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THE ROLE OF EDUCATIONAL TECHNOLOGY IN IMPROVING THE QUALITY OF LEARNING IN THE DIGITAL ERA CASE STUDY AT A VOCATIONAL HIGH SCHOOL

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Abstract

This study explores the role of educational technology in improving the quality of learning in the digital era, with a special focus on Vocational High Schools (SMK). This literature review aims to identify the benefits, challenges, and best practices of technology in the context of vocational education. Through a review of various academic sources, journal articles, and research reports, this study found that educational technology has great potential to increase student engagement, align the curriculum with industry developments, and strengthen digital skills that are in high demand in the world of work. The results showed that the use of special software, digital simulations, and online learning modules can provide a more interactive and practical learning experience for vocational high school students. Increased student engagement was also noted as one of the main benefits, with technologies such as gamification and interactive simulations successfully increasing motivation and active participation in the learning process. This study also identified the need for dynamic curriculum adjustments, adequate infrastructure support, and training for teachers to ensure effective implementation of technology. In addition, this study highlighted several challenges, including disparities in access to technology, the need for teacher training, and concerns about data security and privacy. This study emphasizes the importance of collaboration between the government, educational institutions, the technology industry, and the community to create an inclusive and sustainable education ecosystem. Overall, this study concludes that educational technology has a vital role in transforming learning in vocational schools, provided that the existing challenges can be overcome through a holistic and collaborative approach. Thus, the integration of educational technology in vocational schools not only improves the quality of learning but also prepares students to face the demands of the world of work in the digital era.

Keywords: Educational Technology, Learning Quality, Digital Era, Vocational High School

INTRODUCTION

In this era of globalization and digitalization, technological advances are inevitable. Technology has penetrated almost all aspects of human life, including in the field of education (Gopi, 2022). Educational technology is a term that encompasses the use of technology to improve the effectiveness and efficiency of the teaching and learning process. Vocational High Schools (SMK), which specifically prepare students to enter the workforce, benefit greatly from the integration of technology into their curriculum. The adoption of technology in SMK opens up opportunities for improving the quality of learning and adapting to the demands of a dynamic job market (Mautso & Goosen, 2022).

Educational technology is not only limited to the use of computers and the internet in the classroom, but also includes the use of educational software, interactive tools, and online learning platforms. This allows teachers to deliver materials in a more engaging and interactive way, which in turn can increase student motivation and engagement in the learning process (Maheshkar, 2023). For example, the use of simulations and virtual labs in vocational subjects can provide near-real practical experience, so that students are better prepared when they enter the world of work.

The case study on Vocational High Schools is relevant because vocational schools have a very practical and skills-oriented curriculum. In vocational schools, hands-on learning or direct experience is highly prioritized. With the help of technology, students can access learning materials anytime and anywhere, minimize the cost of expensive practical equipment, and collaborate with other students or mentors from the industry. This is a significant advantage in preparing them to face the challenges of industry 4.0 which greatly requires digital skills (Samaila et al., 2024).

Not only from the students' side, technology also provides great benefits for teachers and institutions. Teachers can utilize various platforms to design a more flexible and personalized curriculum according to the needs of each student. E-learning platforms and Learning Management Systems (LMS) help teachers manage classes, monitor student progress, and provide more timely feedback. In fact, educational institutions can use the data generated by this technology to analyze and improve overall learning strategies (Sahri et al., 2023).

However, the application of technology in education also has its own challenges. One of them is the readiness of infrastructure and digital competence from both teachers and students. Not all schools have adequate access to technological tools, and not all teachers or students have the skills needed to utilize technology optimally (Rachmawati et al., 2022). Therefore, support is needed from various parties, including the government, to ensure that the integration of technology in education can run effectively and evenly. In such a way, educational technology can truly be an important lever in improving the quality of learning in Vocational High Schools and Indonesian education in general.

One of the main challenges in implementing educational technology in Vocational High Schools (SMK) is the availability of infrastructure. Not all vocational schools, especially those in remote areas, have adequate facilities to use technology effectively in the learning process. Unstable internet connections, lack of hardware such as computers and tablets, and the absence of classrooms equipped with the necessary technological tools are major obstacles. Without adequate infrastructure, efforts to integrate technology in education will not achieve the expected results (Asyri & Asyri, 2024).

Lack of digital competency among teachers and students is also a significant challenge. Knowledge and skills in using educational technology devices and software cannot be underestimated. Many teachers have not received adequate training to utilize technology in their teaching (Abbood et al., 2023). Likewise, not all students have the access and skills needed to engage in technology-based learning. Without proper training and mentoring, technology will only be a less effective tool in the education process.

