DEVOTION
Journal of Research and Community Service

Volume 5, Number 7, July 2024
e-ISSN: 2797-6068 and p-ISSN: 2777-0915

EXPLORING THE POTENTIAL OF VR TECHNOLOGY IN EDUCATION IN INDONESIA

Cinta Sekar Kinanti
Sekolah Tinggi Ilmu Hukum Adhyaksa, Indonesia
Email: cinta.kinanti@stih-adhyaksa.ac.id

KEYWORDS
Virtual Reality, Education, Teacher Training, Student Motivation, Indonesia

ABSTRACT

This paper explores the impact of Virtual Reality (VR) on teacher training and elementary education, highlighting the improvement in teachers' understanding and skills as well as students' learning motivation. The paper contributes to the understanding of the benefits and potential applications of VR in educational settings, particularly focusing on teaching and elementary school learning. A literature review was conducted to identify previous findings and research gaps related to the implementation of VR. The study was conducted through observations, surveys, and interviews. The collected data were analyzed qualitatively and quantitatively, and the results were used to develop recommendations regarding VR content design, implementation strategies, and supporting policies. Despite challenges such as cost, accessibility, teacher capacity development, and data security, addressing these challenges could enable VR to become a revolutionary learning tool that can improve the quality of education in Indonesia. With the right approach, including relevant content development and further research, VR can become an effective and engaging learning tool in sports education, taking the learning experience to a more interactive and innovative dimension.

INTRODUCTION

Education in Indonesia continues to evolve along with technological developments. One technology that is currently in the spotlight is Virtual Reality (VR), which offers great potential to change the way learning and interaction in the world of education. This technology enables a more immersive and interactive learning experience, bringing students into a simulated environment that can increase their understanding and engagement in the course material. With the ability to create immersive learning environments, VR opens up new opportunities in education that can adapt to each individual's learning needs and preferences.

In Indonesia, the application of VR in education is still in its early stages, but several initiatives have shown significant potential. VR technology for education in Indonesia is still relatively small but is growing with several startups targeting VR (Hidayat et al., 2023; Juliana et al., 2022; Kusdiyanti et al., 2020). It shows there is significant interest and growth potential for VR in the educational context in Indonesia.

The use of VR in education is not only limited to enhancing students' learning experience but can also help in the development of technical and practical skills (Asad et al., 2021; Farsi et al., 2021; Fernandez, 2017; Gunn et al., 2018; Jensen & Konradsen, 2018; Jou & Wang, 2013; McGovern et al., 2020; Soliman et al., 2021). As discussed in Salim and Ivander (2024), the integration of VR in technical skills training offers accessibility, motivation, and the potential for more effective transfer of skills to the real world. It shows that VR has wide applications in education, from academic learning to practical skills development.

However, some challenges must be overcome to maximize the potential of VR in education in Indonesia. Issues such as cost, accessibility, and teacher capacity building are some of the barriers identified in VR-related research. As stated in Salim and Ivander (2024),

challenges such as implementation costs and developing teacher capacity require serious attention to ensure that this technology is accessible to educational institutions throughout Indonesia.

Apart from that, developing effective and relevant learning content is also key in implementing VR in education. Research conducted by Orsicha et al. (2024) uses the ADDIE development model to produce VR-based learning media that is valid and practical for use in early childhood learning. It shows the importance of a systematic development methodology in creating effective VR learning materials.

Exploring the potential of VR technology in education in Indonesia requires collaboration between the government, educational institutions, technology developers, and all related parties. By overcoming existing challenges and utilizing this technology strategically, VR can become a revolutionary tool for improving the quality of education in Indonesia. Through an innovative and inclusive approach, VR technology has the potential to take education in Indonesia to a higher level, creating a richer and more engaging learning experience for students across the country.

This paper explores the impact of VR on teacher training and elementary education, highlighting the improvement in teachers' understanding and skills, as well as student motivation. The paper contributes to the understanding of the benefits and potential applications of VR in educational settings, particularly focusing on teacher training and elementary education.

RESEARCH METHOD

This research employs a mixed-methods approach, incorporating both qualitative and quantitative methods. A literature review was conducted to identify previous findings and research gaps related to the implementation of VR. Teacher training program evaluations were carried out through observations, surveys, and interviews to assess improvements in teachers' understanding and skills in using VR. Empirical research involved experiments with control and experimental groups to measure the impact of VR use on students' understanding and skills in basketball. The collected data were analyzed qualitatively and quantitatively, and the results were used to develop recommendations regarding VR content design, implementation strategies, and supporting policies.

