Needs analysis of virtual reality to enhance welding learning media

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Abstract

This research aims to analyze the need to develop virtual reality-based learning media in welding learning. The needs analysis is carried out based on the initial stages in the ADDIE development model, namely analysis. This analysis was conducted to determine media use during the welding learning process. The instrument used in the research is a questionnaire or questionnaire with quantitative data type and is a closed questionnaire. The distribution of this questionnaire uses a Google form in the form of a link filled in online. The results of the needs analysis of 4 lecturers and welding practitioners and 51 students in Surakarta. The results showed that 100% of lecturers and practitioners stated that virtual reality-based learning media was interesting. The results of the analysis on students showed 95% of students stated that virtual reality-based learning media in welding learning was interesting, and 91.4% of students stated that they needed to use virtual reality-based learning in welding learning.

Keywords

Needs analysis, Learning media, Welding virtual reality, Digital learning, ADDIE

Introduction

The rapid advancement of technology has significantly impacted the education sector, particularly in technical and vocational education. Welding, as a critical skill in industrial applications, requires innovative teaching methods to enhance learning outcomes. Traditional welding training has drawbacks, including limited opportunities for hands-on experience, expensive material prices, and safety hazards. [1,2]. Virtual reality (VR)-based learning media offers a potential solution by providing a safe, cost-effective, and engaging environment for learners to practice and develop their skills Virtual reality (VR)-based learning media offers a potential solution by providing a safe, cost-effective, and engaging environment for learners to practice and develop their skills [3,4]. Previous research highlights the effectiveness of VR in simulating practical tasks, thus improving student engagement and skill development in various technical fields [5,6].

This study aims to analyze the need for VR-based learning media in welding education, focusing on its relevance and acceptance among stakeholders. Studies have examined the use of virtual reality (VR) as a tool to model welding jobs, demonstrating its potential to close the knowledge gap between theory and practice [7,8]. Additionally, incorporating VR into welding instruction can help with important industry issues including safety worries and the expense of supplies for practical instruction [9,10]. VR is a crucial topic for research because of the growing interest in it as a teaching tool, particularly in programs for vocational training [11,12]. The ADDIE model, which offers a methodical approach to creating useful educational resources, such as VR-based learning, is extensively utilized in instructional design [13,14]. The current problem in learning welding is the need for learning development in the form of virtual reality. For the development of virtual reality, data is needed for the development of virtual reality welding. This study aims to determine the need for the use of virtual reality in improving welding learning.

Method

The analysis phase, the first stage of the ADDIE development paradigm, is used in this study to determine the requirements for VR-based learning materials in welding education [13]. Numerous research on the integration of virtual reality in education have employed the ADDIE approach, which stands for Analysis, Design, Development, Implementation, and Evaluation [14,15]. A closed questionnaire disseminated using Google Forms was used to collect data. Fifty-one students from Surakarta and four instructors and welders participated [16]. The use of the ADDIE model ensures that the analysis of needs is structured and systematic, enabling a comprehensive understanding of the stakeholders' perspectives on the use of VR in welding education.

Quantitative data collected from the questionnaire responses were analyzed to evaluate the interest and perceived necessity of VR-based learning media in welding training. Previous studies have used similar data collection methods to assess the acceptance of VR-based tools in vocational education [1,4]. The adaptability of the paradigm and its focus on iterative development are advantageous when incorporating cutting-edge technologies like [5,6].

Result and Discussion

Results and discussion can be made as a whole that contains research findings and explanations.

Lecturer and Practitioner Perspectives

The results revealed that 100% of the lecturers and practitioners found VR-based learning media to be interesting and beneficial for welding education. They emphasized how it could help with the present issues with conventional training techniques,

especially with regard to maintaining safety and cutting expenses related to consumables [9,10].

Student Perspectives

Among the 51 student respondents, 95% of respondents thought VR-based learning materials were fascinating, indicating a high degree of interest and engagement. [11]. Furthermore, 91.4% of students stated that VR-based technologies should be incorporated into welding education, highlighting how they may improve their learning process and skill development [12,13].

Implications

The findings underscore the necessity of developing VR-based learning media tailored to welding education. By bridging the gap between theoretical understanding and real-world application, these tools help promote a more dynamic and engaging learning environment [14]. The enthusiastic response from instructors and students demonstrates the viability and possible benefits of incorporating virtual reality into vocational education [15,16].

Conclusion

The needs analysis conducted in this study demonstrates a strong demand for VR-based learning media in welding education. Both educators and students recognize its value in improving safety, cost-efficiency, and engagement in the learning process. These findings provide a solid foundation for the development and implementation of VR tools in vocational training programs. Future research should focus on the design, development, and evaluation of VR-based learning media to further validate its effectiveness in enhancing welding competencies.

Acknowledgement

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