The State of Virtual Reality in Education –Shape of Things to Come

Saloni Minocha

Department of Computer Science,N.C. college of Engineering,Panipat, Haryana.
Corresponding email: saloni.minocha2015@gmail.com

Abstract: In this paper the applications, merits and demerits of Virtual Reality have been studied. This paper mainly discusses the effects and use of Virtual Reality in Education. At the end we conclude that adoption of Virtual Reality can be used as an addition to traditional education system.

Keywords: Virtual Reality, Education, Immersive, Illusion, 3-D Stimulus, Simulation, Head Mounts, Graphics.

Introduction

In the last many years, Virtual Reality Systems have drawn much attention of the researchers and companies. It is the recent advances in hardware and software that brought this technology within the reach of ordinary users and researchers. Virtual reality, as a concept has been around for over forty years. It is an illusion of reality created by the computer system. Virtual reality system is characterized by high degrees of immersion, believability and interaction. Its main goal is to make user believe, as much as possible, that he/she is actually in the computer operated environment. Virtual Reality system has the potential to create systematic human testing, training and treatment environments which allow control of complex, immersive, dynamic 3-D stimulus presentations. This in turn makes interaction sophisticated, tracking of behavior and recording of performance possible. Virtual reality can be identified with the following seven concepts: simulation, interaction, artificiality, immersion, telepresence, full body immersion and network communication.

Virtual Reality implementations make use of high speed and high quality 3-D graphics and audio with a combination of hardware such as Head Mounted Displays and wired clothing to achieve realism and believability. Virtual Reality system is capable of simulating events which are normal, abnormal, dangerous or unforeseen. They create scenes and situations in which human mind can participate, interact and exist. Virtual reality is still in the initial stage and only two companies stand ahead in creating gadgets for the system – Sony and Oculus, now owned by Facebook. Virtual reality is a promising technology which is applicable in various domains like education, training, medical, health care and entertainment industry. This paper focuses on Virtual Reality effect in Education and Training.

The paper is divided into several sections for the ease of understanding. Section 2, represents the S.W.O.T analysis of Virtual Reality Systems. Section 3, represents the effects of Virtual Reality in education. Section 4, gives the summary of problems and challenges faced in bringing Virtual Reality as a part of education. Section 5, states the conclusion drawn from the paper.

S.W.O.T analysis of Virtual Reality Systems.

Figure 1:Summary of S.W.O.T analysis

Strengths Ecological validity is enhanced Control and consistency of stimulus Real time performance feedback Error free learning Gaming to enhance motivation Environments that can be of low cost, distributed and duplicated. Deep connection with the audience target group and developers	Weaknesses Motion sickness and balance issues Wires and displays – no free movement Back end data extraction and analysis Platform compatibility Side effects
Opportunities Telepresence and Tele conferencing Engineering and architecture Medicine and surgery Science, education and training Entertainment and games Military Heritage and archaeology Fiction and fine arts Music Manufacturing and urban design	Threats Awareness is limited and there are Unrealistic Expectations Technical and cultural challenges Addiction to Virtual Reality False sense of security Cost issues

Role of Virtual Reality in Education and Training.

Virtual Reality can be used in learning and teaching situations in the followingways:

a)Integration of children with different learning styles and abilities

A creative child is given an opportunity through Virtual Reality to use his imagination and abilities. It is also an effective technique for those children who find it easier to learn using colors, textures etc. There are various examples in which children who were shy or isolates in the group became accepted due to their skills in technology.

b) Interactive Learning

Rather than using assimilation, as in traditional institutes learning is through interaction and construction. Due to Virtual Reality, large groups of students are enabled to interact with each other and within a 3-D environment. Student can interact with objects in the environment to understand them and discover more about them. It gives opportunities for group work and peer learning.

c) Makes learning fun and easy

Complex data is represented in such a way that it becomes interesting and simple. Some students in Ireland even recreated a historic place and explored it. Game based learning is motivating because it is fun. A player's gender, weight, etc. does not interfere with their acceptance by other players, which is not there in many educational games.

d) Learning by doing

Theory of Constructivism suggests that learning by doing is the best way of learning. Virtual Reality enables introduction of practical knowledge in the classroom. Students, instead of listening to lectures can get real experience through virtual immersive environment. For example, suppose the topic is related to safety of the school, students can walk around in the virtual environment and take pictures of unsafe points.

e) A different approach to rewards and punishment.

Virtual Reality would transform traditional concepts of rewards and assessment. Success is acknowledged whereas failures are generally ignored and not punished.

f)It is possible to attend virtual lectures, discussions, exams or labs in 3-D.

g)In learning where safety precautions are required, it is preferable that students interact in a virtual worldinitially.

h) Study of different cultures

Through cultural immersion some courses are using virtual worlds to recreate exhibits.

I) Subject of academic research.

Since the field is relatively new, Virtual Reality itself can be a subject of much academic research.

j) It helps in visualization of abstract concepts which makes the students have a better understanding.

k) Virtual Reality Projects

For example, students can photograph a site with digital camera and then by using computer softwarethephotos can be stitched together into panoramas.

l) Students with special needs

There are various programs that can help students with special needs. One such program helps students with severe hearing impairment learn life skills such as how to cross a street safely. Another program gives students who are disabled, practice in finding their way around schools etc. A program developed in Britain teaches social skills to people with autism.

m) Simulation of computer system

Virtual Reality helps to observe system operation from a number of perspectives.

N) Macroscopic and Microscopic visualization

A benefit of Virtual Reality as compared to traditional methods is that it enables observation of system features that would be either too small or too large to be seen on a normal scale system.

o)Make learning process exciting, so students are likely to remember what they learn.

Use of Virtual Reality for Training and Medical purposes

a) Simulation for soldiers

Video games, training equipment and programs involving simulations are being used currently by US army. Playing interactive computer games lead to the development of ability ofrapid information processing and to interactively solve problems. Simulation also helps soldiers to learn complex equipment, how to work together and rehearse missions.

b) Tool for Training Fliers, Drivers and Miners

These are one of the most popular Virtual Reality training programs. They greatly reduce the amount of time, expense and risks.

c) Virtual Body and Minds for Medical Purposes

Virtual Reality programs allow the students to see organs and body parts in 3-D. They can examine the organs from any angle and can make virtual cuts into the organs. Medical students can repeat this process as often as they want, unlike the real body which can be dissected only once.

Virtual worlds can be used effectively to integrate media as e-books, hyperlinked articles, objectsto manipulate as artifacts, interactive calendars or chalkboards.

IV. Challenges and Drawbacks of Virtual Reality in education

a) Instead of focusing on the educational experience, students may get excited about the gadgets.

b) Technical challenges – Specialized training may be required to understand the complicated nature of Head Mounted Displays and input systems such as gloves and boots. Training to operate and navigate the virtual environment is also required.

c) Cultural challenges- Liability issues, Law enforcement issues or it may lead to inventoryloss of objects in virtual world.

d) Time and effort is required to adjust it to purpose of education

e) Some critics feel that too much dependency on Virtual Reality and computers can lead to loss of personal contact with the teacher.

f) Loss of social interaction lessons that only a face to face classroom can teach.

g) Critics also feel that Virtual Reality cannot have the same impact as an actual visit to a museum, park or historical site.

h) Another limitation of Virtual Reality is that behavior ethics cannot be learned. For example,

how one should behave in a class, a museum or a library.

V. Conclusion

Virtual Reality is not the progress itself, it is a medium of success. In this paper challenges of applying Virtual Reality in education are stated. We suggest that the impact of Virtual Reality is still limited, so it can be used as an addition to traditional classrooms and standard trainings.

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