Strengthening School Management with Digital Education Technology to Improve the Quality of Educational Output

Leni Maryani[1]*, Jumaidi Nur[2], Sri Utami[3], Ihfa Indira Nurnaifah[4], Farida[5]
[1] Universitas Pasundan, Bandung, Indonesia
[2,3] Universitas Kutai Kartanegara, Kutai Kartanegara, Indonesia
[4] Sekolah Tinggi Keguruan dan Ilmu Pendidikan Darud Da'wah wal Irsyad Pinrang, Pinrang, Indonesia
[5] Sekolah Tinggi Ilmu Ekonomu Tri Sakti, Jakarta, Indonesia
*Corresponding author: lenimaryani@unpas.ac.id

Abstrak

Teknologi pendidikan digital meningkatkan metodologi pengajaran melalui sumber daya multimedia, simulasi interaktif, dan alat penilaian waktu nyata. Guru dapat memanfaatkan algoritma pembelajaran adaptif untuk menyesuaikan pembelajaran dengan kebutuhan individu siswa, mendorong keterlibatan, pemahaman, dan keberhasilan akademik. Selain itu, pengambilan keputusan berbasis data difasilitasi oleh teknologi pendidikan digital. Pendidik memperoleh wawasan berharga tentang kinerja siswa melalui analitik yang canggih, memungkinkan mereka mengidentifikasi area yang perlu ditingkatkan dan menerapkan intervensi yang tepat sasaran. Pendekatan ini mendukung identifikasi dini siswa berisiko dan memastikan bahwa sistem dukungan komprehensif tersedia. Selain itu, teknologi pendidikan digital mempromosikan kolaborasi dan komunikasi antara berbagai pemangku kepentingan, termasuk guru, siswa, orang tua, dan administrator. Ini memungkinkan umpan balik waktu nyata, kolaborasi antara orang tua dan guru, serta kesempatan belajar jarak jauh, menciptakan lingkungan pendidikan yang partisipatif dan dinamis. Kesimpulannya, merangkul teknologi pendidikan digital memiliki potensi besar untuk memperkuat manajemen sekolah dan memenuhi tuntutan kualitas pendidikan abad ke-21. Dengan mengotomatisasi tugas administratif, meningkatkan metodologi pengajaran, memungkinkan pengambilan keputusan berbasis data, dan mempromosikan kolaborasi, lembaga pendidikan dapat beradaptasi dengan tantangan yang terus berkembang dan memberikan hasil pendidikan berkualitas tinggi. Merangkul kemajuan teknologi ini penting untuk mempersiapkan siswa menghadapi tuntutan era digital dan memastikan masa depan yang sukses.

Kata kunci: Teknologi Pendidikan Digital, Manajemen Sekolah, Luaran Pendidikan

Abstract

Digital educational technologies enhance teaching methodologies through multimedia resources, interactive simulations and real-time assessment tools. Teachers can leverage adaptive learning algorithms to adapt learning to the individual needs of students, driving engagement, understanding, and academic success. Moreover, data-driven decision-making is facilitated by digital educational technologies. Educators gain valuable insights into student performance through sophisticated analytics, enabling them to identify areas for improvement and implement targeted interventions. This approach supports early identification of at-risk students and ensures that a comprehensive support system is in place. In addition, digital education technologies promote collaboration and communication between various stakeholders, including teachers, students, parents and administrators. This enables real-time feedback, collaboration between parents and teachers, and remote learning opportunities, creating a participatory and dynamic educational environment. In conclusion, embracing digital education technology has great potential to strengthen school management and meet the demands of 21st century quality education. By automating administrative tasks, improving teaching methodologies, enabling data-driven decision-making and promoting collaboration, educational institutions can adapt to evolving challenges and deliver high-quality educational outcomes. Embracing these technological advances is important for preparing students for the demands of the digital age and ensuring a successful future.

Keywords: Digital Education Technology, School Management, Educational Output

1. INTRODUCTION

Digital education technology, also known as EdTech, incorporates digital tools, resources, and platforms in education to enhance teaching, learning, and educational outcomes (Arpaci et al., 2020; P Putra & Aslan, 2020). It encompasses various technologies such as computers, software applications, internet-based platforms, mobile devices, and

multimedia resources that facilitate and improve the educational process. By integrating these technologies into education, digital education technology transforms traditional educational practices and creates more engaging, interactive, and personalized learning experiences (Mishra et al., 2021; Purniadi Putra et al., 2020; Zhang et al., 2022). One of the critical components of digital education technology is the hardware and infrastructure, including devices like computers, laptops, tablets, interactive whiteboards, and projectors, that enable digital tools in the classroom or educational environment. Additionally, software and applications play a crucial role by providing content creation, delivery, assessment, and management functionalities. These include learning management systems, multimedia tools, virtual simulations, educational games, and collaborative platforms (Hendriarto et al., 2021; McCoy et al., 2016; Sudarmo et al., 2021).

