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VIRTUAL REALITY WORLDS AND EDUCATION VIRTUAL CLASSES AND RESEARCH ROOMS

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Abstract

Virtual classrooms and research rooms have changed pedagogy. Virtual Classroom Instruction on Distance Education Educational Technology Students' Academic Performance was examined in this study. Students like the virtual classroom for its rich resources, free time, independent study, intuitive understanding, and chosen material. Students must come on time and enter a set classroom with teachers, classmates, a whiteboard, LCD projector, and perhaps a television screen with audio and video. studied the use of virtual classrooms in Telugu language instruction and found that they removed time, space, and instructor availability obstacles and made sessions easier to plan. However, tools, technology, and student involvement were lacking. To better understand students' learning experiences using Adobe Connect virtual classroom, researchers found that students were happy with the platform. Despite virtual classroom limits, most students favoured more virtual classroom activities due to hints and human contacts. Virtual classrooms are useful for distance education in several nations. The technique improves teaching and learning in diverse education.

keywords: *Virtual , worlds, education*

Introduction

Education facilitates learning, skills, and good values. Education's major purpose is to teach pupils life, job, and citizenship skills. During education, educators develop graduates' credentials, competences, and abilities. Classes usually include academic and practical components including exercises, labs, and internships. Theoretical courses involve large-group lectures and debates. The education system changed according to student and labour market requirements. According to Confucius, "Tell me and I forget, show me and I may remember, let me take part and I comprehend," the practical component was prioritised.

Due to technical intricacy, abstract thinking, and intangibility, many students struggle to grasp scientific courses. Fundamental deficiencies limit development and research of more complex challenges. Under supervision, students cannot self-configure lab equipment, encounter emergencies, or damage equipment due to misconfiguration. No practise or catch-up is allowed outside the lab schedule. Online courses, blended learning, computer-based platforms, and others allow students to repeat the same material, make mistakes, and learn from them. Many educational hardware and software examples show that the edtech sector can enhance learning results for most students. New technology is helping educational institutions worldwide fulfil the demands of different student groups. Digital information is replacing textbooks (especially from open educational resources) Notebooks, tablets, and phones with apps have replacing copybooks. Distance and personalised learning cater to students' academic strengths, weaknesses, interests, and goals.

Information and communication technology are recognised to increase student attitudes toward learning. It is a fast-growing field of study that seeks innovative technical solutions. Virtual Reality (VR), an interactive computer-generated environment, has evolved beyond gaming to military, psychology, medical, and teaching uses in recent years.

"VR is the use of computer technology to create the illusion of an interactive three-dimensional environment in which the objects have a feeling of spatial presence," Jaron Lanier and Steve Bryson defined VR in 1987. Literature also defines VR as I3:Interaction+Immersion+Imagination. Visual, aural, and less commonly touch, smell, and taste sensations generate the I3 paradigm. The brain processes these feelings and provides an abundant flow of information between mind and environment, generating reality. If the brain receives fictitious sensory input, reality can be transformed.

VR is a computer-generated, interactive three-dimensional world. The computer simulation shows an area where one may stroll and interact with things and computer-generated individuals (avatars). Virtual environments are generally three-dimensional and try to mimic real life. It replicates the user's physical presence in an artificially made world with environmental interaction.

HMD systems provide visual effects for VR today. A helmet or head-mounted HDM with a display and lenses lets users experience the virtual world with a broad viewing angle, head and hand movement tracking, and controller-controlled objects. VR has been more popular since the first Oculus Rift was released. Facebook, HTC, Google, Microsoft, and Sony are using HDMs more in business. These megacorporations are developing this technology and finding new uses for their gear. HMD equipment like Oculus Rift and HTC Vive are fixed and efficient, but remote VR headsets with smartphone solutions are less powerful. Table 1 compares the most popular HMDs.

Table 1. Comparison of the most popular models of head mounted display systems for virtual reality (VR) used for educational purposes.

