Chapter 18

Mixed Realities: Human Interaction Technologies

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ABSTRACT

Teaching with technological support brings its own set of problems, some of them technical and others social in nature. Familiarity with specific technology can enhance the teacher’s, the practicing professional’s and the student’s experience, otherwise each will face a potentially steep learning curve before being able to achieve the best outcomes. We live in a time of rapid technical advancement bringing us new and ever more exciting opportunities at ever decreasing cost. In this chapter the authors will look at technologies which present opportunities in the virtuality continuum, from the ubiquitous mobile phone to more specialized augmented and mixed reality systems. They show examples from various fields of endeavor in an attempt to whet the appetite of those interested in new and innovative approaches to training and education.

INTRODUCTION

The traditional teaching class requires the expert and the student to be co-located, willing to discuss their topics of choice in a way that allows the student to gain from the expert. In face-to-face teaching various methodologies for enhancing the student’s learning experience have been used to success, for example experiential, action- and problem-based learning. In recent times traditional approaches have been enhanced, and complicated, by the introduction of technology which allows the teacher and the student to be in different physical locations yet still allowing the necessary interactions and knowledge transfer to take place. There is a wide variety of available technologies, but for each type what is important is how the individual participants interact with it.
and, more importantly, with each other by using it. In all cases, the technology should enhance, not interfere with, the educational process.

As educational technologies have evolved, so have the social technologies which affect our daily life. With a worldwide distribution base of around 4 billion, it is a rarity to find someone in the developed world who does not have access to a mobile phone. Games consoles and personal computers are, also, in widespread use and all of these devices are becoming cheaper and more powerful every year. One of the major applications on each of these platforms is the computer game which, typically, allows the user to enter a virtual world of play for either entertainment or as part of a directed learning experience. Now, with the advent of new, cheap, and powerful sensor technology a new set of applications is becoming available, based on augmented and mixed reality. In the rest of this chapter we will look at the reality continuum and show examples of its use and importance in training and education.

**THE REALITY CONTINUUM**

Milgram & Kishino (1994) show a reality continuum, usually applied to visualization, depicting degrees of blending between the real world and the virtual world. At one extreme we have only reality, so here our technology is introducing nothing which does not belong to the real world. At the other extreme, we have the opposite, Virtual Reality (VR): nothing here belongs to the real world. It is all artificially constructed, an example of which is the virtual world with which a computer gamer interacts on her computer or games console. In between the two extremes are the blends; from reality we move to Augmented Reality (AR) where an environment is made of digital data in combination with information from the real world; and then to Augmented Virtuality (AV), where the virtual environment is dominant and combined with elements from the real world.

The ‘extremes’ (Reality and Virtual Reality) have been in use for quite some time, but with advances in technology, there is an increasing opportunity to mix them developing rich and engaging computer based learning environments.

**VIRTUAL REALITY**

The personal computer has long been a tool for the computer gamer and to a large extent its evolution has been driven by the ever increasing demands of this community for more realistic graphics and faster performance. Typically a game will transport the player into an entirely virtual world, where the computer screen presents a 2-D display of the 3-D world, and the player interacts with it via the traditional technology of keyboard, mouse or gamepad. These environments offer great opportunity for education as games can be constructed to target specific educational outcomes. The current market place is full of such games which target the younger student, presenting them with the familiar computer interface and an attractive visual interface, and making the educational outcome, in some games, almost a side effect of the game play.

“The Sims” (© 2000 Electronic Arts Inc.) is an interesting game based on normal everyday life. It is a single player game in which the player can create characters, homes and neighborhoods which develop a life of their own within the parameters chosen by the player. For example, characters can be created with a range of appearances and behavioral characteristics which define ‘who they are’. Their homes can be created and furnished with the money they ‘earn’ by disappearing to work every day, and the player can observe their lives when they return home to house, spouse, children or which specific lifestyle the player has given them. The game uses artificial intelligence to allow the different character personalities to interact, perhaps caringly if their ‘personalities’ are compatible, or aggressively if not. They perform
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