Online learning platforms also form an integral part of digital education technology. These web-based platforms act as virtual classrooms, providing access to educational content, resources, and activities. They often support features such as video lectures, discussion forums, online assignments, and progress tracking, making learning more flexible and accessible (Aslan et al., 2020; Means et al., 2013a). Digital content and resources are vital, encompassing digital textbooks, e-books, online articles, videos, interactive modules, and other multimedia materials. These resources supplement and enrich the learning process, offering diverse and engaging content for students (Hilton, 2016; Zighan et al., 2023).

Moreover, communication and collaboration tools facilitate interaction and cooperation among students, teachers, and educational institutions. Video conferencing, instant messaging, discussion boards, and collaborative document editing enable real-time interactions, group work, and knowledge sharing (Lee et al., 2012; Suroso et al., 2021). The emergence of adaptive learning systems has further revolutionized digital education technology. These systems leverage artificial intelligence and data analytics to provide personalized instruction tailored to individual student's needs, learning styles, and progress. By collecting and analyzing data, adaptive learning platforms offer personalized recommendations and adaptive feedback, promoting efficient and effective learning (Burnham et al., 2023; Charzyński et al., 2022; Widjaja & Aslan, 2022).

Finally, digital education technology encompasses assessment and feedback tools that streamline the assessment process and provide immediate feedback. Online quizzes, automated grading, data analysis, and visualizations help educators assess student performance and gain valuable insights into learning outcomes. Integrating digital education technology can transform education by expanding access to quality learning opportunities, promoting active and personalized learning, fostering collaboration and communication, and preparing students for the digital age (Kohnke & Moorhouse, 2022; Reyes-Foster & DeNoyelles, 2018; Yates et al., 2021). It empowers educators to create dynamic and interactive learning environments that cater to learners' diverse needs and preferences, ultimately enhancing educational outcomes (Ertmer & Ottenbreit-Leftwich, 2013; Widjaja et al., 2022).

In the 21st century, effective school management plays a crucial role in ensuring the delivery of quality education. School management encompasses various administrative, organizational, and leadership tasks that contribute to the overall functioning of a school. It involves planning and implementing educational policies, overseeing curriculum development, managing resources, and fostering a positive learning environment. The importance of school management in the 21st century is widely recognized as it directly impacts students' educational outcomes and experiences. One key aspect of school management in the 21st century is adapting to the changing educational landscape. The advancement of technology, globalization, and evolving societal needs have led to new challenges and demands in education. Schools must navigate these complexities and stay

abreast of the latest educational trends and practices to provide students with relevant, high-quality learning experiences. Effective school management ensures that schools are equipped to address these challenges and meet the demands of the 21st-century educational landscape (Adams et al., 2023; Hifza et al., 2020; Lumban Gaol, 2023).

Research studies have highlighted the significance of school management in promoting student achievement and school improvement. According to a meta-analysis by Marzano, Waters, and McNulty (Hou et al., 2019; Özdemir et al., 2021), effective school leadership and management practices substantially impact student outcomes. The study found that strong instructional leadership, effective curriculum planning, and supportive organizational structures positively influence student achievement. Furthermore, previous studies emphasized the critical role of school management in creating a positive school climate and fostering teacher development, which leads to improved student performance (Ansari et al., 2020; Bond et al., 2021).

Moreover, the importance of school management extends beyond academic outcomes. Effective management practices create a safe and inclusive school environment, promote student well-being, and enhance parent and community engagement. School leaders and administrators play a vital role in shaping the school culture, establishing positive relationships with stakeholders, and fostering a supportive learning community. These factors ensure holistic development and prepare students for success in the 21st century (Lima et al., 2023; Meier, 2021). In conclusion, the importance of school management in the 21st century cannot be overstated. Effective school management influences educational outcomes, student well-being, and school climate. Schools must embrace innovative practices, adapt to the changing educational landscape, and foster a collaborative and supportive learning environment. By prioritizing effective school management, schools can effectively respond to the challenges and demands of the 21st century, ultimately leading to enhanced educational output.

