

Chapter 10

A Case Study of Augmented Reality Serious Games

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ABSTRACT

The study introduced in this paper examines some of the issues involved in the design and implementation of serious games that make use of tangible AR environments. Our motivation is to understand how augmented reality serious games (ARSG) can be applied to some very difficult problems in the real gaming world. Emphasis is given on the interface and the interactions between the players and the serious games themselves. In particular, two case studies are presented, ARPuzzle and ARBreakout. Results from both case studies indicate that AR gaming has the potential of revolutionizing the way that current games are played and used as well as that it can help educate players while playing.

INTRODUCTION

Serious games are part of a new emerging field that focuses on computer games that are designed for non-leisure and often educational purposes. During the past few years there has been an explosion of serious games mainly because of the evolution of computers, communications, intelligent software agents and accurate physics models. Their main advantage over traditional games is that they can be reused for other simulations in a number of commercial areas such as military operations, medical

education, emergency management training, and many others. This allows modern game technology to make a bridge between entertainment and work changing their image from ‘toys’ to ‘serious tools’.

Serious games evolve from military games originally conceptualized around simulated play and role play, and as a result are particularly used in training and pre-live training situations at present. However, as the tools evolve uses in medical training, cross-agency training and business training are becoming more widely used. The term serious games has developed as a rebuttal to the idea that games are purely for leisure purposes and its use

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goes back to Plato's work on the importance of play as a teaching method. Recently, the serious games movement has emerged from academic communities identifying the power of play for supporting non-leisure activities such as education and training. Recent case studies have identified the power of games technologies for supporting online communities and distributed training groups, for explaining difficult concepts and for engaging and motivating learners (de Freitas & Neumann, 2008; de Freitas & Jarvis, 2008). The power of the formats to engage and motivate in particular has attracted interest from schools and tertiary education institutions, leading to a re-conceptualization of what learning is and stimulating debate around how games might be applied to support specific user groups.

These immersive tools together are offering greater advantages for teaching and training particularly with respect to supporting collaborative learning, supporting social interactions and illustrating complex environments and concepts. The tools certainly do not imply the end of traditional teaching they do however necessitate a re-evaluation about learning and a need to revisit traditional models and modes of learning. One of the authors argues elsewhere (de Freitas & Neumann, 2008) that a new form of learning theory is needed to support these more 'immersive' technologies, and has proposed a model of exploratory learning that focuses upon learning considered as sets of immersive experiences. The work extends from the constructivist models of Kolb's experiential learning, and experimental work being undertaken as part of the UK Technology Strategy Board part-funded Serious Games – Engaging Training Solutions (SG-ETS) research project (with partners Blitz Games Studios and Selex Systems) (de Freitas & Jarvis, 2007; de Freitas & Jarvis, 2008).

The model extends from Kolb's experiential learning cycle with more emphasis upon the role of learner control and exploration and upon social and peer interactions as underpinning effective

approaches to learning with immersive tools. Through a consideration of learning as sets of immersive experiences, we can focus upon learning design as crafting these experiences through role plays, modeling specific processes from real life into virtual environments and editing scenarios that allow for multiple outcomes. Serious games come in many different formats, from simple Flash quizzes animations to high fidelity first person style challenge games. Studies are revealing that the range of games used also have distinct appeal to certain gender and age groups. Although this is changing, on the whole the differences are central to designing the most effective game for the particular target group.

On the other hand, augmented reality (AR) has existed for a few decades now and it refers to a technology that combines virtual information onto the real environment in real-time performance. AR technology is developing rapidly, but it is still in its infancy. The main characteristics of AR, includes accurate registration and seamless interaction between the users and the superimposed information. This information may be any available format that can be digitally reproduced. Users can visualize the superimposed information with a selection of display technologies and can interact with it in a natural manner by employing software interfaces, physical markers and hardware interaction devices. Up to now a number of experimental prototypes have been developed mainly from universities and research institutes targeting numerous application domains including gaming, but commercial applications are not widely available.

The study introduced in this paper examines some of the issues involved in the design and implementation of serious games that make use of tangible AR environments. Emphasis is given on the AR interface, the presentation as well as the natural interactions between the players and the serious games themselves. Our motivation is to investigate whether augmented reality serious games (ARSG) can be used effectively in the real

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