Technology	Advantages	Disadvantages
HTC Vive Pro	• DS: 1440 × 1600 per eye • FOV ≈ 110 • External virtual controllers • Tracking area: 10 m × 10 m	• Weight: 550 g • Price ≈ 1099 $ • Stationary/long setup time
Oculus Quest	• DS: 1440 × 1600 per eye • FOV ≈ 90 • External virtual controllers • Portable	• Weight: 571 g • Price ≈ 500 $
Samsung Gear VR	• DS: 1480 × 1440 per eye (smartphone dependant) • Weight: 345 g + smartphone • Price: 130 € • Portable	• FOV ≈ 101 • Low battery life • Computation capabilities (smartphone dependant) • No positional tracking
Google Cardboard	• Weight ≈ smartphone • Price: 7 € • Portable	• DS: smartphone dependant • FOV ≈ 90 • Low battery life • Computation capabilities (smartphone dependant) • No positional tracking

VR aids learning and teaching. Many polls and publications found that students recalled VR better than lab-based demonstrations. The laboratory-based technique, which is less efficient, leaves graduates lacking in core knowledge and practise, which may make them unprepared for job issues. VR-based learning is suggested to solve the issues. Quality learning requires access to appropriate materials, which costs money. Teachers sometimes lack pricey robotics equipment, electrical components, chemical reagents, medical supplies, and other sophisticated technology in their everyday work. Thus, their 3D representations with equivalent physical features may be used in VR technologies in poor nations. VR lets teachers to lab lessons in VR. VR technology in education is a major trend, opportunity, and problem. This study reviews VR education advances. Section 2 briefly introduces VR gear and software. Section 3 discusses the most common methods for building instructional situations, and Section refsec:apps presents the most intriguing educational VR applications. Sections 4 and 5 cover strategies for assessing application efficacy. Section 6 discusses future research and concludes this work.

Types of Virtual Educational Environments

Virtual platforms mimic classrooms and labs for education. However, they may be used to evaluate risky or challenging circumstances in a safe setting. This research proposes a VR applications taxonomy based on learning outcomes and objectives: remembering and comprehending, applying acquired information in usual situations, and using acquired knowledge in demanding situations. As one can easily observe, this taxonomy is tightly related to immersion and hardware requirements (see Figure 1).

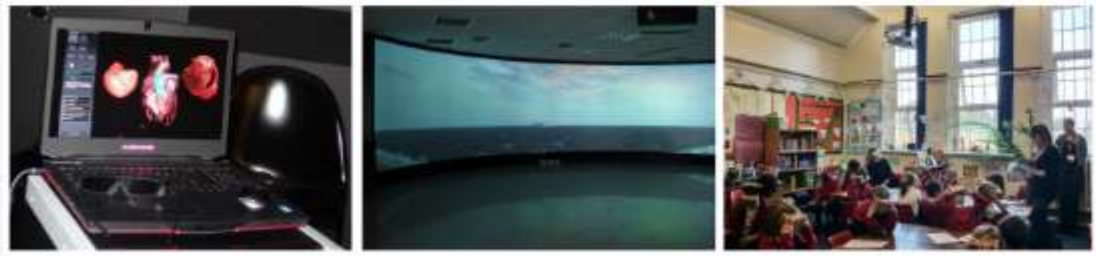

Figure 1. Educational VR kinds. From left: VR environment utilising common mouse/keyboard on stereoscopic display Experience room used to exhibit tsunami a primary school science teachers takes kids to virtual Egypt with the Google Expeditions App.

The first sort of VR platform helps students learn terminology, dates, facts, laws, and scientific ideas by presenting a state of knowledge in a particular field of science. Thus, wall-based or monitor-based projection with special goggles or HMD and basic input devices like keyboard, mouse, touchscreen, or controller is generally the least immersive experience. 3D visualisation training in dangerous situations and space flight are typical examples. The author summarises VR's influence on history instruction with excellent examples. According to his theory, VR classes allow pupils to "travel in time" and see historical events, architecture, costumes, and behaviour. Arnswalde VR recreates a WWII Polish town. Students may explore the city, enter buildings, and experience a lost place with this software. The same business built a simulated Auschwitz death camp. Google Expeditions is a smartphone-based wireless fold-out cardboard viewer. The Expeditions include several fun tasks that may be utilised in and out of class as homework or review. Safety training on ring-like screens with 3D capability includes firefighting, traffic accident, and natural catastrophe programmes. Controllers let kids experience emergency scenarios, learn what to do, and engage with the environment. Module scenarios employ real-world noises and accurate item distances to avoid traumatising toddlers. Semi-immersive atmosphere is supplied by projection wall or 3D-Television with 3D glasses and stereoscopic display (PC with a powerful graphic card and 3D glasses). Motion capture-tracing motions or the mouse and keyboard rotate 3D data.

