IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
IJARSCT
Impact Factor: 5.731
Volume 11, Issue 1, November 2021

Virtual Reality in Education System

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Abstract: *In the education process, student faces Problem with understanding due to the Complexity. So that many students Conducted on the use of VR in education and training. In today world were surrounded by a wonderful array of technologies. We have as simulated many of these technologies in to our everyday lives. We know that computer is the heart of this generation. Virtual reality technologies for supporting teaching and Learning have been an academic research topic for decades. Virtual reality sometime called virtual environment. In the five years, major process has been made and the Virtual reality technology is getting closer to being implemented in education. This paper Present an overview of the uses of virtual reality in education. The purpose of this Research is to explore the current use of virtual reality to support teaching and Learning. We present new opportunities with VR and put together the most interesting, recent virtual reality application used in education in relation to several education areas such as general, engineering and health related education. This paper presenting methods for testing and validation.*

Keyword: Virtual Reality, Education System

I. Introduction

Virtual Reality or VR allows a user to interact with a computer generated three-dimensional model or virtual environment. This environment may be realistic, in the sense that it is familiar to us at a macroscopic scale, it may be realistic in the sense that it depicts the physical world as known to science but which is not usually observable, or it may be used to visualize a world that is entirely imaginary. As such, VR is broadly applicable, and has been applied to, many different areas of education including the sciences, archaeology, history and architecture. The advantage of VR over conventional methods of description is that the student is given the opportunity to experience

Subject matter that would be difficult if not impossible to illustrate or describe with conventional methods. We argue here that this experiential nature of VR together with its other key feature, interactivity, provides a valuable aid to conventional learning paradigms. In this chapter we give a brief description of common VR setups to give a feel for how a VR experience is provided. We also consider, from cognitive and sensory psychology points of view why learning may be facilitated by interactive multi-sensory systems and we provide some examples of the use of VR in educational contexts. Modern education often requires a student to comprehend complex or abstract concepts or appreciate scenarios and situations that no longer exist. To this end, common mechanisms for teaching abstract concepts are the use of metaphor and analogy, especially within the sciences.

By using an analogy we describe an event or abstract concept in terms of commonly observable reality. That is, we relate concepts to experience. The experience provides the material for the construction of a mental model of the concept, which in turn leads to the foundation of knowledge (Duffy & Janssen, 1992). Humans learn by having experiences, by interacting with their environment and using their senses to derive information from the world. Virtual reality is a technology that replaces sensory input derived from the real world with sensory input created by computer simulation. It provides interactivity by responding to movements and the natural behaviours of humans in the real world. In this respect VR may prove to be a powerful resource that can help in teaching by providing an environment that allows the student to experience scenarios and situations rather than imagining them. The experiential nature of VR systems derives from three sources: immersion, interactivity and multi-sensory feedback. Immersion means being

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envelopedor surrounded by the environment. The benefit of immersion is that it ensures a sense of presence or the feeling that one is really in the depicted world (Schlemiel teal. 2001). Interactivity is the ability to control events in the simulation by using one's body movements which in turn initiates responses in the simulation as a result of these movements. The multi-sensory nature of VR means that information can be derived from more than one sense and adds to the experience by making it more believable, engaging (adding to the sense of presence) and providing redundancy of information which reduces the potential for ambiguity and confusion. Sensory combination reinforces information from two or more sensory sources.

The aim of VR is therefore to replace the real world with a virtual world and to allow the user to behave as if they were in the real world. The experiential nature of VR supports constructivist approach to learning (see Winn, 1993). Constructivism is a theory of knowledge acquisition that states that humans construct knowledge by learning from their experiences. As popularized by Jean Piaget the theory states that the learner attempts to assimilate ne experiences within their already established world model. If the learner cannot successfully assimilate new detail they change their world view to accommodate the new experience. When we act on the expectation that the world operates according to our world model and it does not then we must accommodate the new experience by reframing our model of the way the world works; we learn from the experience. This implies that learning is a form of active hypothesis testing. This should be contrasted with the view that learning is a passive accumulation or acceptance of facts. VR provides an environment for this active hypothesis testing and thus provides a powerful medium for learning. In general, and as suggested by Bruner (1961), students who actively engage with new material are more likely to retain this material and recall it at a later stage.