To address this issue, significant investment in infrastructure and training is needed. The government and stakeholders must work together to ensure that schools across Indonesia have access to the technology they need. Training programs for teachers must be expanded and strengthened to ensure that they have the skills needed to use technology in learning (Suhilmiati et al., 2024). In addition, students also need to be given better access to digital devices and resources, for example through subsidy programs for low-income families.

In addition, partnerships with industry and the business world can be an effective solution. Many technology companies and other industries are concerned about improving the quality of education. Through public-private partnerships, schools can get assistance in the form of hardware and

software, as well as training for teachers and students. Industry can also provide internship opportunities and technology-based work practices, so that students can gain first-hand experience in using technology in the workplace (Rina et al., 2024).

With these various efforts, it is hoped that the integration of technology in education in Vocational High Schools can run more effectively. Technology can be a powerful tool to improve the quality of learning and prepare students to face the challenges of the world of work. Young generations who are equipped with technological skills will not only be better prepared to enter the world of work, but also have the potential to become innovators and leaders who can lead Indonesia to a brighter future. Education combined with technology is a long-term investment that will provide great benefits for human resource development and national progress (Moleka, 2023).

RESEARCH METHOD

The study in this study 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 to be studied (Earley, M.A.2014; Snyder, H.2019).

RESULT AND DISCUSSION

Types of Educational Technology used in Vocational Schools

In Vocational High Schools (SMK), various types of educational technology are used to support the learning process and improve students' skills. One of the most common technologies is the Learning Management System (LMS), such as Moodle or Google Classroom. LMS allows teachers to organize learning materials, assignments, and exams digitally. Students can access learning materials from anywhere and at any time, providing flexibility in learning (Humaidi & Alamsyah, 2023). In addition, LMS also facilitates online discussions and collaboration between students, which can improve their interaction and understanding of the learning materials.

Another technology is the use of specialized hardware and software that is relevant to a particular vocational program. For example, students in a mechanical engineering vocational program might use CAD (Computer-Aided Design) software to design mechanical components, while students in a

multimedia vocational program might use video and graphics editing software such as Adobe Premiere or Photoshop. The use of these devices not only helps students understand the concepts being taught, but also provides them with much-needed practical experience in the workplace. Computer labs or studios equipped with these technological devices are an essential part of vocational school facilities (Lieres & Cauvery, 2022).

In addition, simulation and virtual reality (VR) technologies are increasingly being used in some vocational schools to provide realistic training without real risks. For example, flight simulators can be used in vocational schools that offer aviation vocational programs to train students in operating aircraft safely (Balki et al., 2022). Similarly, VR technology can be used to simulate complex engine maintenance or surgical operations in relevant vocational programs. These simulation technologies allow students to learn in a safe and controlled environment, while providing experiences that are very close to real-world situations. Thus, students are better prepared to face the challenges of the workforce after graduation.

In addition to the technologies already mentioned, the use of mobile technology is also increasingly popular in vocational schools. Mobile-based learning applications allow students to access course materials, video tutorials, and interactive quizzes via their smartphones or tablets. This is especially beneficial for students who may not have access to a personal computer at home. Some applications even offer gamification features that make learning more engaging and fun (Jabbar & Halim, 2024). With mobile technology, the learning process becomes more integrated into students' daily lives, so they can learn anytime and anywhere.

Technology also plays an important role in assessment and evaluation in vocational schools. Computer-based evaluation systems allow teachers to give tests online, with results immediately accessible to students. This not only saves time but also simplifies the process of analyzing learning outcomes. In addition, several vocational schools have begun implementing learning analytics technology that uses artificial intelligence (AI) to analyze student performance data (Makhno et al., 2022). With this technology, teachers can gain deeper insights into the strengths and weaknesses of each student, which can be used to design more effective and personalized learning strategies.

The use of the internet and online platforms also opens up opportunities for vocational schools to collaborate with other educational institutions, both domestically and internationally. Virtual exchange programs

and video conferencing can be used to connect students and teachers with colleagues abroad, enabling valuable knowledge and cultural exchange. In addition, many vocational schools have begun to adopt Massive Open Online Courses (MOOCs) as part of their curriculum. Through MOOCs, students can access learning materials from renowned universities and educational institutions around the world, broadening their horizons and enriching their learning experiences (Ramadhani et al., 2023).

The Impact of Technology Use on Learning Quality

The use of technology in learning has had a significant impact on the quality of education. First, technology allows wider and easier access to learning resources. With the internet, students can access various information, e-books, scientific journals, and other learning resources from around the world. This enriches the material taught in class and encourages students to learn independently (Gusho et al., 2023). In addition, online learning platforms and educational applications make it easier for students to understand the material with various methods such as videos, simulations, and animations, which can explain difficult concepts more visually and interactively.