Another challenge is ensuring equitable access to quality education. Disparities in access to education persist globally, with marginalized communities, disadvantaged students, and those in remote areas facing significant educational barriers (Gardner, 2011; Kocak et al., 2021). Bridging the digital divide, providing inclusive educational opportunities, and addressing socio-economic inequalities are crucial for ensuring all learners have equal access to quality education. Additionally, the demands for personalized and lifelong learning have gained prominence. Recognizing that individuals have diverse learning needs, preferences, and paces of learning, there is a growing emphasis on personalized learning approaches that cater to individual student needs (Crompton et al., 2021; Zaidi et al., 2021). This requires implementing adaptive learning systems, using data analytics to inform instructional decisions, and providing flexible learning pathways that allow learners to pursue education throughout their lives.

There are a number issues in supporting the application of digital education technology supports strengthening school management in responding to the challenges and demands for the quality of 21st-century educational output. Long-term impact and effectiveness of using technology in education becoming concern of many stakeholders. While many studies may exist on the short-term effects of implementing digital education technology in schools, there might be a limited number of in-depth, longitudinal studies that examine the sustained impact of these technologies on school management practices over an extended period (Deguine et al., 2021; Means et al., 2013a)(Means et al., 2013b) . Understanding how the use of digital tools evolves and influences decision-making, resource allocation, and administrative processes over time is essential for informed decision-making by educational institutions.

Then, integration and adaptation of technology, the research gap could also lie in exploring the challenges and facilitators of successfully integrating digital education technology into existing school management systems. Investigating how schools adapt their processes, policies, and leadership practices to make the most of technological tools could provide valuable insights for policymakers and educational leaders (Ifenthaler et al., 2021; Spielman et al., 2021). Other issues are equity and access. Digital education technology has the potential to transform education, but there may be disparities in access to technology among schools and regions. Research could focus on identifying how these disparities affect the quality of education and how schools with limited access can effectively leverage available resources to enhance educational outcomes. Effective implementation of digital education technology requires competent and confident teachers and administrators. A research gap may exist in understanding the specific training needs and strategies for building the capacity of educators to use these technologies optimally for improved school management and instructional practices (Haibeh et al., 2022; Supovitz, 2002; Yeh et al., 2021).

To address these research gaps, scholars and researchers in the field of educational technology and school management can conduct empirical studies, case analyses, or mixed-method research that explores the aforementioned aspects in greater detail. By filling these gaps, educational institutions and policymakers can make informed decisions about the effective integration of digital education technology to support school management and enhance the overall quality of education (Christensen et al., 2011; Hew & Cheung, 2013; Rodrigues et al., 2019). Another crucial aspect is the assessment and evaluation of educational outcomes. Quality education requires robust and valid assessment practices that accurately measure student achievement and provide meaningful feedback (Kuhail et al., 2023; Okonkwo & Ade-Ibijola, 2021).

Balancing the need for standardized assessments, including formative and performance-based assessments that capture a broader range of skills and competencies, is challenging for educational systems. Furthermore, ensuring effective teacher professional development is vital for achieving quality educational outcomes. Teachers play a central role in delivering education, and their knowledge, skills, and pedagogical approaches significantly impact student learning. Continuous professional development opportunities that promote innovative teaching practices, pedagogical strategies aligned with 21st-century skills, and the effective integration of digital education technology are essential to enhance teacher effectiveness (Akram & Abdelrady, 2023; Cheah et al., 2023). Therefore this study aims to identify of at-risk students and ensures that a comprehensive support system.

2. METHODS

The research review employed a systematic approach to examine the application of digital education technology in school management and its impact on addressing the challenges and demands for quality scholarly output in the 21st century (Hart et al., 2009). The methodology involved formulating a research question, developing a search strategy, applying inclusion and exclusion criteria, screening and selecting relevant articles, extracting and analyzing data, and assessing the quality of the selected studies (Ma et al., 2020; Vidal-Mones et al., 2022).

By formulating a straightforward research question, the review investigated the benefits and implications of digital education technology in school management. The search strategy employed comprehensive keyword searches across various electronic databases to identify relevant articles. Inclusion and exclusion criteria were applied to ensure that only studies meeting specific criteria, such as focusing on the role of digital education technology

in addressing challenges and demands for quality scholarly output, were included in the review (Kwon et al., 2022).

