International Journal of Multicultural and Multireligious Understanding

http://ijmmu.com
editor@ijmmu.com
ISSN 2364-5369
Volume 11, Issue 12
December, 2024
Pages: 105-116

Development of Virtual Office Reality as a Transformative Learning Media for MPLB Majors to Improve 21st Century Skills

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http://dx.doi.org/10.18415/ijmmu.v11i12.6334

Abstract

Virtual reality (VR) has become popular as a learning medium in recent years due to its potential in increasing the effectiveness and attractiveness of cognitive processes. Virtual reality is also effective for transforming abstract, difficult, and complex concepts into concrete visual experiences. This research aims to develop Virtual Office Reality (VOR)-based learning media that combines VR and office environment simulation to create more interactive and effective learning. The developed product aims to improve 21st century skills such as critical thinking, creativity, collaboration, and communication which are crucial for SMK students majoring in Office Management and Business Services (MPLB). The research used a modified Borg & Gall development model through five stages including initial research, product development, validation, pilot testing, and final revision. Overall, the Virtual Office Reality-based transformative learning media proved to be a feasible and effective tool for improving the 4C 21st century skills.

Keywords: *Virtual Office Reality; 21st Century Skills 4C; Transformative Learning*

Introduction

Technological advancements have always brought major changes in every era. Technology impacts almost every aspect of education. The rapid advancement of technology has provided new possibilities for the field of education (Tulgar, 2019). Access to this technology makes it easier for students to connect with learning in a more authentic and meaningful way, especially with the many opportunities for them to interact with content through the use of Virtual Reality tools (Fitria, 2023). This statement is supported by the results of previous research which states that the use of virtual reality is very suitable for use in the learning process because it makes learning more meaningful (Serin, 2020).

21st century learning demands the integration of technology as a learning medium, to develop students' learning skills (Mardhiyah et al., 2021). 21st century skills which include critical thinking, creativity, collaboration, and communication are important for students to have, especially vocational students majoring in Office Management and Business Services (MPLB) considering that the modern office and business world demands more than just technical knowledge. These demands have made the use of virtual reality in learning environments increasingly popular in recent years (Yunjo, 2021). Virtual

reality has great potential to increase the effectiveness and attractiveness of cognitive processes, allowing the transformation of practical experience into valuable skills, which are very important and valued in industry (Paszkiewicz et al., 2021). The results of Zakiyan's research (2017) show that the learning process by implementing virtual reality in its application in the field always gets a very good response and enthusiasm by students, compared to conventional learning media. Given that today's students are a digital native generation, they are more interested in learning using technological media than just using conventional media (Sukmawati et al., 2022). Virtual reality in learning is a very effective learning media to transform abstract, difficult and complex concepts into concrete visual experiences (Au & Lee, 2017).

21st century learning should have started to apply innovative learning methods and models in order to realize 21st century skills and skills (Fatimah et al., 2022). The success of the learning process is greatly influenced by the willingness of teachers to innovate, starting from innovative learning preparation, learning implementation, to learning assessment (Nessipbayeva, 2019). However, based on the results of observations at Vocational High Schools in Malang city, information was obtained that most students in class X of the MPLB Department still faced difficulties in understanding important concepts in learning materials, due to the lack of variations in learning media so that students' interest in learning was reduced. Following up on these problems, it is necessary to develop a learning media that integrates the use of virtual reality (VR) technology as an innovative solution to create a more in-depth learning experience for students. The advantages of virtual reality in learning include being able to provide technology that can be used interactively, provide visualizations that stimulate the imagination, provide interesting experiences, provide immediate feedback, and increase learning motivation and are able to accommodate a variety of individual learning (Haryana et al., 2022).

This research is important as an alternative learning media, which aims to improve the 4C skills of the 21st century for students and assist teachers in creating interactive and effective learning. Virtual Office Reality (VOR) is a form of technology that combines elements of virtual reality (VR) with a simulated office environment. In the context of learning, VOR is designed to create an immersive and interactive learning experience by simulating real-world situations in an office environment. The success of the learning process is greatly influenced by the willingness of teachers to innovate, starting from innovative learning preparation, learning implementation, to learning assessment In the field of education, the use of virtual reality technology has a positive impact, especially in assisting the learning process (Erviana & Sepriansyah, 2024). The use of virtual reality also allows the role of teachers who only become facilitators in the classroom (Yildirim et al., 2020). Virtual reality is utilized as a supporting medium for the learning process in the hope that it can help students become more active during learning and achieve optimal learning outcomes. Thus, the VOR makes the learning process of students majoring in MPLB can be done actively, interactively and collaboratively. This can improve their readiness to face the challenges and dynamics in the modern office world.

