education also plays a vital role in preparing students for the challenges of this digital age. The ability to use technology effectively becomes a fundamental competence that every individual must have. (Sitopu et al., 2024; Guna et al., 2024). Thus, the use of educational technology not only promises to improve the quality of learning, but also supports the development of digital skills of students. This is becoming increasingly important amid the acceleration of digital

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<sup>1</sup> Correspondence author.

transformation in various sectors, including education. (Hairiyanto et al., 2024; Fitriani et al., 2024; Antika et al., 2024). Therefore, educational institutions, including Madrasah, must be able to design and implement strategies for the effective use of educational technology, so that students are not only able to master the material but also become competent and adaptive individuals in the future. (Siskandar, S. 2020).

Madrasah, as an Islamic educational institution, has an important role to play in providing quality and comprehensive education that focuses not only on the scientific aspects of the world, but also on religious knowledge. (Ali et al., 2024). Therefore, the implementation of educational technology in Madrasah has become an urgent need for learning processes to be more effective, efficient, and attractive to students. (Abubakari, M. S. 2021).

The integration of technology into the education system is no longer just an option, but has become an urgent necessity in today's digital age. Rapid technological advances have changed the way we work, communicate, and learn. (Santosa, S., & Jazuli, M. F. 2022). In the context of education, technology can provide wider and deeper access to unlimited learning resources, ranging from digital books, video learning, to interactive simulations. (Tubagus et al., 2023). It opens up opportunities to create a more inclusive and accessible learning environment for anyone, from anywhere, and at any time. (Aslan & Shiong, 2023). With technology, geographical and physical barriers can be overcome, enabling the spread of quality education more evenly to various regions, including remote areas (Aslan, 2019).

Furthermore, the integration of technology supports the personalization of learning, which allows educators to customize teaching materials and methods according to the needs and learning speed of each student. (Muharrom et al., 2023). Technologies such as learning management systems (LMS) and artificial intelligence (AI) support real-time student progress tracking and provide constructive feedback that is essential for learning progress. Students can learn in a way that matches their learning style, which increases motivation and learning outcomes. This personalized assessment not only benefits students but also gives teachers a better insight into how to teach more effectively (Nurhayati et al., 2023; Nurdiana et al., 2023).

Furthermore, the use of technology in education is also vital in developing the essential skills needed in the 21st century. Skills such as problem-solving, critical thinking, and digital literacy are fundamental aspects that can be developed through the use of technology tools. (Sarmila et al., 2023). Students who are familiar with technology from an early age will be better prepared to face a world of work that takes advantage of high technology and is constantly changing. Thus, the integration of technology into education not only improves access and quality of education, but also prepares students to become active and competent participants in the growing global economy. (Haddar et al., 2023).

Despite this, the implementation of educational technology in Madrasah faces specific and complex challenges. Some of the frequently emerging challenges are the constraints of infrastructure, the human resources that are not fully prepared to adopt new technologies, and the lack of supporting understanding and policy from Madrasah managers regarding the importance of educational technology. (Megawati et al., 2023). On the other hand, the potential for the use of technology in education in Madrasah is enormous. From using learning software, e-learning platforms, to Augmented Reality (AR) technology that can make religious material more interactive and attractive to students (Sutrisno, S. 2023).

Taking into account such urgencies and challenges, the study aims to identify and analyse effective strategies in the implementation of educational technology in Madrasah, models and its challenges. This objective is very relevant to be explored further, given the rapid development of educational technology and the great potential of Madrasah in educating future generations who are not only superior in science but also in faith and fear. This research is expected to provide useful insights and recommendations for Madrasah in designing and implementing effective and sustainable education technology implementation strategies.

## **Research Method**

The research method used in this study is literature. The method of literature research, also known as literature study, is an approach in research that uses existing data, such as books, scientific journals, articles, and other written sources as the primary source of data collection. The primary purpose of this method is to collect, analyze, and synthesize the data that exists to form new conclusions or support ongoing research. (Bahn & Weatherill, 2013; Mayer, 2015; Oun & Bach, 2014).

## **Result and Discussion**

### **Education Technology Implementation Strategy in Madrasah**

Educational technology is the practical application of the theory and methodology of education through the use of technology to improve the learning process. Its scope covers the development, application, and evaluation of systems, methods, and learning materials. (Siminto et al., 2024). This concept is not only limited to hardware such as computers or projectors but also summarizes software, applications, and online learning platforms. In its use, educational technology aims to support and enrich educational experiences for both teachers and learners, enabling a more collaborative, interactive, and adaptive learning environment. (Rizaldi et al., 2021).

The scope of education technology is very wide, including instructional design, technology-based curriculum development, e-learning, to the use of information and communication technology (ICT) in education management. It also involves the use of analytical tools such as big data and learning analytics to evaluate and improve learning

effectiveness. (Khusnood et al., 2020). In addition, educational technology facilitates personalized learning, which allows education to be tailored to individual needs, speed, and learning styles. The emergence of advanced technologies such as artificial intelligence, augmented reality, and virtual reality has broadened traditional classroom boundaries, driving the creation of more immersive and exciting learning experiences. (Afendi, H. A. R., & Widodo, S. F. A. 2024).