The screening and selection process involved thoroughly evaluating titles, abstracts, and full-text articles by two independent researchers. Only articles meeting the inclusion criteria were selected for detailed review. Data extraction and analysis were done to identify key findings, methodologies, and implications from the selected articles (Levin et al., 2008). This process allowed for identifying common themes, benefits, and challenges associated with using digital education technology in school management.

To ensure the review's reliability and validity, the selected articles' quality and rigor were assessed using appropriate evaluation tools, such as the CASP checklist for qualitative studies or the JBI critical appraisal tools for quantitative studies. This quality assessment helped evaluate the included studies' methodological strength and determined their relevance and reliability in addressing the research question (Fitzner, 2007).

3. RESULTS AND DISCUSSION

Results
Benefits of Digital Education Technology in School Management
Digital education technology brings numerous benefits to school management, revolutionizing administrative processes and enhancing overall efficiency. This section will explore several key advantages of digital education technology in school management, supported by relevant citations. Improved communication and collaboration are among the significant benefits of digital education technology in school management. Online communication tools, such as email, messaging apps, and virtual meeting platforms, enable seamless communication between administrators, teachers, students, and parents (Lay et al., 2020; Perrotta, 2013). This facilitates efficient information sharing, quick dissemination of announcements, and effective collaboration among stakeholders, fostering a strong school community (Liu et al., 2020; Rivera et al., 2021). Digital education technology also enhances administrative processes and efficiency. School management systems and software automate attendance tracking, grade management, scheduling, and record-keeping, streamlining administrative workflows (Ali et al., 2023; Ramírez & Tejada, 2022). This automation reduces paperwork, minimizes errors, and saves valuable time and resources, allowing administrators to focus on strategic planning and student support.

Personalized learning experiences are another key benefit of digital education technology. Adaptive learning platforms utilize data analytics and artificial intelligence algorithms to tailor instruction to individual student needs, pace, and learning preferences. This personalized approach helps students engage in meaningful and self-directed learning, improving academic performance and motivation (Abd-El-Fattah, 2010; Liu et al., 2020). Digital education technology enables data-driven decision-making in school management. Educational software and learning management systems generate comprehensive data on student performance, attendance, and engagement. Administrators can analyze this data to gain insights into student progress, identify areas for improvement, and make informed decisions regarding curriculum, teaching strategies, and resource allocation (Ifenthaler et al., 2021; Wohlstetter et al., 2008; Zemanick et al., 2017). Data-driven decision-making supports evidence-based practices and contributes to continuous school improvement.

Access to a wide range of educational resources is a significant advantage of digital education technology. Online platforms provide access to a wealth of digital content, educational materials, and resources, including e-books, multimedia, and open educational resources (Langseth et al., 2023; Topali et al., 2023). This vast array of resources enriches teaching and learning, offering diverse and up-to-date content that supports a comprehensive

and engaging curriculum. In conclusion, digital education technology brings numerous benefits to school management. Improved communication and collaboration, enhanced administrative processes and efficiency, personalized learning experiences, data-driven decision-making, and access to a wide range of educational resources are just a few advantages that contribute to effective school management and improved educational outcomes. Embracing digital education technology empowers schools to adapt to the evolving educational landscape and create dynamic and inclusive learning environments (Hughes et al., 2022; Kruse, 2022).

Strengthening School Management with Digital Education Technology Curriculum Planning and Implementation

Curriculum planning and implementation are critical components of effective school management. Digital education technology provides valuable tools and platforms to strengthen these processes, ensuring the curriculum is well-designed, aligned with educational standards, and delivered effectively.

Digital tools for curriculum design and alignment: Digital education technology offers a range of tools that facilitate curriculum design and alignment. For instance, educators can utilize online curriculum mapping software to create, organize, and align curriculum components such as learning objectives, instructional materials, and assessments. These tools enable teacher collaboration, streamline the curriculum development process, and ensure that the curriculum is coherent and aligned with educational standards. Research conducted by previous study that emphasized the effectiveness of digital curriculum mapping in improving curriculum coherence and consistency (Gupta et al., 2020).

Online platforms for content delivery and assessment: Digital education platforms provide efficient content delivery and assessment opportunities. Learning management systems (LMS) enable teachers to create and deliver engaging online lessons, multimedia resources, and interactive activities to enhance student learning experiences. LMS also offers features for formative and summative assessments, allowing teachers to track student progress, provide timely feedback, and make data-informed instructional decisions. Previous study indicated that LMS implementation positively impacts student engagement and achievement (Picciano, 2020).

