



Practical Applications of Virtual Reality in Continuing Education: a Review of the Case of Secondary Occupational Education

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ABSTRACT

This paper explores the use of virtual reality in secondary vocational education, highlighting its potential benefits and challenges. Virtual reality provides interactive simulations of real-world work situations, boosting student engagement and knowledge retention. Case studies demonstrate its effectiveness in vocational education and training programs. However, the paper also addresses the financial implications of acquiring software and hardware, as well as the need for specialist technical assistance. The study aims to analyze potential research areas and the future of work, presenting a hopeful and exciting tool for future vocational education. Overall, virtual reality offers promising and exciting solutions for vocational education.

INTRODUCTION

Virtual Reality (VR) is a nascent technology with the potential to fundamentally transform the methods by which we educate and acquire knowledge. The technology offers a completely immersive experience that takes learners to a virtual world, enabling them to interact with digital objects and situations in a manner that is indistinguishable from reality (Dieck et al., 2021). VR has become more popular in education, especially in vocational training, since it enables learners to get practical experience in a secure and regulated setting. Nevertheless, there is a scarcity of research papers that explore the difficulties and potential of using virtual reality (VR) in vocational education inside schools. This article aims to examine the advantages, difficulties, and optimal methods of using virtual reality (VR) in vocational education. Additionally, it presents case studies showcasing the effective incorporation of virtual reality (VR) in vocational education. It also explores the potential of VR as a viable educational tool for vocational education in the future. This article aims to provide valuable information to policymakers and assist vocational instructors in schools in effectively introducing and using virtual reality (VR) as a teaching tool for vocational topics.

The Advantages of Virtual Reality (VR) in Career Education

Virtual Reality (VR) has become a potent instrument for vocational education, offering a distinct learning encounter that is both captivating and efficient. VR in vocational education offers a significant advantage by creating a secure and regulated learning setting, enabling trainees to practice and enhance practical skills without facing actual repercussions. This is especially beneficial in high-risk occupational sectors such as healthcare, construction, and aviation. Furthermore, virtual reality (VR) offers a captivating and dynamic educational experience that boosts involvement and drive, resulting in improved retention of information and the development of skills. VR simulations may be tailored to accommodate specific learning requirements, offering personalized and adaptable learning experiences. Experiences (Tom Dieck et al., 2021). Moreover, the accessibility and cost-efficiency of virtual reality (VR) technology make it a compelling choice for vocational education. It allows trainees to access learning materials from any location and minimizes the need for costly physical equipment. Virtual reality (VR) can transform vocational education by offering a novel and efficient method for acquiring skills, enhancing learning results, and eventually equipping trainees for practical occupational problems.

Immersion and Multimodal Learning

How virtual reality aids in the acquisition of useful skills by trainees with the use of sophisticated visual and aural design, as well as immersive and multimodal learning technology, draws kids in with a three-dimensional approach, making for an incredibly captivating and unforgettable learning experience. A growing number of vocational educators are using virtual reality (VR) as a tool to improve immersive learning environments. Through lifelike simulations of actual situations, virtual reality (VR) offers students a secure

setting in which to practice and hone their practical abilities. This is especially advantageous for vocational education since students must get practical experience and apply their knowledge to real-world scenarios. With virtual reality, learners may grow from their errors without worrying about the fallout in the real world (Dieck et al., 2021). Because students can practice often and get quick feedback, this helps them become more competent and confident in their abilities. Additionally, trainees may experience a variety of situations and locations that may be challenging or impossible to recreate using conventional learning techniques via virtual reality. VR offers a potential educational tool for professional training, offering immersive learning experiences that may improve trainees' practical skill development and better equip them to face problems in the real world.

METHODOLOGY

The use of virtual reality as a teaching tool in secondary vocational education is the subject of the present paper, which examines both the difficulties and the potential benefits related to its adoption. Through the provision of genuine, interactive, and immersive simulations of real-world work situations to students, virtual reality has the potential to bring about a major transformation in the field of vocational education. In the article, a number of the benefits of adopting virtual reality into vocational education are highlighted.

