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Virtual Reality (VR) in 21st. Century Education: The Opportunities and Challenges of Digital Learning in Classroom

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Abstract: The education sector has changed over the years; however digital technology has fully transformed the method students learn in the classroom within the last few decades. Today, virtual reality (VR) technologies are being applied in various educational disciplines. VR transform the way educational content delivered. Students have an opportunity to use technology to enable better learning in the digital age. Unfortunately, students continue to be educated in the same way as they were in the past, being taught a standardized and one-size-fits-all pace. Fundamentally, a 21st century education is about giving students the skills and digital integration in developing learning, literacy and life skills. The learning was hands-on and experiential. Since the learning process can be set within an experiential context, VR can help students gain interest and motivation while still effectively facilitating knowledge transfer. However, the potential of VR in education is still not fully being explored. Education faces challenges in adapting VR technology as part of its curriculum and delivery. It is also important to note that while the advantages are enormous, VR's disempowering consequences should not be overlooked as well. Thus, this paper examines the opportunities and challenges of using VR in classroom.

Keywords: Virtual Reality, 21st Century Education, Digital Learning, Technology

1. Introduction

The 21st century learning has been developed recently in relation to students' competencies in dealing with the real lives challenges. 21st century education provides students with the skills and competencies that students need to thrive in the current age (Russell, 2016). The term 21st century skills is generally referring to certain core competencies that help students thrive in globalisation, such as collaboration, digital literacy, critical thinking, and problem solving (Hadinugrahaningsih, Rahmawati, & Ridwan, 2017). Learning for the 21st century is both personal and personalised. Students master content while producing, synthesizing and evaluating information from a wide variety (Malik, 2018). Virtual Reality (VR) opens up the possibility of learning that students have never experienced before and it has the potential to change the way how students been educated and learn before (Wu et al., 2021). VR is an emerging technology that is gaining attention as a learning platform in classrooms due to its possible applications in education (Hall et al., 2019). Chromebooks, tablet computers, smartphones and student-response-systems are examples of technological advancements that have helped to keep education and its tools relevant. One of the digital technologies that has entered the mainstream is virtual reality. VR is described as an interactive, three-dimensional environments and realistic with visual feedback based on body movement (Radianti et al., 2020). The ability to display a simulated environment that resembles the physical world, and the pursuit of high interactivity are two of the key reasons VR has been used for educational purposes (Safar & Abdul Raman, 2021). VR environments allow students to immerse themselves in a virtual simulated environment that mimic real world scenarios to facilitate the learning of cognitive and physical skills, which is needed for 21st century education (Papanastasiou et al., 2019). Implementing virtual reality in education provide an opportunity to young learners and future generations with better and more accessible platforms (Getso & Bakon, 2017). Students would undoubtedly prefer technology over traditional learning methods since they are born and grow in a digital world along with rapid technological advancement (Csorba, 2016). VR technology has a positive effect on the education of future generations (Velev & Zlateva, 2017). In today's fast-paced technological environment, the 4th industrial revolution has necessitated a restructuring of the education system, with a focus on global learning and teaching strategies (Oke & Fernandes, 2020). Virtual Reality is poised to solve the issues that Generation Z students are experiencing with

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existing educational practices (Hall et al., 2019). Lack of constructive learning, lack of student involvement, as well as the ability to visualize difficult models and lack of creativity are all examples of such challenges (Hamilton et al., 2021). Thus, there is a need to reinvent the conventional approach, especially for the next generation, in order to ensure that students' expectations and characteristics are addressed.