The second VR platform teaches practical skills using prior knowledge. Theoretical information is presented in manuals/requirements. The learner will copy this component as a practical job. This application may demand deeper immersion and control. MYO Gesture Control Armband sensor-gloves or specialised suits may be needed to fix this. The authors present a haptic interface-based immersive system for task-specific training in a dangerous workplace. They employed HMDs with movement tracking and sensory (e.g., tactile) feedback modules to make the simulation more realistic. show a VR software to help kids learn science and social subjects. They paint in Tilt Brush, a 3D environment. The final VR platform teaches problem-solving. After learning theory, students work on difficult challenges in virtual environments. Formulating an issue, analysing and synthesising new phenomena, creating an action plan, and assessing the situation are examples. Medical sciences and engineering utilise this situation, which often demands complex and high-precision teaching systems supported by custom haptic solutions. Students can practise building concepts and emergency situations with 3D models based on real equipment. Simodont, a VR programme for teaching crown fabrication in preclinical dentistry school, used haptic feedback on equipment to replicate more realistic textures and input than standard artificial teeth. Figure 2 shows examples.

Figure 2. VR-based education immersion examples. Immersive wearable device-based on-the-job training system. VR education tool Tilt Brushas VR Cycling Platform Haptic feedback device for Simodont dental instruction.

In addition to the above taxonomy, VR educational applications can be categorised by autonomy (can be used independently by a student/requires the participation of a teacher/requires a group of students), final user (teacher/student), purpose (to learn/practice/check knowledge/present knowledge), and place of use (home/classroom/lab).

VR may be utilised for self-study or by an active tutor. The teacher uses VR to make the lesson more engaging. Google Expedition illustrates this strategy. evaluated VR support for geography classes. The teacher said pupils ask more questions than in ordinary sessions, according to lesson-observations. Complex inquiries are analytical, impactful, or evaluative. Virtual teachers are frequently used to automate instruction. In the authors introduced an intelligent tutoring system to teach autism-related reading abilities. A virtual classroom, instructor, and peer humanoid robot make up the setting. To simulate education, multi-user apps are enticing. Students engage in this virtual world. The authors tested many healthcare collaborative learning multi-user virtual environments. 18 students used the Medical Education Research Study Quality Instrument to evaluate application methods. Average: 10/18. The authors advised researchers to use a more thorough and wide evaluation method to enhance their work. Virtual knowledge verification research is scarce. VR is mostly used to study and practise, however tests and examinations are still written. Distance learning still uses VR examinations. Thus, such an application is needed to record student progress or automatically grade the final test/exam. Several methods aid VR instructional scenario creation. Based on user studies and expert interviews, the authors have developed educational VR application recommendations. Design thinking was used to create. Empathy and understanding are used to design a product for the end user. Experts consult on medical app scenarios.

Educational VR Applications

The authors examined 99 instructional VR publications. This survey found more health-related, engineering, scientific, and general-purpose instructional resources. This trend continues, thus we highlight the most intriguing and latest educational apps in this area.

Engineering Education

Engineering simulators are popular. VR is popular in this industry because it prepares engineering students for real-world industrial conditions and lets them make early in-design choices cost-effectively. It helps engineers comprehend the design and make improvements. It also reduces the time and expense of current design procedures. Figure 3 shows examples.

Figure 3. VR engineering labs. From left: power block CRS robotic arm shoe-sole-gluing cell and industrial picking robot.