RESEARCH RESULT AND DISCUSSION

Improving Student Involvement And Drive In The Learning Process With Virtual Reality

(VR)An important benefit of using virtual reality (VR) in vocational education is its capacity to augment engagement and motivation in the learning process. Virtual reality (VR) provides a fully immersive and interactive learning experience that effectively captures students' attention and creates a highly engaging and memorable learning environment. Through the utilization of virtual reality (VR), students are able to engage with digital entities and surroundings in manners that are unattainable inside conventional classroom setups. They can investigate intricate ideas and procedures in a manner that is both interactive and instinctive, granting them a heightened comprehension and control over the educational process (Mathuret et al., 2022). Moreover, virtual reality (VR) offers the chance to integrate game-like components into the educational experience, including incentives, accomplishments, and obstacles, which may greatly inspire pupils. This may enhance students' passion and drive for learning, thus fostering their sustained engagement with the content. Studies have shown that students who include virtual reality (VR) in their educational activities exhibit greater levels of involvement and drive than students in conventional classroom environments. Moreover, virtual reality (VR) offers students the chance to simulate real-life situations inside a secure and regulated setting, therefore fostering self-assurance and drive for their

prospective profession. Utilizing virtual reality (VR) in vocational education may amplify student engagement and motivation by offering an immersive, interactive, and gamified learning environment that captivates and inspires learners.

The availability and affordability of virtual reality

(VR) in vocational education. A benefit of using Virtual Reality (VR) as a teaching tool in vocational education is its accessibility and cost-effectiveness. Virtual reality (VR) can replicate intricate and expensive situations, allowing learners to engage in activities that would otherwise be inaccessible. Trainees get the opportunity to practice operating hazardous equipment, conducting surgical procedures, or flying airplanes in a secure and regulated setting. Furthermore, virtual reality (VR) obviates the need for costly apparatus or infrastructure, such as airplane simulators or heavy machinery, making training more cost-effective and easily expandable. This makes virtual reality (VR) an appealing choice for vocational education institutions that have limited financial resources or are looking to minimize training expenses while still providing excellent instruction.

Obstacles and Constraints Faced by Virtual Reality (VR) in Occupational Teaching

Virtual Reality (VR) has the potential to be an effective tool for vocational education, but it also presents obstacles and limits. An essential obstacle is the upfront expense of procuring the required equipment and software. Virtual reality (VR) also requires a considerable degree of technical proficiency for its development and upkeep, posing a notable difficulty for vocational schools that have limited resources. Another constraint is the possibility of virtual reality (VR) becoming too immersive, resulting in learners experiencing disorientation or motion sickness. Moreover, virtual reality simulations may lack the capacity to completely reproduce the physical circumstances of a real-life vocational setting, resulting in restricted transfer of skills to the actual job. In addition, the creation of superior-quality VR material might require a significant amount of time and resources. There is a potential danger that learners can excessively depend on VR simulations, resulting in a deficiency of practical experience. Notwithstanding these obstacles, the advantages of virtual reality (VR) in vocational education justify the pursuit of further exploration and development of this technology.

Optimal Strategies for Incorporating Virtual Reality (VR) into Career Education

When incorporating virtual reality (VR) into vocational education, vocational instructors in schools might consider the following best practices:

1. Defining explicit learning goals and ensuring they are well-matched with virtual reality exercises.
2. Making sure that virtual reality exercises are applicable and useful for the learners' experiences in the real world
3. Ensuring comprehensive instruction and assistance for both educators and students in the use of virtual reality (VR) technology.
4. Providing a combination of virtual reality (VR) activities and conventional learning techniques
5. Consistently assess the efficacy of virtual reality (VR) activities and implement any required modifications.
6. In addition, fostering cooperation between educators and industry professionals helps guarantee that virtual reality activities precisely mirror current business practices and provide learners with the necessary skills for future professions.

Case Studies Showcasing Successful Examples of Virtual Reality Integration in Vocational Education.