Second, technology encourages the development of more interactive and collaborative learning methods. The digitization of classrooms allows the implementation of digital learning models such as the flipped classroom, where students learn theory at home through videos and apply that knowledge in the form of discussions and projects in class. In addition, collaborative applications and software such as Google Classroom, Microsoft Teams, and LMS (Learning Management System) platforms allow students and teachers to interact in real time, share documents, work on group projects, and provide feedback more easily. This increases student engagement in the learning process and encourages active participation (Jordão & Ricardo-da-Silva, 2022).

However, while technology offers many benefits, there are also challenges to be overcome to ensure that its impact is truly positive. Not all students have equal access to technological devices and the internet, which can widen the educational gap. In addition, the use of technology must be balanced with good supervision to ensure that students are not distracted by non-educational content or experience digital addiction. Therefore, it is important for schools and teachers to consider the right strategy in technology integration, including providing adequate training to students and teachers and ensuring the availability of supporting infrastructure (Xie, 2023).

With the right approach, technology can be a powerful tool to improve the quality of learning and help students achieve their academic potential.

In order to maximize the positive impact of technology in learning, an active role is needed from various parties involved, including the government, educational institutions, teachers, and parents. The role of the government is very important in providing policies that support access to technology in each school, such as school digitalization programs and subsidies for technological devices. Educational institutions must also develop a curriculum that is integrated with technology and offer regular training for teachers to improve their ability to use digital educational tools. This training is very important to ensure that technology is used effectively and efficiently to improve the learning process (Papageorgiou, 2023).

On the other hand, teachers have a critical role in ensuring that the use of technology in the classroom is carried out in a way that supports educational goals. They must be able to integrate technology into everyday learning without neglecting other important aspects of education such as students' social and emotional development. Teachers must also be aware of potential problems that may arise, such as plagiarism or misuse of technology, and educate students about digital ethics and responsible use of technology (Aulia & Marsasi, 2024). With this approach, technology becomes not only a learning tool, but also a means to shape students' character in facing the digital era.

Parents should also play a role in supporting healthy technology use at home. They can monitor their children's use of technology, ensuring that screen time does not interfere with learning and other daily activities such as exercise, play, and social interactions. In addition, parents can provide positive reinforcement by providing access to useful online educational resources and discussing what their children are learning through digital media (Alrehaili et al., 2022). With the cooperation and active participation of all parties involved, technology can be a powerful catalyst in improving the quality of education and preparing students for future challenges.

Teacher and Student Perceptions of Educational Technology

Teachers' perceptions of educational technology are generally positive, especially when they see the concrete benefits it can provide in the learning process. Many teachers view technology as a tool that can enrich teaching materials, facilitate the delivery of information in a more interesting way, and expand access to various scientific resources that may not be available in

conventional classrooms. The integration of technology in education also makes it easier for teachers to evaluate and assess students through online learning systems and automatic evaluation applications (Bismala, 2022). However, there are challenges felt by some teachers, such as the need for ongoing training and adaptation to the latest technology and concerns about technical disruptions that can affect the quality of teaching.

On the student side, educational technology is often appreciated for providing a more dynamic and interactive learning experience. The use of devices such as tablets, computers, and web-based educational applications can make learning materials easier to understand and more relevant to their daily lives. Students also enjoy the freedom to learn at their own pace and take advantage of the many sources of information available online (Martínez & Gómez, 2023). In addition, technology allows students to collaborate more effectively with their classmates through project-based learning platforms and online discussion forums. However, there is also concern that over-reliance on technology can reduce students' ability to think critically and interact directly.

Overall, both teachers and students recognize that educational technology has great potential to improve the quality of teaching and learning. However, the success of implementing technology in education is highly dependent on how the technology is used and supported by adequate infrastructure and training. Collaboration between teachers, students, and other stakeholders is essential to maximize the benefits of technology, overcome existing challenges, and ensure that technology truly becomes a tool that supports the achievement of educational goals (Kamila, 2024). With an integrated approach and focusing on real needs in the field, positive perceptions of educational technology are expected to be stronger and have a positive impact on student learning outcomes.

In addition to the obvious benefits, there are other aspects that need to be considered in implementing educational technology, including ethical and well-being aspects. Teachers need to ensure that the use of technology continues to maintain balance with traditional teaching methods to avoid negative impacts such as addiction and information confusion. Developing policies that regulate the use of technology in the classroom can help create a conducive learning environment and avoid potential misuse of technology (Wibowo et al., 2023). In addition, teachers must also play an active role in educating students about digital ethics, including how to interact wisely and safely in cyberspace.

