

INNOVATION AND TECHNOLOGY IN EDUCATION

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ABSTRACT

Innovation is the process of improving the quality of life and overall human progress. Innovation is an idea or method developed to solve a specific problem, and thus, innovation can be said to be subjective and specific. Innovation in education, particularly in technology-based learning, is key to improving the quality of education and meeting the evolving needs of students in today's increasingly advanced digital era, while simultaneously expanding access to education and creating more effective and engaging learning methods. 21st-century or digital age education standards for teachers and students are inseparable from the application of technology in learning. Therefore, teachers must possess competencies related to the use of digital technology, which is transforming education today. Technology has become a key driver of transformation in the world of education. This change is evident in various aspects, from learning methods to educational management.

Keywords: Innovation and technology; digital technology; education; technology-based learning; Technology in Education

1. INTRODUCTION

Innovations from digital technology developments have brought significant changes to the world of education. Students are now increasingly familiar with digital media as a learning tool, although the effectiveness of using this digital technology still requires further study. Innovation is the process of improving the quality of life and overall human progress. Innovation is an idea or method developed to solve a specific problem, and thus, innovation can be said to be subjective and specific. Now we can access information from anywhere in the world in seconds, communicate with anyone in seconds, and complete tasks that previously took longer more quickly. Innovation in digital technology will create a more flexible and accessible learning environment from anywhere.

The use of technology in education not only increases access to information but also enriches students' learning experiences. With the use of technologies such as e-learning, mobile applications, and interactive tools, learning will become more engaging and more effective, facilitating adaptive and personalized learning. One of the main benefits of digital technology innovation in education is the opening up of broader access.

In the past, quality education was often only accessible to those in urban areas or those with sufficient economic means. However, through innovations in digital technology such as the internet and mobile devices, students living in remote areas can now access the same learning materials as students in large cities.

Digital technology also enables personalized learning, allowing each student to learn at their own pace and in their own way. This personalization not only helps students who struggle to understand the material but also provides additional challenges for those who grasp the material more quickly. This ensures that each student receives an optimal learning experience tailored to their individual abilities. Artificial intelligence (AI) algorithms can easily analyze student learning data and recommend materials tailored to their needs. For example, applications like Khan Academy use data to adjust the difficulty level of questions to suit the student's abilities, making the learning process much more effective. Challenges in education will always exist and are constantly changing, from various aspects, including curriculum, technology, and the students themselves. In facing these challenges, educators with an innovative attitude will be able to adapt to them and even create more engaging, effective, and relevant learning experiences for students.

2. METHODOLOGY

The methodology used is qualitative research, collecting data from various sources, including journal articles, research reports, and case studies. Data collection was conducted comprehensively through a literature review, focusing on references to articles published within the last five years. This was done to ensure that the information used remains relevant and reflects the current situation in digital technology-based educational innovation.

3. RESULTS

Technologies such as artificial intelligence (AI), online learning (e-learning), virtual reality (VR), and augmented reality (AR) have transformed the way teachers teach and students learn. In education, AI technology is not limited to language learning platforms like Duolingo. Many educational institutions have begun integrating AI into their learning management systems, and some universities have even developed AI-based chatbots to assist students with questions about curriculum, administration, and other campus services.

Furthermore, digital technology enables learning across geographic boundaries and creates global educational access that was previously difficult to achieve. Digital technologies in education, such as the use of augmented reality (AR), virtual reality (VR), and gamification, allow students to engage directly with the material they are learning. Game-based learning, for example, keeps students more engaged and motivated to learn, while AR and VR provide more immersive visual experiences, such as interactive explorations of the human anatomy or the planets in the solar system. Digital technology helps provide students with unlimited access to materials from a variety of sources. Broad accessibility is essential for fulfilling curiosity.

