Exploring Metaverse Integration in Education: A Case Study on Vocational School Teachers

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ABSTRAK

Penelitian ini mengeksplorasi potensi metaverse dalam mengubah pendekatan pengajaran tradisional di lingkungan pendidikan, khususnya di SMK Hasina, Sukabumi, Indonesia. Melalui pendekatan studi kasus kualitatif, para pendidik menunjukkan pemahaman yang bervariasi terhadap metaverse, dipengaruhi oleh minat dan latar belakang teknologi mereka. Penelitian mengakui bahwa pelatihan pendidik yang luas dan integrasi metaverse dapat meningkatkan interaksi dan aksesibilitas dalam pendidikan. Rekomendasi mencakup metode inovatif, seperti simulasi pembelajaran interaktif atau kelas virtual, yang dapat memperkaya pengalaman belajar. Meskipun menjanjikan pengalaman belajar dinamis dan kolaborasi global, penelitian lebih lanjut diperlukan untuk memahami potensi dan tantangannya secara menyeluruh. Kesimpulan penelitian menyoroti temuan penting, termasuk perlunya dukungan komprehensif bagi pendidik dalam mengadopsi teknologi, eksplorasi pendekatan inovatif, dan penekanan pada manfaat potensial metaverse dalam pengaturan pendidikan. Analisis kualitatif menekankan urgensi mengatasi hambatan selama integrasi teknologi metaverse, dengan peran latar belakang personal dan teknologi guru menjadi faktor penentu dalam pemahaman metaverse. Secara keseluruhan, penelitian ini memberikan dasar penting untuk pengembangan implementasi metaverse dalam pendidikan, dengan menyoroti manfaat dan tantangan yang perlu diperhatikan.

EXPLORING METAVERSE INTEGRATION IN EDUCATION: A CASE STUDY ON VOCATIONAL SCHOOL TEACHERS

ABSTRACT

This study explores the potential of the metaverse in transforming traditional teaching approaches in the educational environment, particularly at SMK Hasina in Sukabumi, Indonesia. Through a qualitative case study approach, educators demonstrated varying levels of understanding of the metaverse, influenced by their interests and technological backgrounds. The research acknowledges that extensive educator training and metaverse integration can enhance interaction and accessibility in education. Recommendations include innovative methods, such as interactive learning simulations or virtual classes, to enrich the learning experience. While promising dynamic learning experiences and global collaboration, further research is needed to comprehensively understand the potential and challenges. The research conclusion highlights crucial findings, emphasizing the need for comprehensive support for educators in adopting technology, exploring innovative approaches, and emphasizing the potential benefits of the metaverse in educational settings. Qualitative analysis underscores the urgency of overcoming barriers during metaverse technology integration, with the personal background and technological expertise of teachers playing a decisive role in metaverse understanding. Overall, this research provides a vital foundation for the development of metaverse implementation in education, highlighting benefits and challenges that require attention.
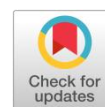
1. Introduction

Over the past few years, the concept of the metaverse has garnered significant attention due to its potential applications across various sectors, including education. The metaverse,

an area of virtual reality that allows users to interact with computer-generated environments and other users, holds the potential to transform traditional teaching techniques and contribute to improved educational outcomes. The metaverse has the potential to revolutionize traditional teaching methods and enhance educational outcomes [1]. This can be achieved through the integration of various technologies, providing opportunities to create immersive educational environments, establish relevant learning and training scenarios, and enhance both individual and social components of the learning process [2]. It is expected that education obtained through the use of the metaverse will be free from time and location constraints, offering equal opportunities to individuals less fortunate due to physical and geographical constraints (e.g., those living in mountainous and disaster-prone areas) [3].

With substantial advancements in several research sectors, the metaverse has proven to play a stronger role in the virtual world, offering greater possibilities in the context of education [4]. This fact has been demonstrated in the field of education. Furthermore, in the realm of history education, many examples of appropriate use of the term "metaverse" have been explored, and these findings have confirmed that the metaverse can provide additional meaning for both educators and those making decisions about educational policies [5]. Investigations have been conducted into the potential applications of the metaverse in advanced English language education, along with an examination of the opportunities and obstacles in teaching speaking, listening, and interpreting skills [6].