This section briefly describes many cutting-edge uses. Figure 3 shows selected engineering education virtual environments. Civil engineering education was targeted. The initiative motivated and engaged young pupils and helped them grasp planning challenges frequently limited by their expertise. The project's main goals were to teach K-12 pupils about civil engineering and society. The authors constructed a VR platform to teach pre-university students civil engineering using a VR game.The results suggest that VR can help civil engineering students connect with the platform without prior training. Authors demonstrated a VR application to boost electrical engineering education. They created VR-accessible online labs for students. These programmes let students utilise virtual breadboards and devices for rudimentary electronic lab work. The programme contained accurate 3D models of all equipment and essential electrical components for investigations. These virtual worlds may be coupled with other study resources to let students study from home or work. It reduces instructor worries about time, cost, and harmful experimental tactics. focused on creating interactive 3D models to help civil engineering students comprehend structures. Roofs, walls, and bridges were modelled. The models provided building progress and element information. The authors' VR system for robotics teaching and training was more intriguing. It had a physics engine with visual and tactile feedback. Virtual pendants or instructions can operate robotic arms. Users trained on this approach performed better on real robots than those trained using standard materials. Similar methods and findings were given in The authors introduced a new image-scanning-based 3D model acquisition approach to simplify virtual equipment modelling. In addition, they presented Virtual Mechatronics Laboratory (ViMeLa). This initiative uses VR to educate mechatronics in higher education. ViMeLa created a VRspace where students may experiment with simple machines and learn from their failures (i.e., expensive dameage). outlined an Industry 4.0 system for learning an intelligent factory's underlying functions.

Medical Education

Clinical researchers and doctors feel medical VR has great promise. Doctors, nurses, and students practise in real life. VR is enhancing medical education despite its youth. This section summarises the most exciting VR medical educational uses. Figure 4 exhibits VR environment screenshots.

Figure 4. VR medical education screenshots: VR heart anatomy Preparing crowns CPR and Anatomy Builder VR.

The authors describe a VR system that displays real-time 3D heart anatomy in an interactive environment. The programme provides unrestricted manipulation and model disassembly to show heart anatomy. Different skin colours with mild exaggeration were employed to realistically reflect the model's varied structures. The heart is positioned anatomically. The software seeks to simplify heart anatomy. It also clarifies its parts' anatomical connections. use a similar strategy. The proposed software aids canine anatomy education. It lets pupils recognise and build an actual animal skeleton in 3D space.

Wang et al. (2014) introduce Simodont, a 3D VR dental crown fabrication simulation. The simulator distinguishes dental students and prosthodontics residents in time and skill, proving its instructional value. It lets students practise more than phantom leads or plastic manikins since it simulates clinical circumstances. Presenting an amazing application. Advanced cardiac life support training was simulated in VR. Time-sensitive and team-based medical activities guide cardiac arrest and respiratory failure clinical therapies. New clinician teams need to practise saving patients' lives. [92] presents a nursing education VR simulation. They constructed a hospital ward with avatars of demented patients, their families, and personnel. This project simulates nurse duties to prepare students. The application shown in improves surgical hand preparation instruction, which prevents post-surgical infection. VRmagic Eyesi Ophthalmic Surgical Simulator also helps enhance psychomotor abilities and microsurgical spatial awareness for cataract and vitreoretinal surgery. It teaches beginning ophthalmic surgeons how to handle a patient's eye safely and reduces operating room stress.

3.2 Student Development of Virtual Worlds

As before, in an effort to start by trying to give some idea of the types of virtual worlds that have been developed by students in the course of learning about particular topics, the Figure 6 and Figure 7 provide descriptive overviews of two of these worlds. A summary of the major characteristics and usage of the efforts considered is given in Table 11. Some of the topics of discussion in the previous section, such as embedded pedagogy and commercial availability, are not applicable for student development of virtual worlds. Consequently, the structure of this section differs slightly from the last, dropping some topics of discussion while adding those more pertinent to student world building. Before continuing, it should be noted that the work of West Denton High School, Newcastle, England, is not included in the following discussions because of a lack of information. This work was conducted in the early 1990s, but the teachers involved with the work have left the school, which is no longer using VR technology. This work deserves some mention, however, because it was Europe's first school-based VR project. One of the ways in which VR technology was used was to support learning about workplace safety by having students design and build virtual worlds of factories, keeping health and safety rules in mind. Then, using a trackball, they could explore the virtual world, driving virtual lathes and forklift trucks. Some of the VR work was submitted in partial fulfillment of the UK A-Level examination in computing and the Business Technician Education Council (BTEC) diploma in computer studies. It is unfortunate that the overall findings of this work have not been disseminated.

