IMPLEMENTATION OF INFORMATION TECHNOLOGY IN EDUCATION MANAGEMENT: EFFECTIVENESS AND CHALLENGES IN THE DIGITAL ERA

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Abstract

The use of information technology in education has great potential to improve the quality of teaching and learning. However, there are various significant challenges that must be overcome to achieve this goal. This study identified six main challenges in implementing information technology in education: access and infrastructure gaps, unequal digital competencies, data security and privacy issues, implementation and maintenance costs, adaptation of curriculum and teaching methods, and resistance to change. Addressing these challenges requires special attention, including providing equitable access, intensive training, strong data security policies, adequate budget allocation, and systematic changes in curriculum and teaching methods. By implementing the right strategy and collaboration between stakeholders, information technology can play an optimal role in transforming education to be more adaptive, inclusive and effective.

Keywords: Information Technology, Education Management, Digital Era

INTRODUCTION

In this digital era, the development of information technology (IT) has had a significant impact on various sectors, including the education sector (Kovban, 2022). Education management which previously relied on traditional and conventional methods is now starting to switch to IT-based systems. This transformation aims to increase efficiency, accuracy and speed in managing various aspects of education. Starting from academic administration, student data management, to human resource management, information technology is present as a solution that is able to provide convenience and comfort in these various processes (Wahyuningsih, 2023).

Educational management is the process of helping students become better so that they have the necessary abilities to organize, supervise and organize activities. This is in accordance with what is meant to be called educational management according to Rivai, educational management is the process of managing various educational resources to achieve educational goals and purposes. These resources include training, educational facilities

and infrastructure, such as laboratories, libraries and information technology (Rhumeta & Nasution, 2024).

In the era of globalization and advances in information technology, the use of information technology has become an important aspect in the development of a modern education system, including in the educational context. Information technology can facilitate data management, expand access to education, and increase the efficiency of the learning process (Bokau & Mokalu, 2024).

In the digital era, the influence of technology on education cannot be denied. Technology has revolutionized teaching methodology, offering personalized and interactive learning experiences that cater to diverse learning styles. The integration of technology in education has the potential to transcend the boundaries of the traditional classroom, enable distance learning, and democratize access to quality education (Manansang et al., 2023).

The use of information technology in educational management is also faced with certain challenges and complexities. For example, limited infrastructure in some rural or remote areas can be an obstacle in implementing information technology in education (Kamu et al., 2023). Apart from that, differences in user needs and preferences, both in terms of students, teachers and parents, are also factors that need to be considered.

The implementation of IT in education management allows educational institutions to manage information more effectively and efficiently. Various educational management information systems, such as the Learning Management System (LMS), school administration systems, and e-learning applications can be used to facilitate various administrative and academic needs (Mardianto et al., 2022). The presence of this technology not only makes it easier to access information and communication between all parties involved in education, but also helps in preparing the curriculum, monitoring student attendance, and managing financial and inventory data.

However, even though it has many advantages, the implementation of information technology in educational management is not free from various challenges. One of the main challenges is the readiness of supporting infrastructure, where many educational institutions, especially in regions, do not have adequate access to technology (Uchechukwuka, 2024). In addition, changes to new technology often face resistance from human resources who are used to conventional methods. Another aspect is the issue of data

security, where IT system integration that is not yet optimal can open up security gaps that have the potential to be exploited (Putri & Zega, 2023).

In this regard, it is important for this research to dig deeper into how the implementation of information technology in educational management is carried out, as well as identifying its effectiveness in improving the performance of educational institutions. Apart from that, this research will also explore the various challenges faced in this implementation, and look for practical solutions that can be applied to optimize the use of information technology in the education sector. Through this research, it is hoped that it can make a significant contribution to the development of more modern and efficient education management in the digital era.

RESEARCH METHOD

The study in this research is qualitative with literature. The literature study research method is a research approach that involves the analysis and synthesis of information from various literature sources that are relevant to a particular research topic. Documents taken from literature research are journals, books and references related to the discussion you want to research (Earley, M.A. 2014; Snyder, H. 2019).

RESULT AND DISCUSSION

Implementation of Information Technology in Education Management

The implementation of information technology (IT) in education management has become the main focus in efforts to improve operational efficiency and service quality in educational institutions. With an education management information system, various administrative processes such as class scheduling, managing student data, attendance, processing learning results, and internal communication can be carried out more quickly and accurately. Information technology not only automates routine tasks but also allows administrative and teaching staff to access information in real-time, so that decision making can be carried out based on accurate and up-to-date data (Valieiev, 2022).

The use of IT in education management also enables institutions to provide better services to students and parents. Online portals and mobile applications give students direct access to view grades, class schedules, and upload assignments. Parents can also monitor their children's academic progress and communicate with school staff more efficiently. Additionally, technologies such as Learning Management Systems (LMS) enable

educational institutions to manage digital learning content and track student engagement and performance more systematically (Duan & Xiang, 2022).