4. DISCUSSION

The use of innovation and technology in education has many positive impacts, including: increasing access to education for communities in remote areas, providing a more interactive and engaging

learning experience, encouraging student independence in learning, and efficiency in managing time, resources, and learning evaluation. This personalization not only helps students who have difficulty understanding the lesson but also provides additional challenges for students who grasp the material more quickly. Thus, each student receives an optimal learning experience according to their potential.

Although the use of technology in education offers various benefits, there are also risks that need to be considered. Some of these risks include dehumanization, where the teacher's role as a moral and emotional guide is indirectly replaced by digital systems. Another crucial risk is the increasing dependence of students on these technological innovations. In some cases, students become more focused on using digital devices than on the learning process itself, and this can hinder their ability to think critically and solve problems independently.

A study by Kirschner & De Bruyckere (2017) showed that excessive reliance on technological devices can diminish students' problem-solving and creativity skills, as they are more likely to rely on digital technology to find shortcuts to their problems without relying on their own critical thinking skills. Therefore, educators' creativity is crucial in creating a balance between the use of technology and traditional educational methods, ensuring that students can continue to develop the critical thinking skills essential for their future.

Furthermore, the social and emotional well-being of students in the context of online learning must be carefully considered. Social interactions that typically occur in face-to-face classes are reduced during online learning. This can lead to students feeling alone, isolated, and missing out on opportunities to interact directly with their peers and teachers, which can negatively impact their mental health.

The role of educators is crucial in creating a supportive learning environment, both academically and emotionally. Therefore, educators can also utilize group discussions by holding interactive online discussion sessions or collaborative activities that involve all students in online learning to increase their motivation and active engagement. Another effective method is the use of game-based learning (gamification), which can also increase student motivation and engagement, as it can make the learning environment much more enjoyable for students.

The readiness of educators to use technology is also a crucial factor in the success of digital innovation. In Indonesia, especially in remote areas, this presents a particular challenge, especially in areas where access to digital technology training is still lacking. The country's difficult-to-reach geographical location on a small island means that many educators still lack the digital skills to effectively utilize technology in the teaching and learning process. In this regard, the government plays a crucial role by significantly investing in the development of digital technology infrastructure in education, including the creation of high-quality technological devices and widespread and accessible internet access.

In situations like this, the gap between technologically skilled educators and those who are less skilled is clearly visible. For example, in some remote areas, many teachers still rely on traditional teaching methods because they lack access to adequate technology training. This reality undoubtedly impacts the quality of education received by students. Therefore, it is crucial to develop effective

training programs to improve teachers' digital skills. These training programs should be designed with teachers' specific needs and local contexts in mind. Training and workshops focused on the use of technology in education can help teachers become more confident and competent in using digital tools.

A study conducted by Turmudzi et al. (2024) showed that technological mastery, adaptability, and active participation by educators will undoubtedly have a positive impact on their performance. Therefore, motivating teachers to continuously improve their technological skills, adaptability, and participation levels is crucial for student progress. The right digital technology can also help students with special needs access learning materials that are tailored to their abilities.

Educational institutions must create curriculum and syllabus that integrate technology into the learning process, provide facilities and infrastructure that support the use of technology, and reward teachers who actively use technology. This way, they can harness the full potential of technology to enhance students' learning experiences.

5. CONCLUSION

Digital innovation in education offers numerous opportunities to improve the quality and accessibility of education. Technological innovation has opened a new era in education, flexible, and inclusive. However, challenges such as the digital divide, content quality, and teacher readiness must be addressed to ensure that the benefits of technology are felt equally.

The use of digital technology plays a crucial role in efforts to improve the quality of education in Indonesia, given its importance in advancing the nation.

Collaboration between the government, educational institutions, the private sector, and all levels of society is needed to develop adequate infrastructure and effective training programs for teachers. Thus, hoped that digital innovation in education can have a sustainable positive impact on all students in Indonesia. Digital technology in education is not just a current trend, but a necessity for creating a relevant education system ready to face future global challenges.

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