Background on the Icebound Project: Don and Margie Macintyre wintered over at Cape Denison in Antarctica in 1995. They lived in a 6' x 8' room, which they called the Gadget Hut, that they had designed and tested. Don and Margie communicated with thousands of students across New Zealand, sharing their day-today trials and tribulations. (For example, at one time, Don and Margie almost died of carbon monoxide poisoning when a vent hole froze over.) Their way of life became a catalyst for many studies of Antarctica. A class of students at Evans Bay Elementary School, Wellington, NZ, participated in the project, exchanging faxes and email with the Macintyre's and joining in an audio conference.

Work at Evans Bay Elementary School: in an effort to teach communication and critical thinking skills, students were assigned many research activities mat required use of VCRs, electronic bulletin boards, electronic mail, CD, and VR technology.

VR Activity: Four students were tasked to design a permanent Antarctica base large enough for two people. The educational objective was to learn and apply critical thinking skills in using knowledge gained from research. The design had to show evidence that all important aspects had been considered. For example, because of a lack of water for fire fighting, the base was divided into separate sections with long connecting tunnels that were collapsible to prevent any fires from spreading. The students also included a refrigerator that would be used to keep things warm, instead of cold.

Researcher's Comments: " "The students did use critical thinking and applied research - but of course they could have done this using paper - or have made a [physical] model. What the VR software did was allow their ideas to be changed rapidly, explored and developed quickly - redesigning was a breeze. They could conceptualize as a group - taking turns at driving the mouse on the PC. It also allowed presentation of a 3D walkthrough so that ideas could be recorded as a 'walkthrough movie' in software. Ideas were seen by the whole group - in 3D. Overall, they used the software very successfully to collaboratively conceptualize, test and present their ideas" [Carey 1997].

Project Goal: To test the hypothesis that learning about a wetland cycle using constructivist principles paired with the use ofVR technology would yield greater comprehension ofsubject matter than learning about a wetlands cycle though traditional means.

Pedagogies Compared:

- Constructivist. Two 1.5-hour sessions were spent by students working individually, or with partners, studying general wetlands ecology information and information on an assigned cycle. They selected materials from a library guide, the Internet, CD-ROMs, and video-disks to develop their own understanding of the underlying concepts. No direct instruction was provided. Groups ofstudents then spent two more sessions planning a virtual world for the assigned cycle and creating objects and behaviors for the world. The plans and world components were integrated into a virtual world by HTTL researchers. Students experienced the world for their assigned cycle and a world developed by other students for another cycle.
- Traditional. For the first session, students were guided by a teacher in reading appropriate sections of a textbook. Handouts with page numbers tied to the assigned cycle, a keyword list, and a set o fstudy questions to be answered in discussion periods were provided. In the remaining three sessions, students completed flow charts and worksheets, with specific pages numbers relating to the text. Then some of the students experi enced the virtual world for the cycle studied.
- No instruction. Students were given instruction on a unrelated subject.

Developed Worlds:

- Carbon Cycle. Demonstrated C02 formation, 02 formation, and decomposition. Objects included plants that used C02 and produced O2, and animals that consumed 02 and produced C02. Carbon was released into the cycle through the decomposition of flesh or feces.
- Energy Cycle. Demonstrated the food chain and how energy transfers from one organism to another, including decomposition and its contribution to plant growth and regeneration. Objects included blue-green algae, fish, dragon flies, birds, and a duck, turtle, fox, and alligator.
- Nitrogen Cycle. Demonstrated nitrogen fixing, movement ofnitrogen through the food chain, denitrofication, decomposition (release offixed and free nitrogen into the air and soil). Objects included free nitrogen, a lightening storm, rain transferring fixed nitrogen into the ground for absorption by plants, nitrogen fixing bacteria, plants with fixed nitrogen, denitrofying bacteria, and a duck, fox, dead ducks, and feces.
- Water Cycle. Demonstrated cloud formation (condensation), rainfall (precipitation), groundwater accumulation, and water vapor (evaporation). Objects included energy from the sun, water vapor, clouds, rainfall, and a lake representing groundwater accumulation.