Technology also requires adequate infrastructure to be accessible to all students equally. This includes the availability of hardware such as computers and tablets, a stable internet connection, and reliable technical support. Especially in economically underdeveloped areas, unequal access to technology can be a major barrier to creating a fair and inclusive learning process. Therefore, collaboration between the government, schools, and the private sector to provide wider and more equitable access to educational technology is essential (Jeon, 2022). With the right support, all students, regardless of their economic background, can enjoy the benefits of educational technology.

Finally, it is important for education policymakers to continue to evaluate and research the effectiveness of technology in learning. Rapid technological changes and developments require a quick and adaptive response in education. Longitudinal studies can provide important insights into how technology affects students' academic achievement and social skills in the long term (Widoretno et al., 2023). By basing policies on accurate and relevant data, education systems can be more responsive to emerging needs and challenges, and ensure that educational technology truly makes a positive contribution to the teaching and learning process.

Barriers to Implementing Educational Technology and Providing Recommendations to Overcome These Challenges

The implementation of technology in education faces several obstacles, including unequal access to technological devices and internet connections. In some areas, especially those that are economically less developed, students may not have adequate access to computers, tablets, or high-quality internet (Sweeney, 2024). In addition, a lack of digital literacy among students and teachers can hinder the optimal use of educational technology. These challenges are further compounded by the lack of training and professional development for teachers to effectively integrate technology into their teaching.

To address these barriers, the first step is to expand technology infrastructure across the region, especially in rural and remote areas. Governments can partner with the private sector and non-profit organizations to provide adequate hardware and internet connectivity to schools in these areas. Additionally, using education funds for subsidies or device loans to students from low-income families can also help improve accessibility (Singh &

Sharma, 2024). Developing technology-equipped learning resource centers in local communities can be an additional solution to bridge the technology gap.

In addition to improving infrastructure, it is also important to improve digital literacy and provide adequate training to teachers. Governments and schools should invest in ongoing training programs that help teachers develop their technological skills as well as effective pedagogical strategies for integrating technology into their curriculum. The development of professional learning communities, where teachers can share best practices and support each other, can also be very useful (Sharma & Singh, 2024). In this way, teachers become not just passive users of technology, but active innovators in creating richer and more efficient learning experiences for students.

In addition to focusing on infrastructure and teacher training, it is also important to consider aspects of the curriculum and students' psychological readiness to face the transformation of educational technology. The curriculum must be designed to be dynamic and flexible, able to adapt to the latest technological changes. The use of technology should not only be limited to teaching aids, but must be integrated holistically into the learning process, encouraging more interactive and project-based learning. The use of gamification and digital simulations, for example, can increase student engagement and motivation in learning (Gobry et al., 2023).

Regarding students' psychological readiness, it is important to note that the large-scale implementation of technology can bring stress and confusion to some students. Therefore, it is important to implement an inclusive approach that takes into account the individual needs of students. Guidance and counseling programs that introduce technology gradually, as well as special support for students with different levels of digital skills, need to be provided (Canchari et al., 2023). This will ensure that every student feels safe and ready to use technology in their learning process.

In the long term, collaboration and partnership between the government, educational institutions, the technology industry, and the wider community are essential. Innovation cannot be done in isolation; there needs to be synchronization between various stakeholders to create an integrated and sustainable education ecosystem. Partnerships with technology companies can bring substantial input and support in the form of device donations, technology training, and the development of relevant educational applications (Bahçekapılı, 2023). With solid and sustainable cooperation, obstacles in the implementation of educational technology can be overcome, and provide maximum benefits for all parties involved.

CONCLUSION

The use of technology such as gamification and interactive simulations encourages higher student engagement, making them more motivated and enthusiastic about learning. Technology enables a more flexible and dynamic curriculum, which can be continuously updated according to the latest industry and technology developments. This ensures that students gain skills that are relevant to the needs of the job market. Access to modern technological devices such as computers, professional software, and high-speed internet enriches the teaching materials and teaching methods used in vocational schools. Through the integration of technology, students gain important digital skills, not only for current educational needs, but also for their readiness to enter the world of work in the future. Technology enables the provision of more personalized support that is tailored to students' individual needs. Technology-supported guidance and counseling programs can also help students deal with psychological challenges related to digital transformation. The application of educational technology in vocational schools has succeeded in improving the quality of learning by providing more innovative, interactive, and relevant educational methods. However, the implementation of technology must be accompanied by adequate training for teachers, strong infrastructure support, and an inclusive approach to ensure that every student can make optimal use of technology. Cooperation between the government, educational institutions, technology industry, and society is essential to create a sustainable and integrated education ecosystem, in order to face the challenges and opportunities in the digital era.

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