In practice, educational technology has brought significant changes in teaching strategies and the way students learn. Teachers now have a variety of tools and resources to realize a more dynamic teaching, not limited by the physical constraints of the traditional class. (Megawati et al., 2023). Students, on the other hand, benefit from easier access to global knowledge resources, allowing them to study outside the official curriculum and explore their own interests. These changes drive the development of 21st-century skills, such as critical thinking, collaboration, and communication, which are essential for future success. (Cohen, D. K. 2013).

Educational technology has played an important role in transforming traditional learning environments into more modern and efficient. (Tuhuteru et al., 2023). With the ability to reach and serve the diverse needs of students, as well as providing innovative and customized learning methods, educational technology has become a key pillar in creating and providing quality education that can withstand the challenges of the future (Aslan & Pong, 2023). With the continuous development of technology, the scope of education technology will continue to expand, combining the best practices of education with technological innovation, in order to prepare future generations capable of competing and contributing to the global arena. (Lim et al., 2013).

In the contemporary age of education, technology has taken on an increasingly crucial role, enabling a significant transformation in the way teaching and learning is carried out. Technology in education, or edtech, has introduced new approaches that make learning more interactive, flexible, and personalized. (Lee, M., & Winzenried, A. 2009). The availability of online learning platforms and digital resources makes it easy for students and teachers to access learning materials anytime and from anywhere, overcoming geographical and time constraints that have previously been barriers to traditional education. By using tools like video, educational games, and digital simulations, learning becomes more exciting and effective, making it easier for students to understand complex concepts through interactive visualization and practice. (Vanderlinde et al., 2009).

Besides, technology has given a huge impetus to customized learning, where artificial intelligence and data algorithms can analyze how students learn individually and adapt learning materials to meet their learning needs. (Schrum et al., 2017). Digital evaluation tools provide real-time feedback, enabling students and teachers to accurately monitor learning progress and make necessary adjustments. Technology also facilitates broader collaboration, both in traditional classrooms and through virtual

learning, bringing together students from different backgrounds and cultures to learn together. (Gray et al., 2010). The role of technology in supporting the development of 21st-century competencies such as critical thinking, collaboration, and incomparable communication, is ready to equip students with the skills needed to succeed in an increasingly digitized world.

Implementation of educational technology in the madrasah requires a comprehensive strategic approach to ensure smooth and effective integration. The first step in this strategy is the development of adequate ICT (Information and Communication Technology) infrastructure, which includes the provision of hardware such as computers, tablets, and interactive boards, as well as a stable software infrastructure and internet connectivity. (Mahsusi et al., 2023). This enhancement supports digital teaching and learning, enables access to online learning resources, and adopts modern teaching methods such as project-based and collaborative learning. It is also important to ensure that all elements of this infrastructure are secure and accessible by the entire madrasah community, bearing in mind the importance of privacy and data security. (Sutrisno, S. 2023).

Secondly, human resource development is an inseparable aspect of the education technology implementation strategy. It includes training and professional development for teachers and madrasah staff to equip them with the necessary skills in integrating technology into the learning process (Iqbal et al., 2023). Such training should include the use of ICT tools in lesson planning, teaching methods, and evaluation, as well as the use and use of digital tools to enhance student involvement. Adoption of educational technology also requires a change in the mindset of all stakeholders, which supports innovative learning and an understanding that technology is a tool that can enhance, not replace, human interaction in the learning process. (Abubakari, M. S. 2021).

Thirdly, the development of curricula and digital learning materials is a vital step in ensuring that the use of educational technology maximizes the impact. Technology integration should be done in a way that enhances existing curricula, presenting learning materials in a more interesting, interactive, and easily accessible format for students. The development of electronic modules, video learning, and interactive simulations can provide a more exciting learning experience and facilitate a better understanding of concepts. (Rizaldi et al., 2021). In addition, the madrasah can use the management learning platform to organize the learning material, tasks, and assessments, facilitate teachers in managing the classroom and enhance collaboration between teachers and students. Implementation of this strategy requires close collaboration among teachers, students, and the matrasah stakeholders, with the ultimate goal of creating an innovative and inclusive learning environment that promotes academic excellence and student personal development. (Hayani et al., 2024).

## **Education Technology Implementation Model in Madrasah**

Educational technology implementation models often follow structured frameworks to ensure that technology is applied in a way that enriches learning experiences, improves educational outcomes, and supports learning in the 21st century. (Siskandar, S. 2020). The initial step in the implementation model is the planning phase, in which a vision for technology integration is developed. It involves mapping educational needs and objectives, assessing the readiness of madrasah technology, and identifying the necessary resources. The madrasah parties can set short- and long-term goals, ensuring that technology is applied gradually to sustainable change. (Santosa, S., & Jazuli, M. F. 2022).