RESULTS AND DISCUSSION

Virtual Reality (VR) technology has shown significant potential in improving the learning process in various fields, including sports education. According to research conducted and described by Halim and Manurung (2023), VR has the ability to improve understanding and basic technical skills in the game of basketball in elementary school children. The use of VR in sports education enables interactive simulations that can deepen students' understanding of basic basketball techniques, offering children a more immersive, interactive, and motivational learning experience.

Additionally, VR technology offers opportunities for more engaging and effective learning (2023). With VR, students can engage in basic basketball technique drills in an engaging virtual environment, which can increase their engagement and motivation in learning. It immersive and engaging learning experience can help students improve their skills in a more efficient way than traditional methods.

However, there are several challenges in the integration of VR technology in sports education, including hardware availability and integration in educational curricula, as expressed in Halim and Manurung (2023). To overcome these challenges, the study recommends the design of VR content specific to the learning of basic basketball techniques and empirical research to measure the impact of using VR technology. This shows the

importance of developing relevant content and further research to ensure the effectiveness of VR in sports education.

VR technology offers revolutionary potential in sports education, especially in improving the basic technical skills of basketball in elementary school children (Halim & Manurung, 2023). With the right approach, including relevant content development and further research, VR can become an effective and engaging learning tool in sports education, taking the learning experience to a more interactive and innovative dimension.

The implementation of Virtual Reality (VR) technology in education brings several challenges that need to be addressed to maximize its potential. One of the main challenges is the availability of the necessary hardware to run VR applications. These devices are often expensive and may not be affordable for all educational institutions, especially in areas with limited resources. Additionally, the safety of VR usage and its integration into the educational curriculum are primary concerns that require further attention.

Furthermore, the issues of availability and safety, another challenge is the high cost of implementation. Procuring the necessary VR devices for each student or even for a classroom can be a significant financial burden for educational institutions. It includes not only the hardware but also the software and educational content that must be developed or purchased. These challenges are exacerbated by technical difficulties and the need for expanded infrastructure to support the wider use of VR.

Teacher capacity development is also a critical challenge in VR implementation. Educators need to be trained not only in using VR technology but also in designing and implementing effective learning experiences using VR. It requires a significant investment of time and resources for training and professional development.

Furthermore, there is a challenge in ensuring that the use of VR in education does not widen the access gap. While VR offers the potential for more immersive and engaging learning experiences, the risk of increasing the digital divide between students who have access to this technology and those who do not cannot be ignored. Therefore, it is important to develop funding strategies that can facilitate broader accessibility to this technology.

Finally, data security challenges and ethical issues are also a concern in the implementation of 5G Technology, which supports the use of VR in education. With the increasing integration of advanced technologies such as VR, AR, and IoT in learning, the security of student data and ethical issues related to data privacy and use is becoming increasingly important to address. The sum of these challenges suggests that while VR has significant potential to transform education, there are a series of barriers that must be overcome to ensure successful and inclusive implementation.

The development of learning methods through Virtual Reality (VR) has become an interesting topic for educational researchers and practitioners. VR technology offers significant potential to improve the quality of learning by providing immersive and interactive experiences for learners. In this context, various studies have been conducted to explore and optimize the use of VR in education.

One relevant study discusses the potential of 5G technology in advancing learning innovation, including the use of VR. 5G technology, with its high speed and responsiveness, enables the use of advanced technologies such as VR in learning, opening up new opportunities in the delivery of learning material and creating a more dynamic and relevant learning environment (Jamil et al., 2024).

In the era of Industrial Revolution 4.0, students' perceptions of the applicability of VR media in learning show positive results. Students have a positive perception of the use of VR, which can increase interactivity, efficiency, and measurable material achievement. It shows that VR can be adapted well in the digital era without leaving out important aspects of the learning process (Zulfikasari et al., 2021).

Other research explores the role of fun learning media, including VR, in increasing student learning motivation. Findings show that interactive learning media, such as VR, can increase students' learning motivation by providing interesting learning experiences that suit their learning style preferences (Palyanti, 2022).

In the context of teacher training, a study was conducted to improve teachers' understanding and skills in using VR-based learning media. This training succeeded in increasing understanding of the material through VR learning media and providing new knowledge to teachers, even though it was faced with challenges such as an inadequate internet network and applications that were still in the testing stage (Amalia et al., 2024).

The integration of VR in technical skills training also shows significant potential. The use of VR can increase learning effectiveness, and participant engagement, accelerate learning, and support the transfer of skills to the world of work. However, challenges such as implementation costs and teacher capacity building have also been identified as critical factors (Salim & Ivander, 2024).

Finally, research on the use of VR in improving basic technical skills in playing basketball in elementary school children shows that VR can be effective in improving basic technical understanding and skills through interactive simulations. It opens up opportunities for the development of students' cognitive and social skills, taking education towards a more interactive and innovative dimension (Halim & Manurung, 2023). The development of learning methods through VR offers extensive opportunities to improve the quality and effectiveness of learning. By addressing existing challenges, such as cost, accessibility, and teacher capacity building, VR could become a revolutionary learning tool in the future.