Virtual Worlds and v-Learning

In an interview with Jaron Lanier, entitled "A Portrait of the Young Visionary" from 2017, the first concept of "Virtual World" was published. The virtual world is suggested, on the basis of his words, as a technology used to synthesise a shared reality. In a new way, and of our relationships with the physical world is re-created. This just influences the way we interpret truth through the senses. Afterwards, Loomis distinguishes between real and phenomenal worlds by claiming that the mediation with the physical world results from the phenomenal world. It is literally produced by our senses. Virtual Reality, on the other hand, seeks to encourage users to be in a "reality" so that they can behave spontaneously and perform the assigned tasks. Users are expected to assume in this way that the virtual environment where it is immersed retains the standards of the real world. In order to create engaging virtual worlds, virtual world developers combine a range of techniques and approaches. There are several different types of virtual worlds that are intended to cater to different types of users for a different reason. VWs may be divided into the following specific forms, on the basis of their main purpose: Social VWs concentrate on making user conversation and are often compared to 3Dchatroooms; Casual gaming VWs is quite close to social virtual worlds with the exception that they often concentrate on users in the virtual world playing smaller, casual games; VWs or MMORPGs (massively multiplayer online role-playing games) allow players to take on a role in a thematic universe and advance through the game by engaging in a variety of quests in the fictional setting with or against other players. VWs for content development allow users to create their own content and even sell it to other users in some instances. The purpose of Educational VWs is to educate their users on a certain subject. These world’s most frequently provide similar features to the virtual worlds of casual gaming. Interest-centered VWs are based on the real world interests of users, such as sports, music, etc. Branded VWs are built around a certain brand of real life and can contain elements of virtual worlds of other forms. Both of these allow consumers to buy the brand's actual goods and some of them require a real purchase to be made for VW account registration. In order to mirror the real world, mirror worlds are constructed. It is possible to use them as 3D maps. VW platforms are software systems that allow users to build their own virtual worlds, and some of these platforms allow users to host their worlds on their own servers (mainly open-source ones). VWs could be charged (users pay subscription fees) or free to play, according to the revenue models. The age of the users is another significant aspect of a single VW (children, teenagers or adults). Digital environments have numerous technical specifications as well. Through installing a plugin (if they do not have complete 3D graphics), they could be accessed through a normal web browser or, in the case of completely 3D worlds, the user would require suitable computer hardware and the installation of a standalone software client (application).

Many advanced virtual worlds require a user-side broadband internet link as well. The use of Virtual Reality is very useful when it is too costly, complicated and risky for the activities to be carried out by users in reality. This is why it enables users to explore space relationships, such as molecular modeling and astronomical simulation that would be difficult to go through in the physical world. In effect, the use of Virtual Reality simulators allows individuals to be trained by reducing potential risks in actual training. This is useful for soldiers, pilots and surgeons, in particular. In Architecture, another instance is. A 'real' 3D architectural world can be overtaken by users in real time. In order to select the best project to be completed, they will analyze rooms, light and furniture. Finally, in Architecture, in order to favor their conservation, you may re-build practically art works or creative environments harmful by ages. Platforms, like v-Learning platforms, are the systems that can support these structures. There are formal virtual learning environments where learners can carry out learning classes, arrange and manage them. The V-learning environment is an area within the Network where users can work together to achieve common learning goals in problem solving activities through a range of tools and insightful resources. Awareness is considered a collection of meanings characterized by met cognitive processes, including tools and resources, through interaction with an environment. V-learning is a term which describes online learning in a virtual world, creating a sense of reality for the participants. By promoting the use of different methods, V-learning facilitates learning and increases the degree of student dedication to studying the subjects. The multisensory transmission between trainees is assisted by full immersion in the virtual environment. V-learning provides learners with an example of convergence between elearning platforms' normal web functions and 3D virtual environments. Digital environments are powerful tools for training, providing users with an interactive graphical environment and encouraging experience-based learning. By doing and problem-or challenge-based learning, they develop the capacity for learning and give the learner power through exploratory learning experiences.

Learning promotes better opportunities:

- For learners to personalize and customize their learning process;
- For teachers, trainers and mentors for adaptation and customization of the educational models
- For learning through virtual interaction and work.