Broad areas of application	Can be expensive and time consuming to set up
Provides a more engaging environment for learning	May in some cases result in simulation sickness
Utilizes interactivity & interactive learning	Learners may feel disorientated as first
Engages multiple senses	Fidelity issues and lack of realism

Table 1: Advantages and disadvantages of using VR

Table 1 lists some of the advantages and potential disadvantages of using VR in an educational context. After reading this chapter, the reader will be able to appreciate how these issues impact on learning. We begin by giving a brief description of VR followed by an account of how interactivity and multi-sensory perception (key components of VR) provide a basis for learning

II. Overview: the Evolution of Virtual Reality

The concept of VR is not new; in the early 1990's speculation on its potential already existed. VR promised to bring an exciting future – where everyone would wave their hands to travel through strange neon geometric places, converse with virtual people, and experience adventures in perfectly simulated worlds or times (Steinke, 2016). However, at the time, VR did not go far. Other than primarily military and industrial uses such as combat training and 3D visualizations (Cruz-Ciera, 2016; Pollack, 1989), it was uncomfortable, not realistic, expensive and required immense amounts of computing power to render. Today, we are greeted with a very different landscape; the technology that once was too expensive or impractical for consumers is now readily available. The popularity of several mainstream consumer products like the Google Cardboard, Daydream View, Oculus Rift, HTC Vive, Samsung Gear VR, PlayStation VR, and Microsoft Hollers are evidence that technical developments have finally resolved many of the problems that previously doomed VR. In addition, the ubiquity of smartphones – used by 65% of the American population (Statist, 2017) – and their rapidly increasing capabilities has expanded VR's reach to more consumer bases. Development and investment in VR – including key players Apple, Microsoft, Facebook, and Google (Mason, 2016) – totalled over $2.3 billion in 2016 alone (Digi-Capital, 2017). Many are optimistic that VR/AR can transform several industries, including education, entertainment, healthcare and corporate training.

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III. Type of Virtual Educational Environment

In case of education purposes, virtual platforms usually simulate the classroom or the labour at or y. In this paper, we propose a VR application taxonomy based on the learning outcome and objectives according to three categories.

The first type of VR platform is mainly used to present a state of knowledge in a particular field of science, supporting the student switch acquiring the or ethical knowledge, e.g. terminology, dates, facts, rules or scientific theories .Therefore, it usually requires the least immersive environment such as wall based or monitor based projection with special goggles or HMD with a simple input devices like keyboard, mouse, touch screen or controller. Generally such scenarios consist of 3D visualization, training in hazardous situation as well as travel and space trips. According to his thesis, VR lessons avoid the opportunities to "move in time", students may witness historical events with their own eyes as well as experience historical places, architecture, cloths and people behaviour The example of such application is Arnswalde V R, which recreate a polish town destroyed in WW Using this app, students can walk through the streets of the city, enter buildings and experience a place that no longer exists. The same company created a virtual model of Auschwitz extermination camp. Google Expeditions, a platform or Google Cardboard, is a wireless fold out cardboard viewer based on smart phones .The Expeditions consists of a number of engaging projects, which can be used inside as well as outside the classroom, serving as an additional review of the material or homework .Another example is a safety training, which consists of three main modules: fire fighting, traffic accident and natural disaster, which are shown on ring like screens with 3D capabilities. Children case experience different emergency situations, learn the appropriate actions and interact with the environment using a controller. The scenes in the modules use sounds from the real world and the correct distances between objects, and the scenes are made in such a way not to traumatize the children. In semi-immersive environment is delivered through projection wall or 3D-Television with 3D glasses as well as stereoscopic display (PC with a powerful graphic card and 3D glasses).The rotate Manipulation of 3D data is based on motion capture-tracing gestures recognition or common mouse and keyboard, respectively.

The second type of VR platform is used to teach practical skills according to previously acquired knowledge. Such scenarios are divided into a presentation of theoretical knowledge this part will be, subsequently, imitated/copied by the student in the way of a practical task. This kind of application may require more profound immersive feeling and controlling. To address this issue, special external sensors, such as Kinect or MYO Gesture Control Armband, sensor-gloves or dedicated suits might be needed. For example, in the authors introduce an immersive system based on hapticinter face simulating task specific training in a hazardous work environment. To increase the realism of the simulation, they used HMD supported by movement tracking device and feedback over multiple sensory (e.g. tactile) channels delivering modules Leiedal. present a VR application to improve children's abilities to learn science and social studies. In their application, they us Tilt Brush, which provides a 3D environment for painting.

