

## Virtual Reality in Education

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*Virtual Reality (VR) is a real – time manmade environment created with the help of a computer software and hardware which gives a live experience in learning, gaming, architectural walkthrough, advertising, movies and many others. It creates a major platform for education, where those which are impossible or extremely hard to be taught in a natural environment are made possible in this manmade environment. It is a latest technology which is creating a platform for itself which is also a boon in electronic learning (e-learning). It attracts the audience of all age groups with its three – dimensional presentation which includes text, image, audio and video. This paper focuses on the usage of this new technology in the field of education by elucidating its purpose, usage and future.*

Keywords: Virtual Environment, Virtual Reality and Latest technology.

### Introduction

The rapid growth in Technology is creating a challenge each day, for the teachers to use innovative and attractive facets for teaching so that the students get fully involved in the learning experience. Also, it is the biggest challenge for every teacher to teach a toughest subject in an easier way. Virtual Reality paves the way for helping each teacher in this process for a better teaching – learning experience. Virtual Reality (VR) is a 3D technology which is created with the help of three – dimensional aspect creating softwares and supporting hardware in order to create a live experience to the audience. It is of great help in the field of education as it creates an easy learning experience for even the toughest subjects by providing a practical way of learning.

This practical way of learning is made possible in a Virtual Environment created with the help of any 3D editing software which is experienced by using a head mounted virtual device in an in-built virtual space. The Virtual Reality Modelling Language (VRML) helps in the creation of this Virtual Learning Experience which is a computer programming language which facilitates this technology. This technology is widely used in military training for new cadets who get a live experience of a battlefield and get trained to face all tough situations and save their country and their own lives. The feedback is positive as the cadets who are been trained with this technology are more efficient than the others. Also, this technology helps in training pilots to handle aircraft

which helps them easily handle when they are into direct training sessions. In the field of medicine, this technology is used to train junior doctors for facing complicated surgeries which is very hard to teach while handling one such, but a video of the same could be showed. The VR training is more powerful than learning by watching such videos. This paper portrays how virtual reality technology is been used in education, its supporting devices, environments along with its purpose and future.

### Virtual Reality Devices

The hardware and software component devices used for the working of virtual reality are as follows:

#### Hardware

The major hardware needed is a computer, either a PC or a smart phone. Then the following other devices are also used.

- Joy sticks, Force balls/ Tracking Balls, Controller Wands
- Data Gloves, Track pads, Magnetic Trackers
- On – device control buttons, Motion trackers
- Body Suits, Tread Mills
- Motion Platforms (Virtual Omni)
- MIDI Keyboards
- Shutter Glasses
- Head Mounted Displays (HMD)
- Cave Automatic Virtual Environment (CAVE)
- Binocular Omni – Orientation Monitor (BOOM)
- Visual/ Auditory/ Haptic Displays
- Projection Screens

#### Software

The software components are:

- An app or program running locally
- Web services
- A content server
- A 3D software (3Ds Max, Maya, Soft Image, etc.)

### Virtual Reality in Education

Virtual Reality can be used in Education with the help of these four types of Virtual Reality Environments in the following ways which are clearly discussed below:

## Immersive

Immersive Virtual Reality environments give a learner experience where the learners feel that they are really present in the environment with the help of wearing the Head Mounted Displays (HMD), in a CAVE environment, where everything appears very close to the eyes of the learner as a 3D object. This helps in understanding about a subject more clearly as it explains with live diagrams as shown in the below figure. It also helps the learner to keep in mind the learnt content for a very long time as they are given hands on experience on it. To put it clearer, with the help of Immersive Virtual Environment students can be taught in depth as what are the parts of a human body, how it functions with the help of a live diagram, by observing all parts in a closer view to the eyes which is impossible in a real – time world unless each part of the human body is cut open and explained.