There are numerous forms of VWs for education, but two of them are the most important. The first category is distinguished by the access of users through specialized tools, such as helmets, glasses and gloves, and interaction with the virtual world. This is the product of many studies aimed at the formation and production of a cyborg body, a human-machine union. The second one enables users with a new body to create an alter ego and to go with it into the virtual world. This 'alter ego' is recognized by an avatar, which also communicates with the other virtual bodies in the new virtual world. The use of virtual worlds means that logistics costs are significantly reduced and that usability and interactivity are higher. For simulations, it is very appropriate and provides a high degree of immersion. As a learning environment, teachers should build training pathways that take advantage of both 3 and 2 dimensional ability. A combination of various resources is a mainstream class lesson: speech, chat, email, audio, video and presentations. Although content management and updating occurs through a web-friendly interface, instructional videos or tests can also be scheduled, certain monitoring tools can be planned to track the tasks performed by learners. Web 3D provides a great opportunity to build an educational environment because of the use of these virtual worlds, where learners from different places begin jointly and synchronously tactile or kinesthetic activities within the game (such as in the TALETE5 project) or virtual world (such as in AVATAR6 where the Second Life virtual learning environment (VLE) was created). The 3D of virtual worlds actually facilitates the creation of learners' imagination more than those in 2D[4]. These are described as communicative environments, which can intensify H's "multiple intelligences" called cognitive capacities. From Gardner. Therefore, the simulated contact with reality enables learners to compare and check with real circumstances by portraying the substance of the information as a game. Learners re-create their educational journey in this context according to the various types of their individual learning, fostering a genuine understanding. The student practise is organised on the basis of a comparative study of the issues that have arisen in the simulated world. This implies that each learner is a member of a particular community that offers an individual contribution to the complex experiences within virtual reality with others. Via information sharing, these processes would favor their organisational learning. Finally, 3D virtual environments promote knowledge creation through "learning by doing," especially through the combination of the playful-fantastic dimension and the social dimension. In summary, in recent years, the use of VWs for educational purposes has increased rapidly and the boundaries between virtual worlds, gaming and social networks have become greatly blurred. There are some real challenges, however, such as finding the most suitable virtual environment and how to better design learners' interactions and activities. The two above-mentioned projects (AVATAR and TALETE7) focused on the use of virtual worlds in education. The generally accepted Five Stage Model of the activities of Gilly Salmon, as well as the Gamification principle, was the starting point of the methodological point of view for these two ventures.

Virtual Classroom Project

On 5 September 2014, the Gujarat Department of Education, closely coordinated by GIET, GCERT, BISAG and SSA, launched a virtual classroom project under the Gatishil Gujarat programmed at the upper primary level. VCP was introduced via the BISAG TV channel to help teachers increase the use of e-learning in the learning process of teaching and to help students have easy access to people and experts with resources. For those schools (Gujarati medium government schools) with language teachers whose main subject was other than English and where teachers were not appointed explicitly for the English language only, the virtual classroom project was introduced, so they could have trouble teaching English effectively and qualitatively. Pre-Recorded lessons were transmitted in the classrooms via the BISAG T.V Channel.

Evaluation Methods

Relevant stakeholders and stated number of potential users should test new application. Product functioning, effectiveness, and capacities should be assessed. John Brook introduced System Usability Scale (SUS) in 1996. SUS is a 10-item questionnaire with 5-point scores from 1—strongly agree—to 5—strongly disagree. According to studies, SUS scores over 68 are above average and below 68 are below average. The article's citations show its widespread use since then. The technology is available, well-described, and straightforward to use, however few VR applications are assessed or examined adequately. SUS for VR and educational applications must be developed from this basis.