Furthermore, digital education technology enables adaptive learning, where content and assessments are tailored to individual student needs and learning styles. Adaptive learning platforms use algorithms and data analytics to personalize the learning experience, providing targeted interventions and remediation as required. Adaptive learning has been shown to improve student outcomes. For example, a study that demonstrated that students who engaged with adaptive learning systems showed significantly higher achievement levels than those in traditional classroom settings (Kontkanen et al., 2016).

Student Tracking and Performance Monitoring

Student tracking and performance monitoring are essential aspects of effective school management, and digital education technology offers powerful tools and strategies to facilitate this process. This section will discuss two critical components of student tracking and performance monitoring enabled by digital education technology: learning management systems (LMS) for tracking student progress and data analytics for identifying areas of improvement and intervention. Learning management systems (LMS) are crucial in tracking student progress and performance. LMS platforms provide a centralized digital space where teachers can manage and organize course materials, assignments, assessments, and student communication (Patricia Aguilera-Hermida, 2020; Zaidi et al., 2021). Through LMS, teachers can track individual student participation, completion of assignments, and

assessment results. These systems allow for efficient monitoring of student engagement, identifying trends and patterns in student behavior, and providing timely feedback and support.

LMS platforms often include features such as grade books and progress trackers that enable educators to assess student performance comprehensively. Teachers can monitor individual student progress throughout the course by inputting grades, recording attendance, and tracking the completion of learning activities (Hew et al., 2019; Picciano, 2020). These tracking capabilities support ongoing formative assessment, allowing teachers to identify areas of strength and weakness for each student. Data analytics plays a vital role in student tracking and performance monitoring. By leveraging the power of data, educational institutions can gain valuable insights into student performance, engagement, and learning outcomes (Romero & Ventura, 2013; Tan, 2023; Zacharis, 2015). Data analytics tools enable the analysis of large volumes of data collected through various digital platforms, providing a comprehensive view of student progress.

Through data analytics, educational institutions can identify areas of improvement and intervention. By analyzing student performance data, educators can identify specific learning gaps, conceptual misunderstandings, or areas where students require additional support (Koedinger et al., 2013; Smit & Humpert, 2012). This information enables targeted interventions, such as providing personalized remediation or enrichment activities to address individual student needs. Data analytics can also inform instructional decision-making, allowing educators to modify teaching strategies, adjust curriculum content, or implement differentiated instruction to optimize student learning outcomes.

In conclusion, digital education technology offers valuable tools for student tracking and performance monitoring. Learning management systems enable efficient tracking of student progress, participation, and completion of assignments, providing teachers with real-time insights into individual student performance. Data analytics empowers educational institutions to extract meaningful information from student data, identifying areas of improvement and intervention for personalized support and instructional adjustments. By leveraging digital education technology, schools can monitor student progress, tailor interventions, and promote continuous improvement in student learning outcomes.

Teacher Professional Development

Teacher professional development is essential for enhancing instructional practices, keeping up with the latest pedagogical approaches, and staying abreast of educational advancements. Digital education technology offers valuable opportunities for teacher professional development, providing convenient and accessible avenues for continuous learning and collaboration.

Online training courses and webinars: Digital education technology enables educators to engage in online training courses and webinars. These platforms offer various professional development opportunities, including workshops, seminars, and certification programs. Online training courses provide flexibility, allowing teachers to access the content conveniently. They also facilitate personalized learning experiences, enabling educators to focus on specific areas of professional growth. Research conducted by previous study indicated that online professional development programs increase teacher knowledge and improve instructional practices (Darling-Hammond et al., 2017).

Virtual communities of practice for knowledge sharing: Digital education technology enables the creation of virtual communities of practice where educators can connect, collaborate, and share knowledge and resources. These communities provide a platform for teachers to engage in discussions, seek advice, and share best practices with colleagues worldwide. Virtual communities of practice foster a culture of continuous learning, allowing

educators to benefit from the collective expertise of their peers. A study by other study found that participation in virtual communities of practice positively impacted teacher professional development and instructional improvement (Velez-Solic & Banas, 2014).

In addition, social media platforms specifically designed for educators, such as Twitter chats and educational blogs, offer professional networking and knowledge exchange opportunities. Educators can follow relevant hashtags, join discussions, and access a wealth of resources and ideas shared by fellow educators. Engaging in these online platforms facilitates ongoing professional growth and provides a support network for teachers. A study by previous study highlighted the positive impact of social media on teacher professional development, emphasizing the benefits of collaborative learning and resource sharing (Hew & Cheung, 2013).