Several successful case studies have shown the potential of virtual reality (VR) as an effective tool for teaching vocational education. Automotive firms like Ford and Volvo have included virtual reality (VR) simulations in their mechanic training programs. This allows technicians to practice practical skills in a secure and regulated environment. Lufthansa and Qantas have used virtual reality (VR) technology to teach their pilots, offering them realistic situations and crises to enhance their decision-making abilities. In addition, vocational institutions and colleges have started incorporating virtual reality (VR) into their curricula. At the Technical University of Munich, students in the architecture and engineering programs may use virtual reality. Handle intricate structures and patterns. At Ohio Technical College, welding students use virtual reality (VR) technology to refine their welding skills, therefore decreasing the need for costly materials and mitigating safety hazards. These exemplary case studies illustrate the potential of virtual reality (VR) in improving vocational education. By offering learners realistic and captivating simulations, VR enables them to acquire practical skills in a secure and cost-efficient way. This article presents several case studies that explore the potential of digital learning technologies. It examines the effectiveness of an IVR application and the use of VR in skill-based education. Additionally, it investigates students' perceptions of using immersive VR technology and explores the use of 360-video virtual reality and augmented reality (AR) technology in vocational training.

Spilski et al. (2019) explored the capacity of digital learning technologies, particularly a virtual reality (VR) solution, to improve vocational education and training for craftspeople. The study used a design-based research strategy and discovered that learners in the construction sector display heterogeneity. Furthermore, it was determined that digital learning technologies can handle this diversity. The VR system underwent evaluation and iterative improvement, taking into account comments from both learners and instructors. It was determined to be a feasible and efficient medium for learning. The report also emphasized the potential of virtual reality (VR) technology for conducting virtual site inspections and providing in-house training. Although there were some difficulties, the research suggests exploring different digital technologies to establish the optimal learning environment.

Babuet et al. (2018) state that the investigation into the efficacy of immersive environments for learning and skill training encompasses several fields, including engineering, pedagogical design, skill training, and experience design. Virtual simulation-based training seeks to maximize the transfer of information and skills acquired during training to the actual world. Multiple research projects document the benefits and drawbacks of using immersive learning models. Utilizing virtual reality (VR) technology to use well-designed instructional tactics in training situations may enhance accuracy and efficiency. Virtual reality (VR) serves as a connection between theoretical and actual learning situations, resulting in substantial reinforcement and improvement of related declarative memory. For successful pedagogical design, it is advised to use both virtual reality (VR) and non-VR learning representations in a balanced manner. Additional study is required to conduct a comparative analysis of tablet-based interactive 3D learning material and virtual reality (VR) experiences over an extended duration.

Kim et al. (2020) carried out an experimental investigation to find out how well an IVR application may improve trainee gardeners' design abilities. The study addressed three research issues: how the IVR interface affects design outputs, how well paper sketching and IVR designing work together, and how behavior in the IVR application relates to design quality. The results of the research showed that although creativity was unaffected, the IVR application positively impacted the percentage of the design output. The results also imply that better design results result from combining paper sketching with IVR designing. Furthermore, there was a favorable correlation found between the work time invested in designing, and the quality of the final product.

According to Widiaty et al. (2022), virtual reality (VR) technology is becoming more and more common in education because of its shown ability to help pupils visualize abstract ideas and better comprehend and explain items. The use of virtual reality (VR) in skill-based education is highlighted by a systematic evaluation of twenty relevant studies, with an emphasis on vocations like medical, language, and laboratory activities. Additionally, this

research argues that VR may encourage the growth of other abilities, such as communication, which will inspire kids to learn. The study approach used included the selection of publications from many databases published between 2015 and 2020, followed by an analysis of the findings.

In line with Mekacher (2019), immersive technology has seen tremendous advancements and can now be used on any mobile phone by using head-mounted displays such as Google Cardboard. This has enabled pupils to experience virtual reality applications, therefore motivating them to enhance their abilities. The use of virtual reality and augmented reality in technical education fosters a heightened desire for knowledge among students, hence enhancing the effectiveness of the instructional session. The university intends to use immersive technology in its virtual vocational training to enable learners to remotely manipulate operations in the fields of pneumatics or mechanics. An interdisciplinary team of specialists will collaborate to develop a user-centric virtual reality (VR) educational platform that enhances the efficiency of the learning process.