Literature Review

Transformative learning is a learning concept that focuses on the development of changes in individual views, so that they become more mature, wise, and critical in thinking and acting. The process includes cognitive-rational, affective-emotional, and communicative-social aspects (Baharun & Mundiri, 2011). Transformative learning encourages the development of skills such as critical thinking, creativity, collaboration, and communication. Students must be equipped with these skills in order to adapt quickly to technological changes and the evolving needs of the job market (Legi et al., 2023). Transformasi pendidikan memerlukan penggunaan teknologi dalam proses belajar mengajar. Educational transformation requires the use of technology in the teaching and learning process.

Various studies have shown that technology-based learning media are effective in increasing student interest, motivation, and learning outcomes (Setyawan et al., 2023). Research by Christian et al.

(2021) revealed that the use of VR in education can enhance the experience, motivation, and understanding of abstract concepts for students, offering an immersive environment where they can interact and achieve effective learning. The research results of Refdinal et al. (2023) also showed that learning using VR can improve student competence better than verbal engagement through visual images and videos. Virtual reality, as a form of innovative pedagogy, has three main components: immersion, interaction, and imagination. VR is a useful medium as a tool for learning and practicing problem-solving skills, which may be due to its ability to stimulate the user's senses and present information in a more realistic way (Araiza-Alba et al., 2021).

The World Economic Forum (2020) report also shows that virtual reality has a positive impact on student achievement, including critical thinking skills, creativity, understanding of material and positive emotions. The flexibility of virtual world design in virtual reality (VR) content is also an excellent value to be applied in the world of education (Ariatama et al., 2021). Virtual reality is a learning media that is able to provide visualizations that can stimulate imagination, provide interesting experiences, provide immediate feedback, and increase learning motivation and can accommodate a variety of individual learning (Haryana et al., 2022). Dengan menggunakan teknologi VR, siswa dapat mencapai tingkat pembelajaran yang sama seperti yang dicapai melalui simulasi nyata By using VR technology, students can achieve the same level of learning as that achieved through real simulation (Mariscal et al., 2020), because learning media that attracts students' attention can increase their curiosity about the material to be learned (Kusuma et al., 2018).

One indicator of learning success can be assessed through the learning outcomes achieved by students (Nurhasanah & Sobandi, 2016). Critical thinking as part of the 4C skills, is very important for learners to build arguments, check the credibility of sources, and make decisions (Nahdi, 2019). Communication, trains learners to manage and convey ideas orally or in writing well, with the main indicators being presenting information and expressing opinions (Sagala dkk., 2020). Collaboration, teaches to work together with various parties responsibly involving compromise and respect (Sugiyarti dkk., 2018). Creativity is the ability to produce new innovations, with indicators of curiosity, flexibility, and originality (Zubaidah, 2018).

Method

This research and development uses the Research & Development model by Borg & Gall which has been modified into five steps.

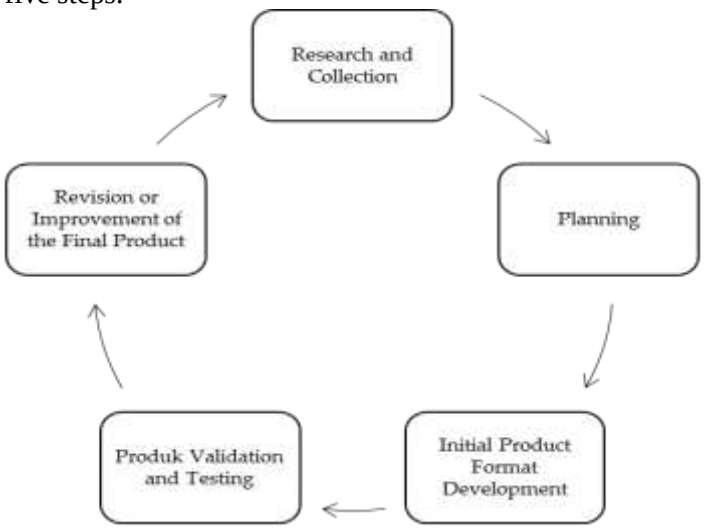

Figure 1: Steps for Using the Research & Development (R&D) Method
Source: Borg and Gall modified by researchers 2024