Training teachers in the use of Virtual Reality (VR)-based learning media is an important step in ensuring that this technology can be integrated effectively into the learning process in elementary schools. This training is designed to increase teachers' understanding and skills in using VR as a teaching aid, which in turn can increase understanding of the material among students. In this context, identifying the targets of training participants is key, enabling organizers to design training that suits the needs and level of understanding of participants, thereby maximizing the benefits of the training.

Evaluation of teacher training programs using VR is an important step to ensure the effectiveness and relevance of training materials to current educational needs. The evaluation phase involves collecting data from various sources, including observations, surveys, and interviews, which are then analyzed to obtain feedback from participants. This feedback is critical in assessing how participants experience VR and whether the material presented aligns with the curriculum and learning objectives.

The evaluation results of the teacher training showed a positive response from the participants. Training participants provided excellent feedback on activity performance, with most enjoying the benefits of training activities aimed at improving their understanding of elementary school material. This shows that the training was successful in increasing teachers' understanding and skills in using VR as a learning medium.

In addition, follow-up based on evaluation results is critical in ensuring the sustainability and effectiveness of the use of VR in education. The service team makes improvements to the VR program based on data obtained from the evaluation, ensuring that the use of VR in education in elementary schools provides real benefits and is in line with the program's objectives. It shows a commitment to the continuous improvement of the use of technology in education.

Teacher training and program evaluation are important components in the integration of VR technology in education. Through well-designed training and comprehensive evaluation, teachers can more effectively use VR as a learning tool, which can ultimately improve the

quality of education. A continuous evaluation and follow-up process ensures that training programs remain relevant and effective in meeting evolving educational needs.

Increasing learning motivation is a crucial aspect of the educational process. The use of technology, such as Virtual Reality (VR), has proven to enhance students' learning motivation by providing more immersive and engaging learning experiences. VR technology allows for realistic simulations that can reinforce students' understanding and skills through instant feedback and personalized learning. It is valuable in the context of education, especially in improving basic basketball techniques among elementary school children, where high motivation and personalized learning play vital roles in developing quality young athletes.

Personalized learning is a key factor in boosting learning motivation. By leveraging VR technology, education can be tailored to the needs and learning pace of each individual. It enables students to interact with learning materials according to their interests and abilities, thereby enhancing engagement and learning motivation. This personalization also helps build students' confidence through achievements that match their abilities, which in turn can further increase learning motivation.

Moreover, the perception of the usefulness of learning materials in everyday life also plays an important role in learning motivation. Students who see the relevance and benefits of the knowledge they acquire are more likely to be motivated to learn. Social interaction and social support also have a significant impact on enhancing learning motivation. Collaboration with classmates, discussions, and interactions with teachers and other academic environments can boost learning motivation. Positive feedback and recognition of learning efforts also strengthen students' motivation to achieve better results.

The use of VR-based learning media has also been proven to increase participants' knowledge, skills, and motivation in using learning media. Students who take part in VR-based training show high enthusiasm and confidence in using this learning media in their learning process. It shows that the use of innovative learning media can increase students' motivation and interest in learning, as well as strengthen their involvement in the learning process.

Finally, the importance of learning media in improving the quality of education cannot be ignored. Interesting and relevant media usage in the classroom can increase learning effectiveness and student motivation. Learning media acts as an effective communication tool to convey learning objectives, making students more interested in following and processing the information offered. It shows that the development and use of innovative learning media is an important step in increasing motivation and personalizing learning.

CONCLUSION

The use of Virtual Reality (VR) in education, particularly in teacher training and elementary school learning, shows a positive impact on improving teachers' understanding and skills as well as students' learning motivation. Factors such as effective training program evaluation, continuous follow-up, personalized learning, and social interaction contribute to enhancing the effectiveness of VR usage. VR-based learning media have proven to increase motivation and interest in learning, indicating great potential for enriching the learning process. In Indonesia, the use of VR technology in education is still in its early stages but shows significant potential to enhance student's learning experiences and assist in the development of technical and practical skills. Despite challenges such as cost, accessibility, teacher capacity development, and data security, addressing these challenges could enable VR to become a revolutionary learning tool that can improve the quality of education in Indonesia.

REFERENCES

Amalia, D., Efendi, A., Kasuya, I. L., Sofia, I., & Fadlillah, N. (2024). Pemberdayaan Media Pembelajaran Virtual Reality Untuk Meningkatkan Pemahaman Materi di Sekolah Dasar. *Martabe: Jurnal Pengabdian Kepada Masyarakat*, *7*(1).

