

Chapter 40

Modifying Commercial Off–The–Shelf (COTS) Games for Use in Education

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ABSTRACT

The use of computer and video games in education is not a new phenomenon. However, the use of commercial off-the-shelf (COTS) games, specifically the modification (“modding”) of them to allow for use in an educational setting, is a relatively new area that is gaining more traction in educational circles. Furthermore, when considering the delivery of learning material in a Higher Education (HE) setting, most (if not all) current educational games are aimed at students below the HE level. Most current educational games use a behaviourist “drill and practice” approach to their delivery of learning and there is still a need to have educational games that mirror more complex teaching and learning theories. This chapter discusses approaches to using COTS games in education, the challenges of designing educational games that work at higher education levels, and the principles attached to using them effectively for student learning and assessment purposes.

INTRODUCTION

Computer and video games (henceforth, games) have been used in education for a number of years. The author remembers being introduced to the con-

cept of trajectories of flying objects (e.g. missiles from a tank’s gun) whilst at secondary school (in the 1990s). This was done through a basic graphical game of two tanks facing each other with a mountain range in the middle; the objective was to correctly set the angle of the tank’s gun barrel and the speed of the shot in order to destroy the

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other player's tank. This game run on very basic IBM PCs and did not have good graphics, even for the time - but it was interesting because it enabled the player to visualise the outcome of the mathematics involved. Instead of watching a tutor trying to draw curves and lines on a blackboard we were able to see the trajectory of the object and change it to suit our needs; at the same time we were also involved in a fun game experience.

In the intervening years, there have been huge strides in all aspects of games technology, from the graphical quality of games to the input devices people use to play them. The huge success of the Nintendo Wii shows that there are many opportunities for people, who were traditionally put off by the complexity of controlling a game, to be involved in playing. Moreover, gaming has recently been shown to be a bigger market than films - with £1.73 billion being spent on games in 2009 (The Daily Telegraph, 26 December 2009).

It is clear to see that games have a place in education. This has been shown through a number of initiatives (such as the McFarlane et al. "Report on the educational use of games" in 2002 and others discussed later on) as well as a number of thoughts put forward by eminent researchers in the field, such as Gee (2007), Shaffer (2008) and Prensky (2007), to name but a few. What is not so clear, however, is how we can use games in education in the most effective way. Until very recently, most educational games followed a simple design protocol that adhered to the idea of "drill and practice" style education - that is, the player is asked to complete a task and if they get it wrong they have to repeat it over and over again until they complete the task successfully. Whilst this type of education can be useful in some situations it is not encouraged in most modern educational establishments, with a more exploratory approach to learning being preferred.

So the issue is how to create and use games that can be used successfully in modern education whilst also enabling the tutor to control and assess the students' experience whilst they play

the game. There is work being done in this area in many different fields (most notably the Serious Games movement) but the majority of work to date (for example, Tim Rylands' use of *Myst* or the use of games in education by Learning and Teaching Scotland (2010)) concentrates on the use of games in primary and secondary levels of education. Further and Higher Education have their own requirements for educational games and these are not really being investigated in the same depth as educational games for younger students. Therefore there is also a need to discuss how to create games that can be used in the higher levels of education.

This chapter aims to summarise the current ideas and work in this area and then propose a framework that could be used to create educational games by modifying COTS games. As part of this framework we will consider what makes a suitable COTS game for modifying and also look into existing uses of COTS games in education and where there are areas for improvement.

BACKGROUND

There are a number of examples of computer and video games being used in education. However, a lot of these are concentrated on the use of educational games (so-called edutainment) - for instance, see products by VTech and the MathBlaster series of games. Whilst these games are useful and for the most part well made they do have limitations when compared to COTS solutions. There are also issues to consider when creating games for use in education that link to the theories of teaching and learning.

Mitchell and Savill-Smith (2004) review a number of examples of the use of video games in education. They introduce the concept of "edugaming", originally coined by Fabricatore (in Mitchell & Savill-Smith (2004)), where the educational concepts are embedded within the game. This is a similar approach to Habgood's (2007), where

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