The purpose of this research is to develop virtual reality-based learning media which is of superior value to be applied in the world of education (Ariatama et al., 2021). The media developed in the form of Virtual Office Reality (VOR) which is a form of technology that combines elements of virtual reality (VR) with simulations of office environments. Its feasibility was assessed through validation by material experts, media experts, and users. The product was tested on teachers and students to assess learning outcomes and skills of critical thinking, creativity, collaboration, and communication. The assessment of 4C skills is based on indicators such as building arguments, checking the credibility of sources, and making decisions (Nahdi, 2019), presenting information and expressing opinions (Sagala dkk., 2020), working with various parties responsibly involving compromise and respect(Sugiyarti dkk., 2018) nd curiosity, flexibility, and originality (Zubaidah, 2018).

The research subjects in this trial were vocational students majoring in MPLB. The research data consists of qualitative and quantitative data. Qualitative data is obtained from input and suggestions given by validators and users of Virtual Office Reality (VOR) media. Quantitative data was collected through validation by media experts and material experts.

Results and Discussion

Results

Outcomes Produced

The output produced is Virtual Office Reality (VOR) learning media assisted by the Milealab platform. VOR-based learning media is prepared in accordance with learning materials and is designed and compiled thoroughly. The media developed includes material on dynamic archive management.

Figure 2. Front View of VOR Learning Media

The picture above displays the initial interface of the Virtual Office Reality (VOR) learning media. This interface serves as a gateway for users to enter the simulated virtual office environment. The interface design is intuitive and interactive so that users can easily understand how to navigate and access various learning features.

Figure 3. Reception desk where mail is received

Figure 4. Leader Room to Approve the Disposition of Incoming Letters

Figure 5. Director's Room to Follow Up on the Disposition of Letters That Have Been Approved by The Leader

Figure 6: Archivist Room for Management and Storage of Company Records

Figure 7. Filling Cabinet for Archive Storage

Visualization in Virtual Office Reality learning media is designed to resemble a modern office environment, giving a real and immersive impression so as to facilitate students in adjusting to the appropriate work atmosphere as in the real world. The media display also integrates design elements that support user experience (UX) principles, where users can feel comfortable and informative interactions. The use of professional colors and neat layouts help students to focus on learning, so that this media is not only visually appealing but also functional as a tool for developing 21st century skills of critical thinking, creativity, collaboration, and communication.

Validation Results

The developed media can be assessed for feasibility through validation. In this study, validation was carried out covering aspects of usability, ease of use, and user acceptance, with assessments from experts and student trials. Testing was conducted on 16 students majoring in Office Management and Business Services (MPLB). The purpose of this test is to assess whether the application developed hones the 4C skills (Critical thinking, Creativity, Communication, and Collaboration). The questionnaire was designed to measure aspects of usability, convenience, and the level of student acceptance of the use of VR.

Table 1. Questionnaire for Students

No	Statement
1	In general, I am satisfied with how easy it is to use this VR.
2	I feel comfortable using this VR
3	I find it easy to learn using this VR
4	I believe I am more productive using this VR.
5	I feel the information provided by this VR is clear
6	I feel the information provided by this VR is easy to understand
7	I feel the interface of this VR is pleasant
8	I like using the interface of this VR
9	I feel this VR has all the functions and capabilities I expected
10	Overall, I am satisfied with this VR
11	Overall, I am satisfied with the ease of completing tasks in it
12	Overall, I am satisfied with the amount of time involved in completing the tasks in it

Source: processed by researchers (2024)

The questionnaire was completed by giving a score to each statement, using an interval scale that included levels from Strongly Agree (SS) to Strongly Disagree (STS). The conversion of this scale is described in Table 2.