Asad, M. M., Naz, A., Churi, P., & Tahanzadeh, M. M. (2021). Virtual Reality as Pedagogical Tool to Enhance Experiential Learning: A Systematic Literature Review. *Education Research International*, *2021*. https://doi.org/10.1155/2021/7061623

Farsi, G. Al, Yusof, A. B. M., Fauzi, W. J. B., Rusli, M. E. Bin, Malik2, S. I., Tawafak, R. M., Mathew, R., & Jabbar, J. (2021). The Practicality of Virtual Reality Applications in Education: Limitations and Recommendations. *Journal of Hunan University (Natural Sciences)*, *48*(7).

Fernandez, M. (2017). Augmented-Virtual Reality: How to improve education systems. *Higher Learning Research Communications*, *7*(1). https://doi.org/10.18870/hlrc.v7i1.373

Gunn, T., Jones, L., Bridge, P., Rowntree, P., & Nissen, L. (2018). The use of virtual reality simulation to improve technical skill in the undergraduate medical imaging student. *Interactive Learning Environments*, *26*(5). https://doi.org/10.1080/10494820.2017.1374981

Halim, A., & Manurung, A. S. (2023). Teknologi Virtual Reality: Apakah Berpengaruh Terhadap Peningkatan Kemampuan Teknik Dasar Permainan Bola Basket Pada Anak Sekolah Dasar. *Jurnal Review Pendidikan Dan Pengajaran (JRPP)*, *6*(4).

Hidayat, Z., Indra, R., Yunita, Z., Marsha, S. A., & Hapsari, P. A. (2023). The Augmented and Virtual Reality of Tourism and Creative Industry: Communicating Indonesia's New Way to the Digital Economy. *Kurdish Studies*, *11*(2).

Jamil, M. A., Haetami, A., Mayasari, M., Aina, M., Sukini, S., & Ulimaz, A. (2024). PERAN TEKNOLOGI 5G DALAM MENDORONG INOVASI PEMBELAJARAN. *Jurnal Review Pendidikan Dan Pengajaran (JRPP)*, *7*(1).

Jensen, L., & Konradsen, F. (2018). A review of the use of virtual reality head-mounted displays in education and training. *Education and Information Technologies*, *23*(4). https://doi.org/10.1007/s10639-017-9676-0

Jou, M., & Wang, J. (2013). Investigation of effects of virtual reality environments on learning performance of technical skills. *Computers in Human Behavior*, *29*(2). https://doi.org/10.1016/j.chb.2012.04.020

Juliana, A., Shabrina Nurqamarani, A., Fadila, S., & Aripin, S. (2022). Virtual Reality in Business Education: Systematic Literature Review. *Lembaran Ilmu Kependidikan* , *51*(1).

Kusdiyanti, H., Febrianto, I., Zanky, M. N., & Wijaya, R. (2020). Web enhanced course-based virtual reality as an interactive molta model implementation for entrepreneurship learning. *ACM International Conference Proceeding Series*. https://doi.org/10.1145/3452144.3452193

McGovern, E., Moreira, G., & Luna-Nevarez, C. (2020). An application of virtual reality in education: Can this technology enhance the quality of students' learning experience? *Journal of Education for Business*, *95*(7). https://doi.org/10.1080/08832323.2019.1703096

Orsicha, W., Miranda, D., Perdina, S., & Lukmanulhakim, L. (2024). Pengembangan Media Virtual Reality dalam Mengenal Rumah Ibadah Agama Konghucu pada Pembelajaran Immersive di PAUD. *Aulad: Journal on Early Childhood*, *7*(1), 240–250. https://doi.org/10.31004/aulad.v7i1.643

Palyanti, M. (2022). Media Pembelajaran Asik dan Menyenangkan untuk Meningkatkan Motivasi Belajar Mahasiswa dalam Mata Kuliah Bahasa Indonesia. *Attractive: Innovative Education Journa5*, *5*(2).

Salim, B. S., & Ivander, F. (2024). INTEGRASI REALITAS VIRTUAL DALAM PROGRAM PELATIHAN PENGEMBANGAN KETERAMPILAN TEKNIS. *Jurnal Review Pendidikan Dan Pengajaran (JRPP)*, *7*(2).

Soliman, M., Pesyridis, A., Dalaymani-Zad, D., Gronfula, M., & Kourmpetis, M. (2021). The application of virtual reality in engineering education. *Applied Sciences (Switzerland)*, *11*(6). https://doi.org/10.3390/app11062879

Zulfikasari, S., Wardi, W., & Windiyantono, W. A. (2021). Keterterapan Media Virtual Reality (VR) dilihat dari Persepsi Mahasiswa dalam Pembelajaran di Era Revolusi Industri 4.0. *Jurnal Penelitian Pendidikan*, *38*(2).