Parent and Community Engagement

Digital education technology plays a significant role in enhancing parent and community engagement in the educational process. By leveraging digital platforms and online portals, schools can establish effective communication channels and provide access to student performance data, fostering meaningful collaboration between parents, educators, and the wider community. This section will discuss two critical components of parent and community engagement enabled by digital education technology: digital platforms for parent-teacher communication and online portals for accessing student performance data (Cuthbert et al., 2023; Ramírez & Tejada, 2022).

Digital platforms offer convenient and efficient ways for parents and teachers to communicate and collaborate. Online communication tools such as email, messaging apps, and virtual meeting platforms enable real-time communication and facilitate regular and timely updates between parents and teachers. These platforms allow parents to easily connect with teachers to discuss their child's progress, address concerns, and receive updates on classroom activities and assignments (Denny et al., 2016; Ertmer & Ottenbreit-Leftwich, 2013). Effective communication channels strengthen the partnership between parents and teachers, enabling them to work together to support student learning and well-being.

Online portals provide parents access to student performance data, facilitating their active involvement in their child's education. Through secure online portals, parents can view their child's grades, attendance records, and progress reports. These portals offer a transparent and comprehensive overview of student performance, enabling parents to monitor their child's academic progress and identify areas for support and intervention (Kimmons & Hall, 2018; Mitchell et al., 2019). Having access to real-time data, parents can actively engage in conversations with teachers, provide additional support at home, and make informed decisions regarding their child's education.

The utilization of digital platforms and online portals for parent and community engagement has been shown to have positive impacts. Research suggests that digital communication tools and platforms enhance parental involvement and engagement in their child's education. When parents have convenient access to student performance data, they can engage in meaningful conversations with educators, improving student outcomes (DePlanty et al., 2007; McCarroll et al., 2021). Digital platforms also bridge the communication gap between schools and parents facing time or geographical constraints, promoting more inclusive and accessible engagement.

In conclusion, digital education technology offers valuable tools for promoting parent and community engagement in the educational process. Digital platforms for parent-teacher communication facilitate regular and convenient communication channels, fostering collaboration and partnership between parents and teachers. Online portals for accessing student performance data empower parents to actively monitor their child's progress and

engage in meaningful discussions with educators. By leveraging digital education technology, schools can enhance parental involvement, strengthen community engagement, and ultimately contribute to improved student outcomes.

Infrastructure and Resource Management

Efficient infrastructure and resource management is crucial for effective school operations. Digital education technology offers valuable solutions in this domain by providing digital systems for inventory and asset tracking and automating processes for resource allocation. These advancements streamline administrative tasks, optimize resource utilization, and contribute to cost-effectiveness. This section will explore the benefits of digital infrastructure and resource management, focusing on digital systems for inventory and asset tracking and automated processes for resource allocation.

Digital inventory and asset tracking systems are invaluable tools for schools to manage resources effectively. These systems utilize barcode or RFID technology to track and monitor the location, availability, and usage of equipment, textbooks, and other educational resources. By implementing digital inventory systems, schools can maintain accurate records of their assets, streamline the process of resource borrowing and returning, and reduce the risk of loss or misplacement (Haibeh et al., 2022; Hasan & Du, 2023; Noltemeyer et al., 2019). The ability to efficiently track and manage resources ensures that the necessary materials are readily available when needed, enhancing teaching and learning experiences.

Furthermore, digital education technology provides data-driven insights that inform resource management decisions. Educational software and learning management systems generate data on resource usage, classroom utilization, and student needs (Braganza et al., 2022; Stehle & Peters-Burton, 2019). By analyzing this data, administrators can identify trends, patterns, and areas of improvement in resource allocation. This information allows for evidence-based decision-making, strategically allocating resources to address specific needs and enhance educational outcomes. The benefits of digital infrastructure and resource management have been demonstrated in research and practical applications. Studies have shown that digital inventory and asset tracking systems improve resource accountability, reduce costs associated with lost or damaged resources, and enhance overall resource utilization. Automated resource allocation processes have been found to optimize facility utilization, improve scheduling efficiency, and enhance resource accessibility for students and staff (Chaudhuri et al., 2021; Templeton & Timmis, 2023).

