

The Impact of Avatars and 3D Virtual World Creation on Learning

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ABSTRACT

Authentic experiences include learning activities that emulate real life situations, problems and tasks - activities that learners consider to be important (Herrington, J. and Oliver, R. 2000). When combined

with pedagogical approaches that promote "deep learning" (Biggs, 1999) the affordances of virtual environments such as 3D Virtual Worlds and Avatars (virtual humans) offer the learner the opportunity to engage in surreal and imaginary experiences that transcend the actual world in which they live (HCIG 1999).

This paper explores some of the advantages, disadvantages and pedagogical implications of utilising these technologies when considering the use of authentic tasks in learning. Primarily, it will discuss whether immersion of the learner within a realistic environment is able to enhance the learning process and assist in the achievement of pre-defined learning outcomes.

1. INTRODUCTION

In this paper we will in the first instance explore some of the historical, technological and pedagogical aspects surrounding 3D VR and Avatars. We will then look at the possible opportunities both positive and negative for educators and learners alike if they choose to interact with these technologies in a learning environment.

2. WHAT IS AN AVATAR AND WHERE DOES THE WORD AVATAR COME FROM?

An Avatar can be best described as a computer generated graphic representation of a user within a 3Dimension (3D) Virtual Reality (VR) environment therefore enabling the user to take on a visible persona. Certainly not a newly created techno buzz word, Geoffrey Parrinder, (1982), highlights the origins of this word in ancient Hinduism with the definition "a manifestation of the divine in human form" or reincarnation.

3. WHAT IS 3D VIRTUAL REALITY AND WHERE HAS IT COME FROM?

3D Virtual Reality is a computer generated artificial environment where the user is projected into a sensation of three dimensional space. There are two types of 3D VR. Firstly, total immersion systems where the user wears VR equipment that interacts with special software giving interactive tactile and multi-sensory feelings similar to real world experiences. Secondly, 3D VR simulations, such as those that train pilots or astronauts where special equipment is not worn but the user places themselves not physically but visually in a 3D virtual computer environment (Williams and Sawyer, 2003).

The gaming and entertainment industries were the first to use 3D VR and Avatars together with Internet 3D chat rooms (Fralich et al, 1996). It did not take long before users of chat rooms realised the dark side of the virtual world and the ability to project themselves into these chat rooms as whomever they liked whilst hiding a secret and possibly sinister identity and motive for communication. As early as 1964 a University graduate student by the name of Ivan Sutherland began work on both a computer system that could display three dimensional graphical images and a Head Mounted Display (HMD) which would project these images into the eyes. This was followed, in the 1980s, by the invention of Medical student Tom Zimmerman of a Data Glove. This is a spandex mitten worn on the hand with joint tracking sensors able to virtually grasp and manipulate virtual items (Pesce, 2001). In the mid 1990s, Mark Pesce developed a language called VRML or virtual reality modelling language, a computer language that enabled VR to work on the web. The tactile and visible world of virtual reality was born.

4. THE IMPACT OF 3D VR AND AVATARS ON EDUCATION

As society becomes more immersed in virtual living or “TeleLiving” (Halal, 2003) as a way to shop, educate and work whilst online, educational technology has slowly been moving towards 3D VR. As our children become familiar with exploring within virtual worlds through play from a young age, we need to create an authentic and familiar environment in which they can learn and engage their interest. An example of this type of play can be seen in *The Sims(c) 2000*, a 3D virtual game where the user becomes an inhabitant of a virtual society, experiencing a wide range of normal daily life emotions, actions and consequences. In this environment the user is playing whilst learning with authentic 3D virtual reality that has real world relevance, an important factor in learning (Harrington, Oliver and Reeves, 2003).

4.1. Pedagogical implications

The creation of authentic learning environments is often offered as the justification for many educational designs (HCIG, 1999). When examining the meaning and purpose of authenticity it is necessary to step beyond the affordances offered by 3D Virtual Worlds and Avatars to craft and manipulate objects, assume different personas and communicate with others. Certainly these experiences are conducive to creating real-world simulations and experiences but the potential to imaginatively participate in “the surreal and non-real, the imaginary, the fantastic” (HCIG, 1999)

offers the individual the opportunity to have experiences beyond the “real” in order to visualise certain concepts and actively participate in an environment that, without such technology, would otherwise be impossible to simulate.

With this in mind, one of the greatest advantages in using 3D VR is the ability for individuals to immerse themselves in role playing by the use of Avatars. Educators in various disciplines may offer their students the ability to assume a different persona to experience the world of another. In the area of psychotherapy, for example, learners could enter the world of a sufferer of anxiety and panic. Similarly, a great deal could be learnt by observing psychotherapy patients as they project an image, expose their weaknesses in this image and confront unpleasant situations to build confidence. It is a safe way to practice to reduce social and physiological anxieties. (Goldsten, 1973; Yablonsky, 1976) The Cognitive Neuroscience Section (CNS) of the National Institute of Neurological Disorders and Strokes (NINDS) cites total immersion 3D VR systems as useful for the purposes of functional stimulation and response execution research. Roblyer and Edwards (2000) describe the freedom for handicapped learners that a 3D VR system, particularly full immersion, would offer students where they could “practise skills and social behaviours in private, controlled environments”.