The last type of VR platform is supposed to teach how to use acquired knowledge when faced with problems. IN such scenarios, after gaining theoretical knowledge, students are put into virtual environment to deal with challenging tasks. Such tasks can be a formulating problem analyzing and synthesizing new phenomena, formulating an action plan and valuing the situation according.

IV. VR Application School and College

VR applications in schools and colleges fall into two sub-categories; those in which teachers use Pre-developed applications (Cell Biology, Virtual Gorilla Exhibit, Maxwell World, Atom World, Newton World, Greek Villa, and those in which students they build virtual worlds in order To test hypotheses (Virtual Stage, Wetland Ecology). Pre-developed applications consist of a virtual environment, supporting software and hardware in which students perform a required task. Previous implementations include Maxwell World which is part of a suite of three scientific applications called Science Space developed for children aged 9-15 years by Dede and coworkers (Dede, et al., 1996). Maxwell World teaches students about electrostatic forces and electric fields by allowing them to position electrical charges and to see and interact with the resultant electromagnetic field. Maxwell World is a small-scale VR application occupying a 1 meter cube

And with axes used to provide a reference frame. The space is presented in stereo using a HMD and menus are used for interaction. Newton World, also part of Science Space, similarly teaches students about forces in Newtonian Mechanics, and Pauling World is used for teaching atomic and molecular structure. The educational uses of VR is also being investigated by the HIT Lab at the University of Washington. Previous projects of the HIT Lab include a HMD stereo system called Atom World which was used to aide teaching of atomic and subatomic particles to Grade 11 students and Phase World used in Chemistry to teach students about state changes in matter and how this depends on volume and ambient temperature and pressure. Current projects of the HIT Lab are evaluating VR in several teaching areas including visualization in oceanography. Another producer of pre-developed VR systems is Cabernet Systems Corporation which has developed Astronomic on which is a HMD based visualization of the Solar System. Students make changes to planets etc. in order to answer specific questions. They have also developed Virtual Gorilla

Intended to allow students to reproduce the movements and behaviors of gorillas situated within a gorilla family and within an appropriate habitat. Other fields where VR techniques are actively being applied for educational purposes are in Cultural Heritage and Archaeology. For example, Learning Sites has developed numerous desktop systems for exploration of Archaeological reconstructions of buildings and sites in Europe and the Middle East. One of these was Attica, Vary House which was developed as a desktop VR system and tested on grade 9 – 12 students. The virtual environment consisted of a reconstructed Hellenic House (modeled using details from excavations). Teaching components included set problem-solving tasks. Another organization that has also been active in the field of cultural heritage is the Institute for the Visualization of History which sells QTVR and VRML models of reconstructed sites such as the Acropolis in Athens. VRML stands for Virtual Reality Modeling Language and was used to quickly set up virtual environment models and the interaction environments in which they could be used. This has now been superseded by X3D which a web based standard that can be used in World Wide Web VR applications.

4.1. Training

The final application area of VR in education that we will mention is in training. We might Consider training as a separate case of education because it usually entails teaching specific Knowledge relating to manual tasks rather than general knowledge. VR training provides a safe Environment for training tasks which would otherwise be unfeasible or even dangerous to perform in real life. VR training has been applied to the general fields of transportation, medicine, engineering and military & security. We give a brief overview of these next.

4.2. Transportation

Flight simulators were one of the first applications of VR technology. Training pilots to fly using grounded 'simulators' is almost as old as flying itself. Modern VR flight simulators use high resolution computer graphics providing 180 degrees field of view, real instrument panels and motion platforms capable of up to 6 degrees of freedom (translation and rotation). These motion platforms provide the vestibular motion cues which are correlated with auditory and visual events providing highly realistic feedback. Specific simulators are now used for specific aircraft types (e.g. the Airbus A320) allowing commercial pilots to be trained and retrained when transferring from one craft to another and databases of actual airports around the world providing realistic scenarios for take-off and landing. Pilot training is costly both from financial and environmental perspectives, as well as being dangerous. VR simulators therefore provide a commercially viable and safe alternative and can be used to prepare pilots to handling demanding and dangerous situations that would be hard if not impossible to stage in the real world. A leading developer of such systems is Evans & Sutherland a company that has pioneered developments in computer graphics and VR since 1968. VR simulators are also being used in other fields of transport. For example driving simulators can be used to train people to drive cars and to handle specific driving conditions including fog and heavy rain. These simulators are similar to flight simulators in that they may be housed on Real cars situated on a motion platform to provide vestibular feedback. A number of car Manufacturers are adopting this technology. For example, Daimler-Benz has opened its own VR center for prototyping, ergonomics and for demonstrations.