Furthermore, the metaverse has been investigated as a potential instrument to enhance student engagement and academic performance, with a specific emphasis on its impact on motivation and learning engagement [7]. The use of the metaverse for basketball education purposes has the potential to stimulate the flow experience of students and positive behavioral intentions due to the technical characteristics and virtual reality effects of the metaverse [8]. Additionally, the metaverse has been recognized as a promising option to address gaps in learning and technology in agricultural education applications [9]. This was discovered by researchers.

The fact that the metaverse can be applied in various transaction situations within the context of the digital economy application, while also achieving high levels of efficiency in trade, is an additional factor contributing to the promise that the metaverse holds in the field of education [10]. The fact that it is a universal and immersive virtual environment, made possible by virtual reality and augmented reality, offering opportunities for the development of an intelligent education ecosystem, is another aspect that has been emphasized [11].

This study aims to explore the implementation of the metaverse in teaching, focusing on its potential to revolutionize the way subjects are taught and understood. The significance of this research lies in its ability to provide insights into how the virtual environment can be effectively utilized to improve literacy and spatial skills. By examining the experiences and methodologies of teachers who have integrated the metaverse into their teaching practices, this research aims to understand the impact, challenges, and future prospects of this innovative approach in education.

2. Method

This research utilizes a qualitative method with a case study approach to explore the process of introducing the metaverse to teachers at SMK Hasina, Sukabumi. Through the case study approach, in-depth observations were conducted to understand the steps taken in acquainting the concept of the metaverse to the teachers in that environment. The research population encompasses all teachers at SMK Hasina, Sukabumi, while the research sample comprises 12 teachers selected through purposive sampling. Selection was based on specific criteria, including an interest in learning about the metaverse and willingness to participate in the research. Research instruments used included observation and interviews. Direct observation was carried out to monitor the introduction process of the metaverse, while interviews were conducted to delve into the teachers' understanding after their involvement in the introductory activities. Data analysis in this research adopts a descriptive qualitative approach. The analysis process involves reducing data, presenting gathered information, and

drawing conclusions from the understanding expressed by the teachers in the context of introducing the metaverse.

3. Results and Discussion

The research implementation process at SMK Hasina in Sukabumi, Indonesia, began with the primary goal of introducing the concept of the metaverse to a group of twelve teachers representing various departments in the school. In this process, a spectrum of understanding about the metaverse was identified among these teachers, ranging from strong understanding to limited or even no understanding at all. The first step in the research implementation involved introductory activities and training on the metaverse in education for the teachers. This activity lasted for 4 hours and was divided into two main parts. The first part focused on introducing the concept of educational technology in general, providing a foundational understanding of various tools and methods that can be used in modern education. The second part was more specific, concentrating on the implementation of the metaverse in the context of teaching and learning. In the second part, teachers were given step-by-step guidance on how to integrate the metaverse into their teaching methods. This included hands-on practice and an introduction to various metaverse tools that can be used to enhance student interaction and engagement. Participants were given the opportunity to directly experience the use of metaverse technology and address potential challenges that might arise during implementation.

Throughout the training, various resources and learning materials were provided to support the understanding of the teachers. Additionally, question-and-answer sessions and group discussions were conducted to provide space for participants to share experiences, ask questions, and exchange ideas related to the use of the metaverse in the context of education.

Fig. 1. Workhshop Metaverse at SMK Hasina

In this research, several facts were discovered that became the specific focus and considerations of the research team. First, there is an undeniable need to provide extensive training and resources to educators to enhance their understanding and proficiency in using metaverse technology. This aligns with research emphasizing the necessity of comprehensive support for educators to grasp technology [12]. The second recommendation proposed by the research is to investigate specific approaches to integrate the metaverse into educational practices, such as creating interactive learning simulations or captivating virtual classes. This represents an innovative approach to implementing the metaverse in the educational context [13]. Third, the research emphasizes the importance of engaging in discussions about the potential benefits of using the metaverse in educational settings. These discussions should focus on improving student engagement, fostering better collaboration between teachers and students, and expanding access to global learning opportunities. From the qualitative analysis conducted by the researchers on these findings, the research team emphasizes that

it is crucial to investigate and address any difficulties or obstacles that may arise during the process of integrating metaverse technology into the educational environment. Zhang et al. revealed that understanding that challenges need to be identified and proactively overcome is essential in implementing the metaverse in education [14].

