Chapter 16
Designing Game-Based Learning Activities in Virtual Worlds:
Experiences from Undergraduate Medicine

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ABSTRACT
In view of the current interest taking place in the area of education and virtual worlds, such as Second Life®, many educationalists have began to explore the benefits of applying game-based learning in these environments. In this chapter, the authors attempt to explore the elements associated with game-based learning in virtual worlds, focusing on the design process and how effective game-based learning activities can be achieved following pedagogic frameworks. The authors view learning in games as a form of driving learners’ motivations and this is reflected in the design and development of the virtual respiratory ward at Imperial College virtual hospital explained in this chapter.

INTRODUCTION
Computer games have been developed and embedded in academic settings since the first arrival of computers in the classroom. As Veugen and de Lange (2007) pointed out, one of the key factors for using computer games in education is the power to motivate. The British Educational Communications and Technology Agency (BECTA) highlighted the following statement:

“A striking feature of games software is its power to motivate. Motivation or the will to continue the use of the software is the end product of a mixture of psychological effects” (BECTA, 2001, pp.2).

Malone (1981) and Malone and Lepper (1987) identified four features that motivate persistence and enjoyment of games: challenge, control, curiosity and fantasy. At the same time, Flow Theory has become very significant in explaining the feelings of enjoyment including playing computer games (Sherry, 2004). According to this theory, arousal
will increase as a task becomes more challenging but performance and enjoyment will depend on the level of skills. Flow is achieved when a gamer reaches an optimal match between his/her skills and the challenges presented by the game (Boyle and Connolly, 2008). Video game designers create these emotions by balancing a number of game components, such as character traits, game rewards, obstacles, game narrative, competition and opportunities for collaboration (Squire, 2003).

The theories described above contribute to our understanding of player enjoyment in computer games. However, games that over-emphasize educational requirements in some cases undermine the potential of play, game and story for creating memorable experiences (Hirumi and Stapleton, 2008). Therefore, the right balance between educational requirements and motivational factors should be achieved in order to ensure an enjoyable and effective game-based learning experience.

Learners, usually in their 20s, are native speakers of the digital language of computer, video games, DVD players, mobile phones, iPods and the internet (Holloway, 2003). According to Prensky (2001), they are “digital natives”. The “gamer generation” has a cognitive style characterised by multi-tasking while learning, short attention span during learning, and an exploratory and discovery approach to learning (Asakawa & Gilbert, 2003; Bain & Newton, 2003; Prensky, 2005).

Virtual worlds present rich interactive 3D collaborative spaces in which users can meet and interact (Livingstone, 2007). These virtual worlds can be used by many different users at the same time and for a range of different applications, including cultural, business, tourism and education (De Freitas, 2008). According to the Federation of American Scientists (FAS) and De Freitas (2008), virtual worlds have the following characteristics:

- “Learner control: learners control and interact through the creation of a virtual representation of themselves, called “avatars”” (De Freitas, 2008, pp. 8).
- “Collaboration: emphasis upon collaboration and community building”. (De Freitas, 2008, pp. 8).
- “Persistence: persistence of the world leads to the capacity for immediacy and synchronous use of the world” (De Freitas, 2008, pp.8).
- “Inclusion of shareable and user generated digital content.” (De Freitas, 2008, pp. 8).
- “Immersion and interactivity: the user feels immersed in the environment and fully engaged with the activities being undertaken.” (De Freitas, 2008, pp.8).

As De Freitas pointed out, it is worth noting that “the lines between virtual worlds, games and social networking are blurring significantly leading to the assertion that over the next five years the majority of young people under 18 coming into tertiary education will have avatars and will be using this kind of applications daily and therefore have different expectations about how education may be delivered to them.” (De Freitas, 2008, pp.8).

Virtual worlds have been around for a very long time starting with the popular Multi-User Dimensions/Dungeons (MUDs) and Multi-Object Oriented MUDs (MOOs), developed in the early 1970s. Multi-User Dungeon also known to former players on CompuServe as British Legends was developed in 1975. It is the world’s oldest virtual world which can still be played (British Legends, 2005). These environments had the characteristics of modern virtual worlds except they were text-based. They provided the foundations for the development of modern online communities that are supported by 3D spaces. Following these social text-based communities emerged the first virtual world which used graphics and avatars. Lucasfilm’s Habitat, came out in 1985 and supported its online community for six years. Habitat was able to:
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