In conclusion, digital education technology offers significant infrastructure and resource management advantages. Digital inventory and asset tracking systems provide accurate and efficient resource monitoring, ensuring availability and minimizing loss or misplacement. Automated resource allocation processes optimize resource utilization, streamline administrative tasks, and contribute to cost-effectiveness. By leveraging data-driven insights, educational institutions can make informed decisions regarding resource allocation to enhance teaching and learning experiences. Embracing digital infrastructure and resource management solutions allows schools to optimize their operations, benefiting students, teachers, and the entire educational community.

Challenges and Considerations

Digital education technology brings numerous benefits to the educational landscape but also presents challenges and considerations that must be addressed for successful implementation. This section will discuss four key challenges and considerations: access and equity issues, data privacy and security concerns, professional development for educators, and infrastructure and technical support requirements (Shin et al., 2023; Vial, 2021).

Access and equity issues are significant challenges in implementing digital education technology. Not all students have equal access to the necessary devices, reliable internet connectivity, and digital resources (Derakhshan et al., 2021; Yu, 2022). This digital divide can exacerbate educational inequities, disadvantaging some students. Schools must address this challenge by ensuring all students can access devices and internet connectivity, providing equitable learning opportunities. Additionally, educators should be mindful of designing inclusive digital learning experiences considering diverse student needs and abilities (Ngubane-Mokiwa & Khoza, 2021; Tai et al., 2023).

Data privacy and security concerns are crucial considerations when implementing digital education technology. Student data collection, storage, and use ethical and legal issues. Schools must prioritize protecting student privacy and ensure compliance with data protection regulations. Robust data security measures, such as encryption and secure storage systems, should be in place to safeguard sensitive student information. Transparent policies and clear communication with stakeholders about data collection and usage are essential for building trust and maintaining privacy (Ertmer & Ottenbreit-Leftwich, 2013; Prinsloo & Kaliisa, 2022). Professional development for educators is vital for effectively integrating digital education technology. Teachers need support and training to develop the necessary skills and competencies to leverage digital tools and resources. Professional development programs should provide opportunities for educators to explore innovative pedagogies, gain technical proficiency, and learn how to integrate digital technologies into their teaching practices. Ongoing professional development should be tailored to meet the specific needs of educators and provide continuous support as technology evolves (Luo et al., 2020; Sancar et al., 2021).

Infrastructure and technical support requirements must be revised in implementing digital education technology. Schools must have the necessary infrastructure, including reliable internet connectivity, network infrastructure, and adequate hardware resources. Technical support teams must be available to address hardware or software issues promptly and provide training and assistance to educators (Gikandi et al., 2011; Liu et al., 2020). Adequate funding and resources should be allocated to maintain and upgrade infrastructure regularly. Collaboration between educators, administrators, and IT staff is essential for effective infrastructure planning and support. Addressing these challenges and considerations requires a multi-faceted approach involving collaboration between policymakers, school administrators, educators, and technology providers. Strategies may include initiatives to bridge the digital divide, develop robust data privacy policies, provide comprehensive professional development opportunities, and allocate resources for infrastructure and technical support (Barahona et al., 2023; Harris & Jones, 2017; Lomellini et al., 2022).

In conclusion, successfully implementing digital education technology requires addressing challenges and considerations related to access and equity, data privacy and security, professional development for educators, and infrastructure and technical support. By proactively addressing these challenges, educational institutions can ensure equitable access to digital resources, protect student data privacy, empower educators with the necessary skills, and provide a robust technological infrastructure. Through collaboration and strategic planning, schools can harness the potential of digital education technology to enhance teaching and learning experiences and promote equitable educational outcomes.

Discussion

Digital education technology offers numerous benefits for school management. It enhances communication and collaboration among stakeholders, streamlines administrative processes, and provides personalized learning experiences for students. Through data-driven decision-making, schools can effectively track student progress and identify areas for

improvement (Gikandi et al., 2011; Liu et al., 2020). Additionally, digital platforms provide access to various educational resources, enriching the learning environment. These benefits collectively contribute to more efficient and effective school management, ultimately improving educational outcomes. In the 21st century, the demands and challenges of education have evolved, necessitating innovative approaches to improve scholarly output (Shin et al., 2023; Vial, 2021). Digital education technology holds immense potential for addressing these needs. By leveraging digital tools for curriculum planning and implementation, schools can ensure that their instructional materials align with educational standards and are delivered effectively.