Table 2. Assessment Ratio Conversion

Gradation	**Intervals**
Strongly Disagree	0 – 19.9
Disagree	20 – 39.9
Neutral	40 – 59.9
Agree	60 – 79.9
Strongly Agree	80 - 100

Source: processed by researchers (2024)

From each respondent's answer, the average score for each statement is calculated, which provides a representative value to analyze the respondent's overall perception of the media. Figure 8 shows the results of the questionnaire that has been filled in by students as respondents.

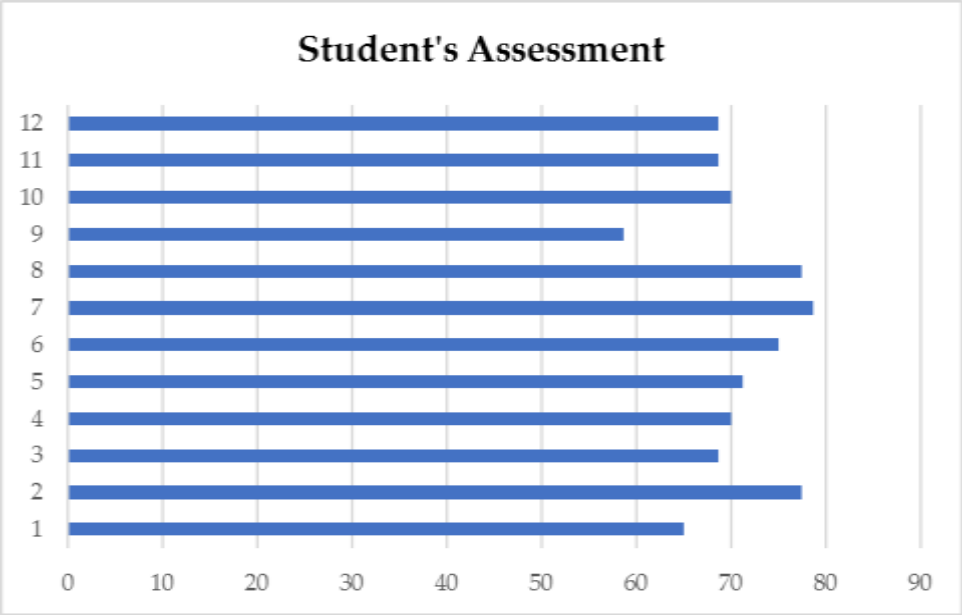

Figure 8. Student Assessment Results

In general, all students were satisfied with the media that had been developed. However, the results for question number 9 still show a need for further improvement. Based on the observation during the test, some functions that must be improved are the functions on the sensor to be more responsive to detect the user's hand or finger movements.

After testing the students, the learning media was also tested by two media experts. The purpose of this test is to assess the suitability of the visualized material, as well as the ease and usability aspects of the media. The test includes evaluation of character movements, user hand interaction with touch objects, interaction through character buttons, as well as material delivery steps provided by the media. In this test, media experts were given a questionnaire that aims to measure the usefulness, convenience and suitability of the material on the developed media. Table 3 shows the questions given to media experts. From the assessment conducted by media experts, in general, the media developed can facilitate and assist students in honing 4C skills.

Table 3. Questionnaire for Media Experts

No	Statement
1	In general, I am satisfied with how easy it is to use this VR.
2	I feel comfortable using this VR
3	I feel that the material information in this VR is easy to understand
4	I feel that the material provided by this VR is in accordance with the field of learning
5	I feel that this VR makes it easy to deliver learning materials
6	I feel the interface of this VR is fun
7	I feel that the operation of the interface in this VR is easy to understand and use
8	Overall, I feel helped by the existence of this VR for the learning process

Source: processed by researchers (2024)

The questionnaire was filled out by giving a score to each statement using a scale that includes gradations from Strongly Agree (SS) to Strongly Disagree (STS). Figure 9 displays the average results of the assessment from the experts. Although the average score obtained is relatively good, there are several

aspects related to comfort and convenience (questions 1 and 7) which indicate that this media still needs to be further developed.