Rafiq et al. (2022) investigated how polytechnic students felt about immersive virtual reality (VR) being used in higher vocational education. High levels of immersion and simplicity of use in virtual reality have been shown to boost student understanding, involvement, and commitment to learning. Better learning outcomes have been related with the virtual reality (VR) experience of presence. This study will be expanded upon in the future to examine the efficacy of immersive VR technology in higher vocational education.

Zhan et al. (2022) state that Virtual reality technology has great potential to enhance vocational education by providing immersive and interactive simulations of real-life instruction inside a virtual learning environment. The conventional method of skill training encounters obstacles such as exorbitant expenses, potential hazards, meager profits, protracted training duration, inefficiency, environmental contamination, and difficulties in replication. The integration of vocational education with virtual reality has the potential to address these problems. Demonstrations are given for virtual reality modes that include multi-channel, networked, desktop, panoramic, and wearable options. The use of technology in college has been shown to inspire students, enhance their practical abilities, and lead to improved learning results.

Rahmanu et al. (2022) investigate the use of 360-video virtual reality in the Indonesian language classroom, using cell phones to control the SVVR tool. The research utilizes the UTAUT theory to evaluate student performance and effort expectations. The findings suggest that SVVR has great potential as a technique to augment student motivation and facilitate language acquisition. The integration of voice, 360° video, text, and images offers a full learning experience for students to enhance their language proficiency. SVVR has the potential to be used to teach other languages. However, further investigation is

required. In summary, the research emphasizes the possible advantages of using technology in the classroom to improve language instruction.

Chiang et al. (2022) performed a comprehensive analysis of the use of augmented reality (AR) technology in vocational training, including a period of 20 years from 2000 to 2021. The study primarily examined the enhancement of occupational skills and the advancements in augmented reality (AR) training. It analyzed a total of 80 pertinent papers from several sectors. The results indicated that Augmented Reality (AR) is extensively used in vocational education, medical training, and industrial maintenance and assembly. AR glasses, simulators, the Unity3D game engine, 360° panorama, AR systems, and applications are often used for training activities, and their advantages have been recognized. The study conclusively shows that Augmented Reality (AR) significantly enhances vocational training. Future researchers may further investigate the integration of vocational skills education with these advanced technologies to enhance teaching practices.

The Potential and Consequences of Using Virtual Reality (VR) in Vocational Education

The potential of Virtual Reality (VR) in Vocational Education is bright as the technology progresses and becomes more readily available. Potential applications of virtual reality (VR) in vocational education include the capacity to generate authentic simulations of work settings, offering learners a secure and regulated environment to hone and enhance their practical abilities. The technology may also enable collaborative learning, enabling trainees to collaborate on projects and get experience working in teams. The use of virtual reality (VR) in vocational education can fundamentally transform the methods of acquiring and evaluating skills (Dieck et al., 2021). Instructors may enhance the accuracy of skill assessment and provide focused feedback for progress by offering learners practical experiences in simulated contexts. Moreover, with the growing prevalence of VR, there is the potential for enhanced uniformity and coherence in vocational education, leading to a more proficient and capable workforce. The potential of VR in vocational education seems promising, offering prospects for immersive learning experiences and enhanced skill development. Additionally, it has implications for more effective evaluation methods and the creation of a more proficient workforce. By actively incorporating technology resources into a blended learning environment, instructors may enhance student engagement across all levels of education, including elementary, middle, high school, and college. Lesson plans should have details on how to strategically and effectively use technology to meet the needs and expectations of students. Blended learning allows students to acquire knowledge and delve into a new academic subject or deepen their comprehension of previous material by using both traditional print resources and digital tools. Prior to conducting synchronous courses, technology may also be used to pre-load information. Teachers must use technology effectively in order to enhance student engagement while they contend with digital media. Utilizing technology to include students in the educational setting enables the

establishment of a communal atmosphere, enhances accessibility, provides support, fosters motivation, stimulates interest in learning, and promotes self-regulation (Bond & Bedenlier, 2019).