However, the implementation of IT in education management is not free from various challenges. Some institutions may face obstacles related to inadequate IT infrastructure, resistance to change among staff, and limited budget for technology investment. In addition, the issue of data security is a serious concern considering the large amount of sensitive information managed by this system (Santos & Kwee, 2022). Therefore, appropriate strategic planning and policies are needed to ensure that the application of technology can run smoothly and provide maximum benefits for all stakeholders in the education sector.

To ensure the successful implementation of information technology in education management, training and capacity development for teaching staff and administrative staff is very important. Continuous training will help them use software and information systems effectively and reduce resistance to change (Afolayan, 2023). In addition, the involvement of all parties in the IT planning and implementation process will increase understanding and commitment to the expected changes. Institutions also need to adopt a participatory approach that involves input from all members of the educational community so that IT initiatives can be tailored to the institution's specific needs.

Information technology also enables increased transparency and accountability in education management. With an integrated system, data regarding finances, attendance and academic performance can be accessed and audited more easily. This not only helps in increasing internal efficiency, but also increases trust from external parties such as parents and other stakeholders (Fitriani et al., 2023). For example, digital reporting systems allow parents to receive periodic and real-time reports on their child's progress, which contributes to increasing parental participation in their child's education.

In the future, educational institutions must continue to adapt to the increasingly rapid development of information technology (Chen, 2022). The integration of artificial intelligence (AI), big data analytics, and blockchain technology in education systems can open up new opportunities in personalizing learning, managing academic records, and data protection. Thus, educational institutions that are able to innovate and invest in information technology will not only improve their internal management, but also the quality of education and competitiveness at the global level. Strong

support from government policies and partnerships with the private sector will be the key to success in facing challenges and maximizing the benefits of information technology in education management (Kharchenko, 2022).

Effectiveness of the Use of Information Technology

The use of information technology (IT) in the world of education has brought many positive changes, one of which is increasing operational efficiency. With an educational information system, various administrative processes such as class scheduling, managing student data, and processing evaluation results can be carried out more quickly and accurately. This reduces the workload of administrative personnel and allows them to focus on other strategic tasks (Sumantri et al., 2023). In addition, real-time access to integrated data helps school management make decisions that are more data-based and responsive to the needs of students and teachers (Mishra et al., 2024).

Apart from operational efficiency, IT also increases student involvement and participation in the teaching and learning process. Through the use of Learning Management Systems (LMS), students can access learning materials, upload assignments, and interact with teachers and classmates digitally. This not only makes it easier for students to manage their study time but also allows for more flexible and interactive learning. Technologies such as simulation and augmented reality (AR) enable more in-depth and contextual learning experiences, thereby helping students understand abstract concepts better (Kafa, 2023).

In terms of communication, information technology facilitates more effective relationships between educational institutions and students' parents. The online portal and mobile app allow parents to monitor their children's academic progress, view class schedules, and communicate directly with teachers and administrative staff. This creates transparency and increases parental trust in educational institutions (Skagne & Dalipi, 2022). In addition, digital communication systems make it easier to disseminate important information quickly and evenly, thereby reducing the risk of miscommunication and increasing coordination between various parties involved in the education ecosystem (Kizi, 2024).

To achieve optimal effectiveness, the implementation of information technology in education must be accompanied by adequate training for teachers and administrative staff. They need to be equipped with sufficient digital competence to be able to make maximum use of IT. Apart from that,

data security issues must also receive special attention. Educational institutions must ensure that student data and all other sensitive information is managed securely and in accordance with applicable regulations. Support from the government and collaboration with related parties is also an important key to the successful implementation of information technology in the education sector (Besker et al., 2022). Thus, the effectiveness of using IT in education is not only seen from a technical perspective, but also from the human aspect and the policies that support it.

The use of technology also plays a big role in supporting distance and hybrid learning, especially during emergency situations such as the COVID-19 pandemic. Video conferencing platforms such as Zoom and Google Meet have become the primary tools for holding virtual classes, while collaboration tools such as Google Classroom and Microsoft Teams allow learning to occur seamlessly even when students and teachers are in different locations. This provides flexibility in time and place, allowing students who have limited access to still get a decent education (Sari & Suwandi, 2024). Online class recordings can be accessed again to review material that may be less understood, providing a more in-depth and personalized learning opportunity.

IT implementation also supports personalization of learning that can be tailored to the individual needs of each student. Through big data analysis and artificial intelligence (AI), educational institutions can identify learning patterns and difficulties faced by students. This allows for more adaptive curriculum development and more targeted interventions. For example, adaptive learning platforms like Khan Academy and DreamBox Learning use algorithms to adapt learning content to students' level of understanding. This helps students learn at their own pace, which ultimately improves academic outcomes and learning satisfaction (Cheng, 2024).