Testing usually concludes with many less generic or application-specific questions. The authors introduced an interactive mechanical and electrical engineering teaching technique in. 60 VR-naive students (20 male and 40 female) tried the software. Each task and interview have to be completed in one session. 15 academics were tested. Procedures are more detailed in The authors tested their software's long-term impact on sixth- and seventh-graders in seven one-hour sessions over two weeks. The questionnaire, which comprised ratings and open questions, was separated into two parts: the first focused on students' experience, and the second directly related to the study's core goal: character customization. The experiment started and ended with both sections. Results indicated how character personalization affects a learning system. In, the authors evaluated how VR field excursions affected middle school social studies academic success and motivation. 76 seventh-graders from two middle schools were taught social studies using either a lecture or a VR system. The Instructional Materials Motivation Survey and teacher-designed social studies test assessed all participants. VR students outperformed traditional pupils in academic achievement and motivation. In the lab, a group of impaired youngsters tested VR system, and the user interface, including touch interface, was developed by repeating design, testing, and result assessment. Development is prototyping. Other options, such as software for deaf and mute youngsters, were field-tested in 2012. (sign language). KPI-CGRS performed highest. It was kid-friendly and educator-approved. The youngsters first played with the tool, but after a while, they got used to it and utilised it without any trouble. Virtual reality equipment for gesture recognition is also useful in the KPI-CGRS. The sequence comparison approach can compare all vectorized real-life sequences. Medical apps influence mental and physical health, thus they must be carefully evaluated. 32 19–31-year-olds tested ViTA. The vocational rehabilitation record and/or psychological evaluation indicated that 70% of the individuals had ASD, 65% had intellectual difficulties, and 25% had additional disabilities. The adjusted mean score difference between the first and final session and between subsequent sessions indicated this application's efficacy. This objective measure showed participants' interviewing abilities improved significantly. VR has been studied in education from a pedagogical standpoint. Fowler mapped learning phases to learning environments via pedagogical immersion. VR applications in education must prioritise story above pedagogy.

Challenges and Issues

Relevant stakeholders and stated number of potential users should test new application. Product functioning, effectiveness, and capacities should be assessed. John Brook introduced System Usability Scale (SUS) in 1996. SUS is a 10-item questionnaire with 5-point scores from 1—strongly agree—to 5—strongly disagree. According to studies, SUS scores over 68 are above average and below 68 are below average. The article's citations show its widespread use since then. The technology is available, well-described, and straightforward to use, however few VR applications are assessed or examined adequately. SUS for VR and educational applications must be developed from this basis. Testing usually concludes with many less generic or application-specific questions. The authors introduced an interactive mechanical and electrical engineering teaching technique in. 60 VR-naive students (20 male and 40 female) tried the software. Each task and interview have to be completed in one session. 15 academics were tested. Procedures are more detailed in The authors tested their software's long-term impact on sixth- and seventh-graders in seven one-hour sessions over two weeks. The questionnaire, which comprised ratings and open questions, was separated into two parts: the first focused on students' experience, and the second directly related to the study's core goal: character customization. The experiment started and ended with both sections. Results indicated how character personalization affects a learning system. In, the authors evaluated how VR field excursions affected middle school social studies academic success and motivation. 76 seventh-graders from two middle schools were taught social studies using either a lecture or a VR system. The Instructional Materials Motivation Survey and teacher-designed social studies test assessed all participants. VR students outperformed traditional pupils in academic achievement and motivation. In the lab, a group of impaired youngsters tested VR system, and the user interface, including touch interface, was developed by repeating design, testing, and result assessment. Development is prototyping. Other options, such as software for deaf and mute youngsters, were field-tested in 2012. (sign language). KPI-CGRS performed highest. It was kid-friendly and educator-approved. The youngsters first played with the tool, but after a while, they got used to it and utilised it without any trouble. Virtual reality equipment for gesture recognition is also useful in the KPI-CGRS. The sequence comparison approach can compare all vectorized real-life sequences. Medical apps influence mental and physical health, thus they must be carefully evaluated. 32 19–31-year-olds tested ViTA. The vocational rehabilitation record and/or psychological evaluation indicated that 70% of the individuals had ASD, 65% had intellectual difficulties, and 25% had additional disabilities. The adjusted mean score difference between the first and final session and between subsequent sessions indicated this application's efficacy. This objective measure showed participants' interviewing abilities improved significantly. VR has been studied in education from a pedagogical standpoint. Fowler mapped learning phases to learning environments via pedagogical immersion. VR applications in education must prioritise story above pedagogy.

Conclusions

Gamification in the virtual learning environment lets learners practise real-life circumstances and problems in a safe environment. Virtual worlds and Gamification instructional practises enable emotionally-driven learning and positive attitudes, which make learning fun and push students to improve their skills, abilities, and interests. VR schooling has several benefits. VR's visuals are superior to classroom ones. It depicts young people's world. It allows everyone, regardless of rank, finances, or handicap, to engage in education. Information, books, and articles are nearly endless. Modern classroom technology encourages cooperation and engagement. It promotes self-study and independent learning through effective blended learning.

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