4.2. Opportunities for educators of computing

3D VR interactive environment offer a range of exciting possibilities in the field of computing education. Consider an “Active World” (HCIG, 1999) where students are able to dissect and rebuild computer hardware, construct networked environments and assess the strategic placing of networked elements, set up realistic simulations of computer security breaches or even be instructed in the construction of such VR environments. A total 3D VR immersion system could be used to create a highly realistic information technology working environment where they could utilise the senses to experience a wide range of scenarios in order to prepare students for the workforce.

4.3 A word of warning

There is a danger in using 3D VR as a teaching tool that students may become isolated, desensitised to the physical world and lost in a world of unreality. Taplin as cited in Alexander (2000) reminds us of the complications and negatives of students working alone and at a distance from their peers and the fact that this type of segregation from real world society can

cause frustration and uncertainty. Teacher support and peer scaffolding must be interwoven into any 3D VR learning to maintain the humanistic element so essential to holistic development of the individual (Alexander, 2000).

5. CONCLUSION

Obviously there are ethical and equity issues surrounding the use of 3D Virtual Reality not touched on in depth in this paper. The availability of this technology to all students may be affected in particular by the issue of cost particularly with respect to the total immersion systems which are expensive to implement and require the services of highly trained operators to ensure effective utilisation. However the authentic environment that the technology affords and the deep learning that can occur provides a stable pedagogical platform to facilitate the achievement of the learning goal.

The use of such technology in role play situations allows the user to experience at an "arms length" things that they would otherwise not contemplate thus giving a feeling of confidence and the drive to experience the situation or thing in real life outside of the realms of 3D VR.

As with any virtual technology, isolation and desensitisation to the real world are highlighted in this paper as a potential disadvantage to the student. This highlights the need to ensure teacher intervention at all times to monitor and make changes necessary to continue to engage the student in real life activities not only virtual. Provided that careful planning occurs in the preparation of any 3D VR simulations and the lesson or course plan incorporates a wide variety of different mediums not just solely 3D VR, learning should be enhanced. Designing and pre lesson or course testing of the 3D VR environment is important to make sure that users do not become disorientated and frustrated with their learning environment.

This is a technology to which we must become accustomed as across all generations we are becoming immersed more and more in the world of 3D VR play, design and communication. With the advent of the Internet our world took a turn towards virtual reality without too much control on our part. 3D VR gives us the opportunity to take in hand some of that control.

REFERENCES

Alexander, S. (2001) Learning in 3-D. Online Learning Magazine, Issue July 2001. Available at: [http://](http://209.125.88.134/new/jul01/printer/feat2prt.htm)

[/209.125.88.134/new/jul01/printer/feat2prt.htm](http://209.125.88.134/new/jul01/printer/feat2prt.htm). Retrieved 12th March 2003.

Biggs, J.B. (1999) What the Student Does: teaching for enhanced learning Higher Education Research & Development, Vol. 18, No. 1, 1999

Goldstein, A.P. (1973) Structured learning therapy: Toward a Psychotherapy for the Poor. New York: Academic Press, Inc.

Fralich, D., Mario, C., Mitchell E., Peterson M., and Smith L. (1996) Update on Virtual Reality: Avatars and 3D-Chat. Emory University Business 552E. Available at: www.emory.edu/BUSINESS/et/avatar/ Retrieved: 12th March 2003.

Halal, W.E. (2003) Teleliving: When Virtual Meets Reality. The Futurist, Washington: Mar/April 2003. Volume 37, Issue 2, Start Page 44, ISSN 00163317.

Herrington, J. and Oliver, R. (2003) Patterns of Engagement in Authentic Online Learning Environments. Australian Journal of Educational Technology Vol. 19 (1), 59-71. ISSN 0814-673X.

Herrington, J., and Oliver, R. (2000). An instructional design framework for authentic learning environments. Educational Technology Research and Development, 48(3), 23-48.

HCIG VLearn Conference, May 1999 Research panel discussion from the Human/Computer Interaction Group (HCIG) at Cornell sourced 17 March 2002 from <http://www.vlearn3d.org/workshop99/hcig.text.presentation.html>

National Institute of Neurological Disorders and Stroke (1998) Development of Virtual Reality Headgear/Goggles and Gloves for use in the Administration of Cognitive and Motor Tasks. Available at: <http://grants.nih.gov/grants/guide/notice-files/not98-023.html>. Retrieved: 8th April 2003.

Parrinder, G. (1982). Avatar and Incarnation - A comparison of Indian and Christian beliefs. Oxford University Press, New York.

Pesce, M. (2000) The Playful World - How Technology is Transforming our Imagination. Ballantine Books, New York.

Roblyer, M.D. and Edwards, J. (2000) Integrating Educational Technology into Teaching. Prentice-Hall, New Jersey, Columbus, Ohio.

Spaulding, S. (2002) Distance education, broadcast media, virtual reality and cyberspace: Is the future passing us by? Comparative Education Review. Chicago; February 2002. Volume 46, Issue 1, Start Page 119-130, ISSN 00104086.

Yablonsky, L. (1976) Psychodrama: Resolving emotional problems through role-playing. New York: Basic Books.

Williams, B.K. and Sawyer, S.C. (2003) Using Information Technology. A Practical Introduction to Computers and Communications. McGraw-Hill Irwin. New York.