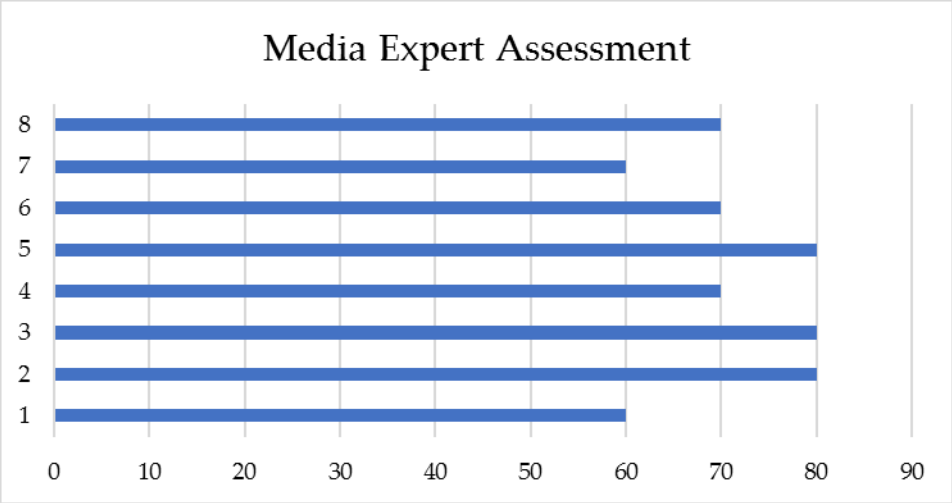

Figure 9. Media Expert Assessment Results

Table 4. Material Expert Testing Question

No	Statement
1	I feel the material in this VR is aligned with the learning objectives
2	I feel this VR provides information clearly
3	I feel this VR is easy to use
4	I feel that this VR has a good interface so that it is interesting for students to learn
5	I feel this VR is interactive and can support students in learning the material.

Source: processed by researchers (2024)

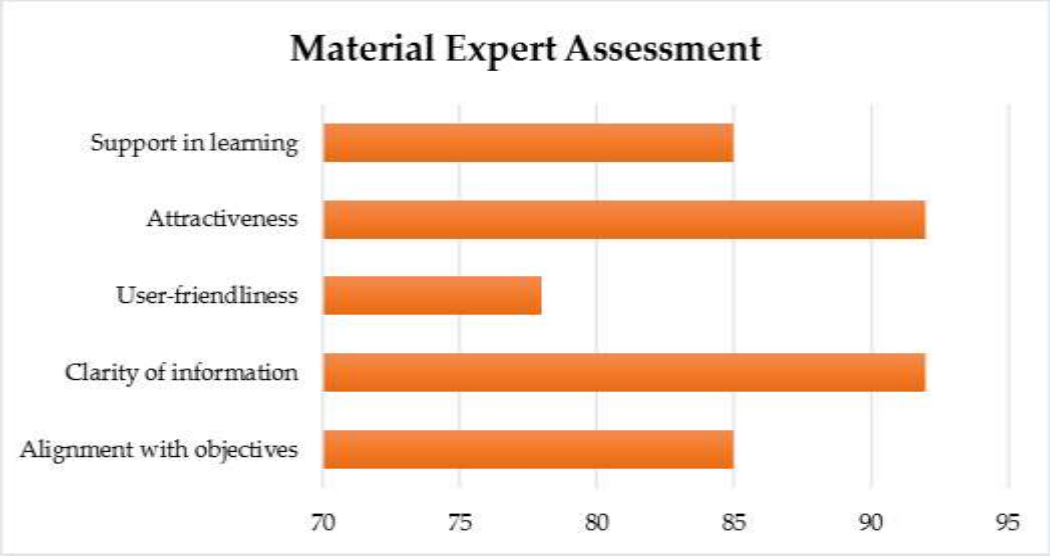

Figure 10. Material Expert Assessment Results

An average value of at least 80 is considered valid in this study. Based on the average results of each indicator on the learning material expert questions, this VR application is valid because all values

are above 80. Visual appeal gets the highest score of 92 which shows the VR application is very visually appealing. Ease of use gets a lower score of 78, indicating this aspect still needs improvement, especially in user navigation.