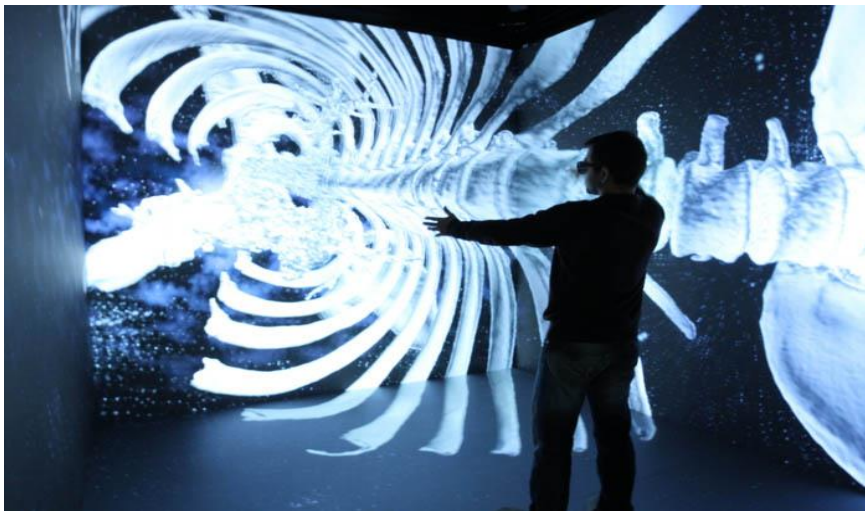


Fig. 1: Cave Immersive VR Environment

## Non – Immersive

A Non – Immersive Virtual environment is just the opposite of immersive type whereas the learner gets an experience at a distance where they are not fully into the Virtual environment which is created. This type of environment is accessed with the help of keyboards, joysticks, track balls, mice and other external hardware. This experience is just like watching a video or a tutorial on a computer or a smart phone but it is accessed with VR hardware as we see in the below figure as how the learner by wearing VR hand gloves and accessing non – immersive virtual environment studies the human body parts.



Fig. 2: Non – Immersive VR Environment

The difference between immersive and non-immersive could be clearly understood through these two figures where the immersive attracts more rather than the non – immersive but both have its own advantages and disadvantages depending on their functions as sometimes some learners would not be that dare enough to have an immersive experience to study the parts of a human body whereas a non – immersive will be much more suitable. But when it is training on a recent device like using a professional camera, the immersive way will be more pleasing rather than a non – immersive form.

### Semi – Immersive

A Semi – immersive Virtual environment is a latest technology which gives a partially immersive experience as the name suggests. A suitable example would be teaching a subject by showing it with large projection screens. It gives an experience as like learning through a projector illustrated PowerPoint presentation. The following picture gives in more insight regarding semi – immersive environment where a professor in engineering gives a practical exposure to the students on recent mechanical equipment which is designed in a 3D environment and projected as like projecting in a screen with the help of a computer and projector. The appeal of the new technology is more eye catchy than the former one which we use.

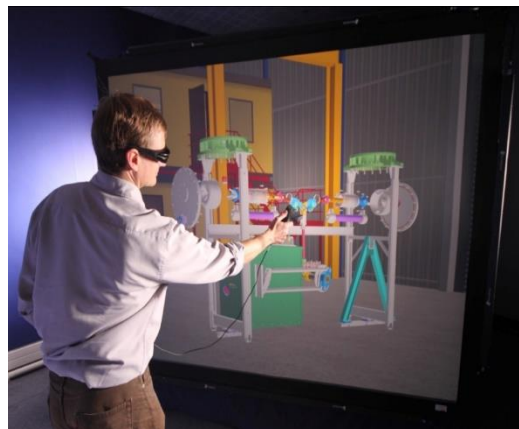


Fig. 3: Semi – Immersive VR Environment

## Collaborative

Collaborative Virtual reality environments gives a multi learner experience where many learners can be involved to have a combined learning experience as like Collaborative learning using a video conferencing or a chat forum. The VR also provides opportunity for such unique learning experience. The following figure explains as how it is connected as like a Chat Forum where the learners can move around the Virtual Environment discussing about the subject and have a wonderful learning experience.

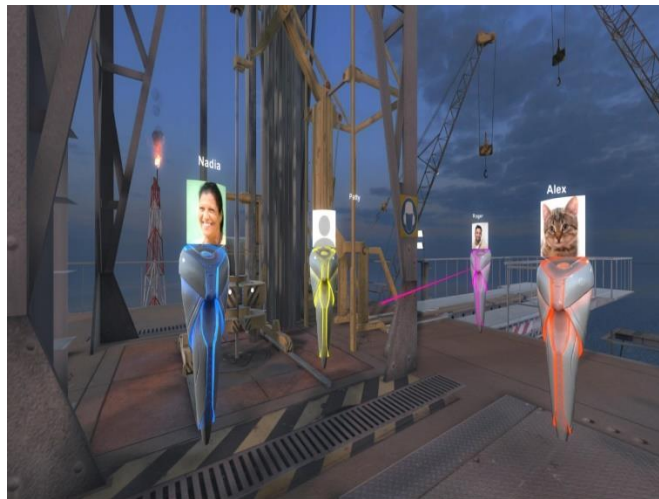


Fig. 4: Collaborative VR Environment

This figure puts in light as how constructing a site as an engineer and working for a project can be prepared as a group which is being practiced in this Virtual Collaborative Immersive Environment.

## Conclusion

Education is stepping into a new era where the technology is making the work of a teacher even easier that even a student who takes time to understand and is differently – abled could also learn like the other students and come out in flying colours. Also, teachers should take concern to include such technological aspects in their way of teaching and necessary training must be given to them so that they themselves can handle this technology and teach easily. At present in India, Virtual Reality Technology has been used in Medical, Military, Navy and Air force Training. But still it hasn't come into importance in school and college education. But, in foreign countries, they have made a trial with this technology in education which has become a great success and they have implemented it in their course curriculum. In the coming years, definitely this technology will create a platform in India too.

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