The Use of Virtual Reality in the Field of Education

Virtual reality (VR) is a reliable educational tool, especially for enhancing student motivation and engagement (Papanastasiou et al., 2019). Consequently, universities are contemplating allocating substantial resources (including personnel, funds, and equipment) towards the adoption of virtual reality (VR), namely immersive VR, which is distinct from its use in cyberspace. Given the positive impact of immersive virtual reality (VR) on learning outcomes in higher education, it is important to explore the potential applications of immersive VR technology in this context (Makransky et al., 2019). The empirical evidence supporting the use of VR in education may be found by examining its educational uses. There are two categories of virtual reality: non-immersive and immersive, as stated by Ventura et al. (2019). Non-immersive virtual reality (NVR) is a kind of virtual reality that is often examined in scholarly publications (Moloney et al., 2018; Wu et al., 2021; Yoon et al., 2020). According to Artun et al. (2020), scenario-based techniques may display the virtual reality (VR) world and its interactions on a regular computer monitor. Non-immersive VR offers better cognitive results and learning attitudes compared to standard teaching methods. Desktop virtual reality simulations have a stimulating impact. Immersive virtual reality (VR) utilizes a helmet that is connected to show the virtual environment. This headgear allows for controlled interaction with the virtual world. Additionally, a handheld device is used for input, and a system is in place to detect forward movement. This is especially advantageous when used in combination with a smartphone, personal computer, or laptop. Virtual reality has been used to enhance educational practices in several domains (Dommett, 2018). Creating a simulated facility accident in a virtual laboratory, for instance, has effectively shown the necessary safety protocols for chemical engineering students. According to Maresky et al. (2019), students acquire a greater amount of knowledge when they use 3D design representations in a virtual setting, especially while studying human anatomy. There has been a discussion among researchers on the use of immersive virtual reality in engineering education (Stojšić et al., 2017). Immersive experiences can empower students with more autonomy in their learning activities and enhance their level of engagement (Ruiz-Cantisani et al., 2020). Having control is crucial since technology-assisted learning sometimes lacks student ownership in the learning process. Enhancing students' engagement and sense of ownership in learning activities may be achieved by integrating them in a process that gives them autonomy and control over their movement inside a virtual 3D environment. Prior research (Grivokostopoulou et al., 2020) has shown that immersive VR technology, as compared to desktop VR, elicits a greater sense of presence but leads to reduced levels of learning. Conversely, immersive virtual

reality (VR) technology enhances the speed at which learning occurs. There is a lack of research on the impact of using advanced virtual reality technology in higher education to enhance student engagement (Hernandez-de-Menendez et al., 2020; Passig et al., 2016; Webster, 2016). This article presents study findings on the impact of using instructional media on student engagement levels in the learning process. The methods will be detailed in the next section.

CONCLUSION AND RECOMMENDATIONS

In the field of vocational education, virtual reality (VR) has shown significant promise as a teaching tool. By offering a simulated environment that simulates real-world settings, virtual reality (VR) has the potential to increase practical learning. This offers trainees the opportunity to obtain hands-on experience without the risk of incurring any fees or taking any risks. Virtual reality has the potential to enhance an individual's level of engagement and motivation, making the learning process more immersive and participatory. For students who are located in remote locations where there is a lack of infrastructure, this will prove to be advantageous. Best practices and successful case studies may lead educators toward optimal integration of virtual reality (VR) in vocational education. This is despite the fact that there are still certain hurdles and limits involved with the deployment of VR in schools. As virtual reality (VR) technology continues to advance, it is presenting new prospects for vocational education. The use of VR technology inside a virtual world may significantly influence the user's visual perspective. Immersive virtual reality (VR) is user-friendly and enhances students' understanding and engagement in their educational experience. By demonstrating a profound grasp of their research subject and achieving the specific learning goals of many courses, students may establish a stronger commitment to a certain area of study. The heightened degree of immersion in virtual reality (VR) was shown to be connected with an enhanced sense of presence, which in turn led to greater learning and engagement. Further investigation will be conducted to expand upon this study, focusing on the educational achievements resulting from the use of immersive virtual reality technology in vocational higher education.

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