Discussion

The product produced from this research is Virtual Office Reality learning media based on virtual reality assisted by the Milealab platform. Virtual reality (VR) technology can help improve the quality of learning in an increasingly advanced digital era. Virtual office reality, which is an evolution of the metaverse-based virtual office, can be used to create an engaging and interactive virtual work environment. Virtual office reality (VOR) is a learning technology that utilizes a virtual environment to present simulations of office activities and business management. The use of VOR in educational institutions, especially at the Vocational High School (SMK) level, can provide students with learning experiences that are relevant to the demands of the modern world of work, because virtual reality is able to create immersive simulations that allow users to interact while feeling like they are in an environment that exists in cyberspace (Jamil, 2018). In the VOR, students can access a virtual office space that simulates everyday work situations, from meetings, presentations, to administrative tasks. The flexibility of virtual world design in virtual reality (VR) content is an excellent value to be applied in the world of education (Ariatama dkk., 2021).

The results show that when compared to conventional learning approaches, the integration of virtual reality (VR) in learning media provides more contribution to the development of students' skills and knowledge. The assessment results from students show that if students agree that the interface in virtual reality (VR) is very fun when used in learning with a questionnaire score of 78.85 which is included in the assessment ratio of agree. Fun and interactive learning experiences through virtual reality (VR) can increase student attention and engagement and improve retention and understanding of the concepts learned. The use of virtual reality makes the student learning process can be done actively, interactively and collaboratively. This is in line with the assessment given by the material expert, who gave a score of 85 on the indicator of support in learning. This assessment shows that this VR learning media is classified as interactive and can help students in understanding the material taught, thus helping to improve students' readiness to face challenges and dynamics in the modern digital world.

The development of Virtual Office Reality (VOR) has shown great potential to increase student interest in learning, engagement and understanding. McGovern et al. (2020) stated that virtual reality also fosters deeper understanding, higher motivation, and improved thinking skills. By incorporating virtual reality (VR) technology into the MPLB curriculum, an engaging and interactive learning experience to enhance the essential 21st century 4C skills for students to possess. In global education, the potential of virtual reality demonstrates the ability to simulate real-world situations and enhance intercultural communication skills. The digital simulation experience of using virtual reality provides ample opportunities for students to explore different cultural perspectives and contexts. Virtual reality is a learning media that is able to provide visualizations that can stimulate the imagination, provide interesting experiences, provide immediate feedback, and increase learning motivation and can accommodate a variety of individual learning (Haryana et al., 2022). This is in line with the goals of digital education 5.0, namely, to optimize student engagement, encourage collaboration, and improve overall learning outcomes (Yusuf et al., 2023).

The use of technologies such as virtual reality should be expanded to encourage the creation of skills required in the 21st century. Virtual reality has become an innovative form of pedagogy that has emerged as a response to the digital age. This technology allows students to conduct scientific experiments, explore the world in a safe and controlled virtual environment in three-dimensional form. Virtual reality has great potential to increase the effectiveness and attractiveness of cognitive processes and enables the transformation of practical experiences into valuable skills, which are essential and

valued in industry. Virtual reality has become one of the most exciting technologies in the digital transformation of education as it enables immersive and interactive learning experiences and increases students' curiosity and passion for learning as well as allowing educators to deliver material more easily. This is in line with the results of research by Rong et al. (2022) which states that if the learning process involves virtual reality media, this will bring a positive perspective from both teachers and students.

The need for virtual reality technology will continue to increase, considering that virtual reality is able to improve the quality of human resources by opening up new learning opportunities and giving students the opportunity to learn directly from the simulation of their environment. Virtual reality should continue to be developed and expanded in education to improve the quality of human resources and prepare future generations to adapt to rapid and dynamic transformation. With the support of virtual reality (VR) technology, it is hoped that education in Indonesia can develop better, in line with point 4 of the Sustainable Development Goals (SDGs), which aims to ensure quality, relevant, and inclusive education to increase lifelong learning opportunities and rights for all people in the world (Ariatama. Soni. et al., 2021).

Conclusion

The result of this research is the development of Virtual Office Reality (VOR) learning media products, which aim to be interactive, effective learning media, and developers of 21st century 4C skills for vocational students majoring in MPLB. The media developed includes material on dynamic archival management. Through media and material expert validation as well as from user feedback, the developed product has demonstrated its validity and feasibility for use. The results show that the use of Virtual Office Reality can provide a context that is more real and relevant to transformative learning. In addition, the utilization of Virtual Office Reality as learning media not only makes learning more interesting but also opens up opportunities for the development of students' 21st Century 4C skills.

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