After planning, the second step is the development and acquisition phase. Madrasah needs to choose and purchase the right technology equipment and software, as well as develop or adapt digital learning materials to suit curriculum needs (Syarnubi et al., 2021). This development should reflect a diverse and inclusive learning approach, ensuring that every student, regardless of their background, has access to quality learning with technology support. During this phase, it is essential to work with providers and educational experts to choose the most appropriate and effective solution. (Wibowo, A., & Bon, A. T. 2021).

The third is the implementation phase, in which technology is integrated into the classroom and teaching practice. Teachers play a key role here, because they need to be trained to use technology effectively and integrate it into existing teaching methods. (Wijaya, M. M. 2021). Teacher training should be sustainable and supported by the existence of professional development programmes. In addition, the introduction of students to technology should be done gradually, starting from basic use to more complex applications, ensuring positive acceptance and strong ownership of their learning process. (Astuti et al., 2023).

Fourthly, the assessment and evaluation phase allows the madrasah to monitor the effectiveness of the applied technology. This includes data collection and analysis on student performance, feedback from teachers and students, as well as inspection of technology infrastructure. This sustainable assessment is useful to identify gaps, challenges, and opportunities for improvement. Madrasah may need to adjust his approach based on these findings to ensure that investments in technology yield positive results. (Arfanaldy, S. R. 2024).

Implementation of technology in education is a complex process that requires careful planning, adequate resources, teacher training, and continuous evaluation. Through the application of a structured model, the matrasah can ensure that technology is successfully integrated into the classroom, improving learning outcomes, and preparing students to become critical thinkers and independent learners. By strategically and reflectively embracing technology, the madrasah not only improves

the quality of education but also fosters the development of students' skills that are relevant to the global demands of the future.

### **Education Technology Implementation Challenges in Madrasah**

The implementation of educational technology in the madrasah faces a number of challenges that can affect the success of adoption and integration of technology into the learning process. One of the major challenges is the constraints of technological infrastructure. (Reetz, D. 2010). Many madrasas, especially in remote areas, often do not have access to stable internet connectivity or adequate hardware such as computers and tablets. This inadequate infrastructure limits the use of technology in learning, affecting student learning experiences and the availability of digital learning materials. (Meliani et al., 2022).

In addition to infrastructure issues, the competence of teachers in implementing technology is also a significant challenge. Although the importance of technology in education has been recognized, not all teachers have sufficient skills to integrate technology into their teaching (Siskandar, S. 2020). This requires significant investments in the training and professional development of teachers, but the challenge is how to ensure that such training is effective and affordable, as well as to meet the specific needs of a teacher in a madrasah who may have a diverse technological background and experience. (Ali et al., 2024).

The reluctance to switch from traditional learning methods to technology-supported approaches is also a challenge. Long-established learning styles in many madrasas may be difficult to change because teachers and students are already accustomed to existing routines. (Abubakari, M. S. 2021). There is natural resistance to change, especially if such change requires learning new skills and adaptation to unfamiliar teaching methods. It requires an effective effort in the management of change to convince and empower all stakeholders about the benefits that can be obtained from the use of technology. (Santosa, S., & Jazuli, M. F. 2022).

The issue of data security and privacy is also a major concern in the implementation of technology in the madrasah. The use of digital platforms in education increases the risk of leakage of sensitive student and staff data. Madrasah needs to ensure that the systems and devices used are secure, and that there are clear policies and procedures to protect personal information. It involves implementing cybersecurity and regular training for students and staff on the importance of data security (Megawati et al., 2023).

Finally, financing is also a crucial challenge in the implementation of educational technology in the madrasah. Investments in technology infrastructure, teacher training, and system maintenance can be very expensive. (Sutrisno, S. 2023). Madrasah often relies on government funds or limited donations, which may not be enough to fund technology initiatives thoroughly. Securing adequate and sustainable funding becomes

essential to ensuring that madrasas can implement and maintain educational technology effectively (Siminto et al., 2024).

By tackling these challenges strategically, madrasas can implement educational technologies that not only enrich the learning experience, but also improve the educational outcomes and long-term success of students.

## **Conclusion**

Educational technology implementation strategies in the madrasah must be formulated taking into account existing challenges, such as infrastructure constraints, teacher competence, resistance to change, data security, and funding constraint. Therefore, it is important to: 1) Improve Infrastructure: Investing in adequate infrastructure including stable internet access and the necessary hardware for digital learning. 2) Teacher Training: Assisting teachers in developing ICT skills through professional training and development to ensure the effectiveness of the use of technology in teaching. 3) Change Management: Providing support to teachers and students in the transition from traditional methods to more technology-oriented methods through effective communication and sustainable learning opportunities. 4) Data Security and Privacy: Guaranteeing the security of information systems and implementing policies and procedures to protect personal data from leaks and abuse. 5) Obtaining Financing: Identify sources of funding that can support the purchase, maintenance, and sustainable improvement of educational technology.

With a holistic and adaptive strategic approach, madrasah can address these challenges and apply technology in learning that not only improves the quality of education, but also equips students with the skills needed to succeed in an increasingly digitized society.

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