V. Problem In VR

5.1. Traditional Methods of Teaching Lead to a Lack of Student Engagement

A widespread problem in education is that traditional methods of lecture-based education lead to disengaged students (Delialioglu, 2012). This lack of engagement is considered a major reason for many unfavorable behavior's hindering student success, including Dissatisfaction, negative experience, and dropping out of school (Delialioglu, 2012). If students' engagement with academic activities is increased, so does the students' learning and personal development (Delialioglu, 2012; Winn et al., 1997). In this section, we describe two learning opportunities provided by VR that can complement traditional forms of teaching.

5.2. It is Difficult to Deliver Authentic, Highly Relevant Contexts for Learning

Students often find classroom-based learning to be irrelevant; there is a disconnect between content learned in textbooks and authentic practice in the 'real-world'. Gee (2004) describes this as education lacking 'situated' learning (p.38). Correctly Implemented, situated learning in the example of biology allows students to learn terms while seeing the broader applicability, instead of simply memorizing biological facts Isolated from context. Virtual reality can provide an environment for situated learning that is relatively easy to access. Through the increased relevance and situated nature of Virtual worlds, students can learn academic content in contexts that increase the potential for learning

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5.3. Teaching 21st Century Skills in a Traditional Classroom Setting is Difficult

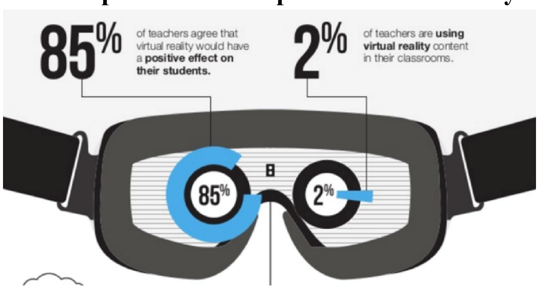
A third problem in education is that today's workforce increasingly demands 21st century Skills such as creativity, empathy, critical thinking, and technological literacy but these kinds of skills are difficult to teach and are not emphasized. This is Because of several reasons, most notably that technology is frequently used to simply Increase the effectiveness of traditional teaching methods. In this section, we describe below two opportunities provided by VR that provide 21st century skill Development.

V. Opportunity in VR

6.1 Virtual Reality Leads to Increased Student Engagement

Several characteristics of VR provide an opportunity to boost student engagement. As a hands-on, interactive, immersive experience, it provides a novel way of learning for students, delivering powerful new experiences they may not have encountered before. For example, Google Expeditions allows teachers to transport students to virtual field trips to Mars, the bottom of the ocean, and many other settings, which can spark new interest in subject matter, provide a shared Experience for better classroom discussion, and improve overall engagement. Experiences like these provide unique and fresh learning moments that draw in students and pique their interest as they actively explore and exercise their curiosity. This increased engagement can be an opportunity for addressing typically boring or low appeal subject areas. For example, Costa and Maloti (2012) found that VR exhibits increased interest in archaeology, especially where interest was low in the past. The novelty and entertainment value of VR can be used strategically to draw in the attention of lost and disinterested students, including in subjects that some students may usually find boring or irrelevant. From there, VR-specific pedagogy, which will be discussed later, can maximize the learning potential of these experiences. VR also boosts engagement by providing students with a strong sense of presence and immersion compared to traditional learning environments. Different kinds of classroom experiences have varying levels of presence: reading literature in a classroom; passively watching videos; watching performance theatre; and the most interactive, actually embodying actors and objects in VR. (Aylett and Lou chart, 2003). By enveloping a student in an authentic, multi-sensory experience, VR makes a subject area come alive. For instance, students have the opportunity to navigate inside the human body's bloodstream as a red blood cell in The Body VR (The Body VR). The ability to simulate an environment and increasing a student's sense of presence is one of the most important opportunities of VR to create more engaging educational experiences.