2. Virtual Reality in 21st-Century Education

Education and technology are interconnected (Kapur, 2018). VR, as a cutting-edge in 21st-century education, provides a major contribution to students' and instructors' teaching-learning processes (Rivas, Valdivieso, & Rodriguez, 2020). According to Csorba (2016), today's students are essentially taught to interact with technology through touch from the moment they are born. Modern classroom often equipped with the various forms of educational technology: interactive whiteboards, computer, tablet (Lazar, 2015). Students' today's have lived their whole life surrounded by technology, the latest generation of students is considered to be more deemed in the use of technology (i.e., tech-savvy) than previous generations (Iivari, Sharma, & Venta-Olkkonen, 2020). The future of learning is digital (John & Wheeler, 2015). The use of technology in the classroom can improve learning by making it more and student-centered and engaging **(**D'Angelo, 2018). The emergence of digital classrooms and advocacy for student-centered learning has led to a need for pedagogical design transformation that support 21st century skills development through knowledge-based training (Kong et al., 2014). VR is the next in the potential to bring tangible skills into the classroom without ever leaving the classroom, making learning experience priceless (Velev & Zlateva, 2017). Immersive virtual environments as compared to more traditional platforms such as smartphone or computer, help students study more effectively (Martin-Gutierrez et al., 2017). Whilst traditional leaning method happens through a 2D screen, while VR learning allows students to interact with objects and people in the same virtual space, as they would in the real world (Kaminska et al., 2019). Immersive environments provide students with rich and complex content-based learning while assisting students hone their creative, technical and problem-solving abilities (Velev & Zlateva, 2017). Interactive learning has evolved from active learning and active interaction (Khan et al., 2017). Students have the freedom to explore in the VR world, which can lead to better solutions to the challenges of the real-world issues.

3. Challenges of Using Virtual Reality in The Classroom

Current teaching skills apply in a traditional classroom environment of the 21st century is challenging (McGuire, 2018). Today's workforce is constantly requiring 21st-century skills such as technical literacy, innovation, empathy and critical thinking. However, such skills are difficult to teach and are not emphasized in classrooms (Wrahatnolo, 2018). This is one of many factors, in particular the fact that technology is mostly used merely to improve the usefulness of traditional teaching approaches (Duignan, 2020). Technology developments take place every second, making it extremely difficult for educators, in particular, to keep up with the speed without getting the right or correct technological skills (McKnight et al., 2016). It gets complicated if educators are not driven in the right direction. Thus, new training programmes would have to be built in order to fulfil evolving needs in the longer term (Lawrence, Ching & Abdullah, 2019).

Teaching in virtual environments comes with its own range of difficulties (Loup et al., 2016). Educators lack of requires skills in creating classes in a virtual world (Monova-Zheleva & Tramonti, 2015). Courses development takes way longer than what is normally expected (Luna Scott, 2015). The time and effort required to create a virtual environment is not justified for particular courses with very clear learning goals (McGuire, 2018). With VR, students can be best equipped for the highly diverse and interconnected social world in which they work and live by using the virtual reality (Oke & Fernandes, 2020). Since virtual worlds require powerful broad band internet connection and computing equipments, students must consider adopting changes in order to become a virtual world users (Alismail & McGuire, 2015). This equipment is often not accessible for students at home, and it is often missing from computer labs or classrooms that do not meet the minimum or required specifications for optimum use of virtual worlds (Christopoulos, Conrad, & Shukla, 2018).

Traditional method of lecture-based curriculum leads to disengaged students, which is a common issue in education (Barkley & Major, 2020). Traditional teaching method of write, talk and books are failing to engage students and leading poor learning outcomes (Baepler, Walker, & Driessen, 2014). This lack of engagement is thought to be a major factor in a variety of negative behaviours that impede student achievement, such as drop out of school, negative experience and dissatisfaction (Bambaeeroo & Shokrpour, 2017). While VR can be a great asset for most of the existent fields of learning activities, it can also be a huge disadvantage. The traditional education is based on personal human communication and interpersonal connections (Lindsey & Rice, 2015). VR is quite different; it is you and the software, and nothing else. This can damage the relationships between students and the overall human communication (Lavoie et al., 2021). Thus, VR technology is expected to assist learning and not to replace it (Kwon, 2019). There is a need to identify what kind of learning activities that are beneficial in virtual environments in order to increase student personal development and learning while improving human connections.

