

## Chapter 26

# Racing Academy: A Case Study of a Digital Game for Supporting Students Learning of Physics and Engineering

**Richard Joiner**

*University of Bath, UK*

**Ioanna Iacovides**

*University College London, UK*

**Jos Darling**

*University of Bath, UK*

**Andy Diament**

*Penwith Further Education College,  
UK*

**Ben Drew**

*University of West of England, UK*

**John Duddley**

*Barnfield Further Education College,  
UK*

**Martin Owen**

*Medrus, UK*

**Carl Gavin**

*Manchester Business School, UK*

### EXECUTIVE SUMMARY

*Racing Academy is a digital game, which is specifically designed to engage and motivate students in science and engineering. The aim of this chapter is to report a case study where the authors evaluated how effective Racing Academy is at supporting students' learning of science and engineering. The study involved 219 students from five different courses in three further and higher educational institutions. They were given a pre-test a week before they started using Racing Academy. It consisted of an assessment of the students' knowledge of engineering or physics and motivation towards engineering or physics. A week after they had used Racing Academy, they were given a post-test, which was the same as the pre-test, but it also included a measure of how motivating they found Racing Academy. The project found that after playing Racing Academy there is an increase in students' knowledge and*

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*understanding in all five of the courses in which Racing Academy was used. The students found Racing Academy motivating to play, and 95% thought that Racing Academy was successful. The implications of these findings and the lessons learnt are discussed.*

## **INTRODUCTION**

Science, technology engineering and mathematics (STEM) is seen by the USA and by the UK as essential for their long term economic futures (DfEL, 2009; Engineering UK, 2009; US NSB, 2007), which has led to a drive to improve STEM education (National Research Council, 2010; National Science Board, 2010). In pursuit of this aim, there has been considerable interest in using digital games for supporting STEM education for a number of reasons. First, a number of reports have shown that digital games have become an integral part of life for children and adolescents. In a recent survey of US adolescents, 98% of teenagers played digital games (Lenhert, Kahne, Middaugh, Macgill, Evans & Vitak, 2008) regularly at least once a week.

Second, well designed digital games can provide powerful learning environments (Gee 2005, FAS 2006, Mayo 2007, 2009). The Federation of American Scientists (FAS, 2006) identifies the following reasons why digital games could facilitate students' learning in STEM.

- They are highly motivating (Kafai, 2001) and research has consistently shown that high levels of motivation leads to high learning outcomes.
- They provide clear learning goals and players know why they are learning something.
- Players are presented with a range of experiences and practice opportunities.
- They are learning in a complex challenging simulated world rather than learning a set of abstract facts devoid of real world context.
- The lessons can be practiced over and over again.
- Video games continually monitor player's progress and provide feedback which is clear and often immediate.
- Video games move at a rate that keeps players at the edge of his or her capabilities moving to higher challenges when mastery is acquired.
- They are infinitely patient and can offer scaffolding, providing learners with cues, prompts, hints and partial solutions to keep them progressing through learning until they are capable of directing and controlling their own learning path.
- They encourage inquiry and questions and respond with answers that are appropriate to the learner and context.

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