The varying levels of understanding among teachers regarding the metaverse can be linked to several influential factors. First, a teacher's high interest in delving into the metaverse correlates with a more comprehensive understanding of this technology, in line with research indicating a correlation between personal interest and technological understanding [15]. Additionally, educators with backgrounds in technology show a stronger tendency to understand the metaverse effectively, where the educator's background in technology plays a significant role in technological understanding. A teacher interested in virtual reality and actively exploring the metaverse in their free time may have a profound understanding of its complexity. On the other hand, teachers with backgrounds in computer science or software development may quickly grasp concepts such as spatial computing and deep experiences, facilitating their understanding of the metaverse.

Furthermore, research results indicate that teachers who recognize the potential of the metaverse in an educational context reach a consensus regarding its capacity to enhance interaction, visualization, and accessibility in the educational environment. In this study, it was found that the metaverse has the potential to improve crucial aspects of the educational experience. Specifically, the metaverse has the potential to revolutionize student engagement with various subjects. These findings suggest that the metaverse can be highly beneficial for students facing difficulties with traditional teaching methods [16]. The research also states that the metaverse provides virtual space for students to explore and experiment, which can foster creativity and problem-solving skills. Moreover, research results affirm that the potential of the metaverse in transforming education indicates that interaction within the metaverse offers a more lively and interactive platform between educators and students. These findings also support the claim that the visualization capabilities of the metaverse can create a more engaging and realistic learning environment [17]. Finally, the results of this research support the concept that the capabilities of the metaverse are a highly relevant effort to connect students from various parts of the world. As the metaverse continues to evolve, these findings reflect the potential to revolutionize education and make learning more inclusive, dynamic, and impactful.

4. Conclusion

The conclusion of this research highlights key findings that contribute significantly to understanding the role of the metaverse in education at SMK Hasina in Sukabumi, Indonesia. First, the emphasis on the need for extensive training and resources for educators reflects alignment with previous research highlighting the need for comprehensive support for educators in adopting technology [12]. Second, recommendations to explore innovative approaches, such as interactive learning simulations or virtual classes, add a new dimension to the implementation of the metaverse in education [13]. Third, the importance of discussing the potential benefits of the metaverse in educational settings, with a focus on student engagement, teacher-student collaboration, and global access, becomes a key recognized point. Qualitative analysis emphasizes the urgency of addressing barriers during the integration of metaverse technology in the educational environment, in line with findings by Zhang and colleagues [14]. Furthermore, differences in teachers' understanding of the metaverse can be linked to personal interest and technological background, consistent with previous research on the correlation between interest and technology understanding [15]. Teachers with a background in technology tend to have a deeper understanding, highlighting the crucial role of educators' backgrounds in technological understanding.

In the context of recognizing the potential of the metaverse in education, teachers reach a consensus on its ability to enhance interaction, visualization, and accessibility in the educational environment. The metaverse is identified as a potential tool to revolutionize student engagement, especially for those facing constraints with traditional teaching methods [16]. The research results indicate that the metaverse provides students with a space

for exploration, encouraging creativity and problem-solving skills. Furthermore, the potential of the metaverse in transforming education highlights that interactions within it create a lively and interactive learning platform, supporting claims about its attractive and realistic visualization capabilities [17]. Overall, this research provides a crucial foundation for further understanding and development of the implementation of the metaverse in the educational context, highlighting potential benefits and challenges that need to be addressed.

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Declarations

Author contribution. All authors contributed equally to the main contributor to this paper. All authors read and approved the final paper.
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