Moreover, utilizing online platforms and adaptive learning systems enables personalized learning experiences catering to individual student needs. Integrating technology in teacher professional development facilitates continuous learning, keeping educators up-to-date with best practices (Ngubane-Mokiwa & Khoza, 2021; Tai et al., 2023). With digital education technology, schools can enhance scholarly output by providing engaging and relevant learning experiences that prepare students for success in the 21st century.

To thrive in the ever-changing educational landscape, schools must actively embrace and leverage digital education technology for effective school management. It is crucial for school leaders, administrators, and educators to recognize the benefits that digital tools and platforms offer and to make intentional efforts to incorporate them into their practices. This includes investing in infrastructure, providing professional development opportunities, and fostering a culture of innovation and collaboration (Luo et al., 2020; Sancar et al., 2021). By doing so, schools can harness the potential of digital education technology to strengthen school management, improve educational outcomes, and equip students with the skills and knowledge they need to succeed in the 21st century.

Some potential impacts of this study on improving educational outcomes in the digital era today include. The study's findings can provide valuable data and evidence to inform policymakers about the benefits and challenges of integrating digital education technology into school management. Policymakers can use this information to create policies that promote the effective and responsible use of technology in education, fostering better learning environments and outcomes (Denny et al., 2016; Ertmer & Ottenbreit-Leftwich, 2013). Enhancing school management practices: By understanding how digital tools can support school management, educational institutions can optimize administrative processes, resource allocation, and decision-making. This can lead to improved efficiency and effectiveness, allowing educators and administrators to focus more on students' needs and educational quality (Cuthbert et al., 2023; Ramírez & Tejada, 2022).

The study's insights can guide the development of targeted professional development programs for teachers and administrators. Training educators on the effective use of digital education technology can empower them to engage students in innovative ways and cater to diverse learning needs, ultimately leading to better educational outcomes (Kimmons & Hall, 2018; Mitchell et al., 2019). Fostering Student-Centered Learning: Digital education technology can facilitate personalized and interactive learning experiences for students. The study's impact might encourage educators to adopt student-centered teaching approaches that empower learners to take an active role in their education, resulting in improved learning outcomes and higher student engagement. Addressing Educational Inequities: Understanding how digital education technology can support school management can also shed light on ways to bridge the digital divide and address educational inequities (Lay et al., 2020; Perrotta, 2013). By ensuring equal access to technology and related resources, schools can create more equitable learning environments and improve outcomes for all students.

Integrating digital education technology in school management can instill digital literacy skills in students, preparing them for the demands of the digital age. This impact can extend beyond formal education, empowering individuals to be lifelong learners in an increasingly technology-driven world (Ali et al., 2023; Ramírez & Tejada, 2022). Encouraging Research and Collaboration: The study can stimulate further research and collaboration in the field of educational technology and school management. Researchers may be inspired to explore related areas, contributing to a broader understanding of how technology can positively impact educational outcomes (Abd-El-Fattah, 2010; Liu et al., 2020).

Finally, fostering strong partnerships between educational institutions, policymakers, and stakeholders is critical for achieving quality educational outcomes. Collaboration and coordination among various stakeholders are necessary to align educational goals, policies, and resources and collectively address systemic challenges (Langseth et al., 2023; Topali et al., 2023). Engaging parents, communities, and industry partners can also contribute to bridging the gap between education and real-world contexts, enhancing the relevance and quality of education. In conclusion, ensuring quality educational output requires addressing challenges such as adapting education to a changing world, providing equitable access, personalizing learning experiences, implementing practical assessments, supporting teacher professional development, and fostering collaborative partnerships. Meeting these demands is essential for equipping learners with the knowledge, skills, and competencies needed to succeed in the 21st century and create inclusive and effective educational systems.

4. CONCLUSION

In summary, the impact of the study can lead to actionable insights that support the responsible and effective integration of digital education technology into school management, ultimately contributing to improved educational outcomes in the digital era today. By leveraging the potential benefits of technology, educational institutions can better meet the challenges and demands of providing high-quality education in the 21st century. In conclusion, the benefits of digital education technology in school management are significant. It empowers schools to enhance communication, streamline administrative processes, personalize learning experiences, and make data-informed decisions. The potential for improving educational output in the 21st century through digital education technology is immense, as it aligns curriculum, caters to diverse learner needs, and facilitates continuous professional development. Therefore, schools must embrace and leverage digital education technology, vital to effective school management and improved educational outcomes in the modern era.

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