6.2 Virtual Reality Provides Authentic Experiences to Impact Student Identity



VR makes it possible to visit any location, time, or person in a relatively inexpensive way via virtual field trips. This creates powerful learning opportunities for experiencing historical contexts, scientific environments, and personally meaningful moments. Already the immersive nature of VR is allowing assisted-living elders to visit their childhood homes, the human body to be explored through the blood vessels, and battles from the 1500s to be reenacted in great detail In classroom settings, the immersive nature of virtual field trips has enabled students to have 'authentic and powerful' experiences in Colonial Williamsburg (Stoddard, 2009, p.431) and increased attention and retention of information on Mexican immigration (Lacuna, 2004).Perhaps equally important is the opportunity to impact student identity – for example, can students be given experiences to inspire them to enter STEM careers? Virtual field trips already exist that permit students to experience life in a professional's workplace or to learn from a mentor. Google Expeditions, for example, contains 'career expeditions' experiences where students can 'shadow' a scientist or professional in their laboratory or office (O'Brien, 2016). This can be encouraging for students, especially minority students, to pursue academic interests or occupations in fields in which they are historically underrepresented (Butler, 2003).In addition, the existence of social VR applications such as Rec Room and Facebook Spaces also provide channels for more intimate and immersive communication. Already, scientists like Bill Nye have entered into these virtual spaces to interact with the public. Opportunities like this, in schools where low resources or time constraints limit going out into the field, are excellent examples of VR's potential benefits (Lacuna, 2004; Placing and Fernandez, 2001; Tut hill and Klum, 2002). By delivering these first-hand experiences, VR increases the Possibility that students can adopt new identities that can impact their career trajectories.

6.3Virtual Reality Affords New Perspective Taking and Empathy

VR excels at providing opportunities for new perspective taking, empathy, and the ability to visualize difficult models. For example, when students were given a VR experience of being an elderly person their empathy towards older generations significantly increased (Bailenson et al., 2008). Chris Milk (2016), one of the foremost 360° film directors, argues that VR makes anyone and anywhere feel local. In his VR film, Clouds over Sidra, Milk creates a compelling experience where the viewer is transported to a refugee camp in Jordan. He uses this medium, where empathy with the subject is engendered by immersing the viewer in a realistic experience of becoming a refugee. Another powerful VR experience of this nature is the simulation Outcasted. In Outcasted, the player gets to Experience true stories of how people become homeless. VR builds empathy as the player

Begins to experience the social rejection that many homeless people face (Priestman, 2015). One of the strongest arguments for VR as a learning tool is this ability to create empathy in students and to change perspectives (Bailenson et al., 2008); this opportunity is especially important in a divisive age in which understanding another's point of view can be essential to find solutions and ways to compromise.

VII. Conclusion

The purpose of this study was to compare in a blended learning environment context the level of student academic engagement through lecture-based with the level of engagement through problem-based learning strategies utilized. We should design creatively while building on how we know students learn. Since VR is an excellent medium for constructivist learning experiences pedagogy targeting its use should be founded on constructivist learning models. Problem-based learning, anchored instruction, cognitive apprenticeship, and intentional learning environments are all effective models founded on constructivism (Wilson, 2012). VR has the potential to enrich these methods with interactive simulations and stunning visuals that immerse students in authentic learning experiences. It can push the boundaries of the traditional classroom to be engaging, creative, and responsive to the needs of the student. As such, overlap with game design principles is likely and ideal.

References

[1]. Elliot Hu –au, joey lee, Columbia University, virtual reality in education a tool for learning in the experience age.

[2]. Dorotas kamiska institute of mechatronics' and information system, Tomasz sapinki ICV lab virtual reality &application in education.

[3]. Aimilia Tzanvari associate professor at the design & multimedia university of nicosa, Nicolas Tsapatsoulis school of electrical & computer engineering affective, interactive and cognitive methods for E-learning design.

[4]. Ferry B.kervin L.turbill, the design of an online classroom simulation to enhance the decision making skill of beginning.

ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 11, Issue 1, November 2021
Impact Factor: 5.731

[5]. Oshiee kulala lumpur metropolitan university college, problem in education and opportunity in vr.
[6]. Gianna Knowles, supporting inclusive practices and ensuring opportunity is equal to all.
[7]. Mate wren, VR boosts engagement by providing student with a strong sense of presence.
[8]. Wilson, problem-based learning, Anchored instruction, cognitive Apprenticeship

DOI: 10.48175/IJARSCT-2110