Information technology also contributes to the professional development of teaching staff. Through various e-learning platforms and webinars, teachers can continue to develop and update their knowledge about the latest teaching methods, educational technology trends, and new curriculum materials without having to leave where they teach. This creates a culture of continuous learning that not only benefits teachers, but also has a positive impact on the quality of education provided to students. Digital communities for teachers can provide collaborative support and brainstorm ideas for more innovative and effective teaching (Makasheva et al., 2024).

To achieve sustainability in the use of information technology in the education sector, supporting regulations and policies are needed. The

government can play a role by providing adequate IT infrastructure, such as high-speed internet and necessary hardware in all regions, including remote areas (Dzhumaevich, 2022). There needs to be collaboration between educational institutions, the private sector and communities to develop and implement innovative technology solutions. With strategic planning, the right investment, and harmonious cooperation, information technology will continue to be the main pillar in the transformation of education that is more inclusive, effective, and of high quality.

Challenges in Implementing Information Technology

1. Access and Infrastructure Gaps

   One of the main challenges in implementing information technology in education is the gap in access and infrastructure. Even though advanced technology is available, not all students and teachers have the same access. In many remote or less developed areas, adequate internet infrastructure remains a major problem. This limited access results in a gap between students who live in urban areas and those in rural areas, which in turn can affect the quality of education they receive. Hardware such as computers and tablets are not yet accessible to all groups, especially disadvantaged families, thereby exacerbating inequality in access to technology (Matytsin, 2022).

2. Inequality of Digital Competence

   Apart from access problems, unequal digital competence between teachers and students is also a serious challenge. Not all teaching staff have adequate technological skills to integrate IT into the learning process. Many teachers need intensive training to be able to use these technological tools effectively. Likewise with students, some may not be familiar with digital learning technology and need time to adapt. Lack of professional support and assistance in this process can hinder the optimal application of technology in educational institutions (Latupeirissa et al., 2024).

3. Data Security and Privacy Issues

   With the increasing use of information technology in education, the issue of data security and privacy has also become a significant challenge. Schools and educational institutions store a variety of sensitive data, ranging from student personal data to academic information that must be managed very carefully. Cyber attacks and data leaks can have a serious impact on the individuals and institutions concerned (Karjo et al., 2022). Therefore, the application of information technology must be balanced with strong

security policies and infrastructure to protect data. Institutions need to comply with existing regulations regarding digital data management, such as Europe's GDPR or other specific data protection rules, to ensure the security and privacy of all parties involved.

4. Implementation and Maintenance Costs

   Information technology implementation often requires a large initial investment, including the cost of hardware, software, training, and adequate IT infrastructure. There are ongoing maintenance costs to ensure that the system remains up-to-date and operates properly. For many educational institutions, especially in developing countries, these costs can be a serious barrier. Limited budgets often make it difficult for them to allocate sufficient funds for technology investment, thereby slowing down or even stopping the digitalization process (Singh et al., 2023).

5. Curriculum Adaptation and Teaching Methods

   Information technology requires a change in approach in curriculum preparation and teaching methods. Many traditional curricula have not been designed to optimally exploit the potential of technology. Changing or adapting this curriculum to make it more compatible with digital platforms requires time, effort, and collaboration between various parties, including curriculum developers, teachers, and technology experts (Perdana et al., 2023). Teaching methods need to be redesigned to take advantage of the interactive and real-time capabilities offered by information technology. Without systematic efforts to make these adaptations, technology implementation is likely to be ineffective.

6. Resistance to Change

   Change is always met with resistance, especially when it comes to adopting new technology in an environment that already has established ways of working. Some teachers and educational staff may feel uncomfortable or skeptical of new technologies for various reasons, such as ingrained habits, distrust of the technology's effectiveness, or fear of losing their jobs to automation (Gupta et al., 2024). To face this resistance, there needs to be an inclusive approach and ongoing support. Providing adequate training, opportunities to experiment, and demonstrating the real benefits of the technology can help reduce resistance and encourage broader acceptance.

   By effectively addressing these challenges, educational institutions can maximize the benefits offered by information technology, thereby bringing the transformation of education in a more advanced and inclusive direction.

CONCLUSION

The implementation of information technology in education offers great potential to improve the quality of teaching and learning. However, significant challenges need to be overcome to realize this vision. Key challenges include gaps in access and infrastructure requiring special attention to ensure that all students and teachers have equal access to technology, inequality in digital competencies highlighting the importance of intensive training and ongoing support for teachers and students, issues of data security and privacy requiring policies and infrastructure strong ability to protect sensitive data, implementation and maintenance costs are a major obstacle especially for institutions with limited budgets, adaptation of curriculum and teaching methods requires systematic changes to integrate technology effectively, resistance to change can be overcome with an inclusive approach, adequate training, and demonstration of the real benefits of technology. With the right strategy and collaboration between stakeholders, these challenges can be overcome, so that information technology can play an optimal role in educational transformation. Creating a more adaptive, inclusive and effective educational environment allows students to better prepare themselves to face future challenges.

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