4. Potential of Using Virtual Reality in The Classroom

VR provide an opportunity to boost student participation (Allcoat & von Muhlenen, 2018). VR has been shown to alter students' attitudes, such as increasing self-efficacy and student engagement (Papanastasiou et al., 2019). Immersive experience, hands-on and interactive provide a new way of learning for students, providing powerful new experiences they may not have encountered before (Lau & Lee, 2015). The entertainment value and novelty of VR can be effectively used to gain the attention of lost and disinterested students, even in subjects that are normally dull or meaningless to students (Radianti et al., 2020). In comparison to traditional learning environments, VR improves student participation by offering with strong sense of immersion and presence (Huang et al, 2020). Therefore, one of the most significant opportunities for VR is to construct more immersive learning environments, with its potential to increase students' sense of presence and stimulate an environment (Christopoulos et al., 2018).

VR also provide an opportunity for constructivist learning (Scavarelli, Arya, & Teather, 2020). Constructivism is based on the assumption that through experience and reflection, people are able develop their own interpretation of concepts about the world around them. Students construct their own knowledge from meaningful experiences (Huang & Liaw, 2018). Since VR can provide students with an immersive synthetic environment, where students become learners who can build skills through the learning-by-doing method. Hence, constructivist learning suits best in a simulated environment (Chau et al., 2013). Unintentional learning is enabled by virtual worlds and authentic learning experiences, in which students explore and build information not for its own sake but in order to achieve a purpose, resulting in deeper knowledge and better understanding (Abdelaziz, Alaa El Din, & Senousy, 2014). Currently, a lot of attention is paid to active learning, where the student is an active participant through feedback, discussion and activities (Allcoat & von Muhlenen, 2018). According to Fransson, Holmberg, and Westelius (2020), by having immersive learning spaces actively engaging, customisable, and self-sustaining for student achievement, VR has a lot of tremendous ability to improve the educational landscape.

VR providing potential for visualise complicated models, new perspective taking and creativity (Allcoat & von Muhlenen, 2018). Students may also use VR to construct whatever students want and quickly visualise and manipulate objects to help students understand complex concepts (Molina-Carmona et al., 2018). *Tiltbrush*, for example, is a Google VR programme that encourages artistic expression and creativity. Students may use *Tiltbrush* to paint, design life-sized three-dimensional objects and sculpt to create impossible materials including stars, fire and snow based on students own imaginative (Ho, Sun, & Tsai, 2019). VR is useful not only for content consumption, but it is also great for content creation (Varnum, 2019). This will help students boost their creativity and interact with students' own imagination (Oyelere et al., 2020). Thus, VR in terms of bring important new strategies as well as improving general learning contexts to reach students that who need the most support.

5. Conclusion

This paper highlighted the importance of emerging technologies in the classroom in educating the next generation. In the experience age, educators must exploit and adopt better approaches to deliver the most effective learning opportunities to students (Rapanta et al., 2020). Educators have started to accept VR and its vast range of learning possibilities as the technology increasingly enters the mainstream (Fransson et al., 2020). VR is valuable for expanding learning opportunities (Hicks, 2016). The advantage of using VR as a learning tool is that it reaches young students on an experiential level, which students prefer. The existing education system needs genuine experiences and engaging that can contribute to good learning. The best way to use VR in education is to construct experiences that aid students in better understanding in the learning context (Chen, 2016). What is needed is a pedagogy takes advantage of VR's unique features. With the advent of the virtual reality device, educators and universities now have a variety of options for creating an interactive learning experience for the 21st-century students (Dostovalova et al., 2018). VR revolutionise modern education and 21st-century learning by completely immersing and engaging the students in the concepts or subjects being taught (Hamilton et al., 2021). Hence, modernising education through the use of virtual reality may be a fruitful undertaking. It is important to note that whilst the benefits are more numerous, but not to be overlooked is that VR can have debilitating effects.

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