Racing Academy: A preliminary evaluation of an online racing car simulation game for supporting students learning of engineering

Conference or Workshop Item

Racing academy: A preliminary evaluation of a online racing car simulation game for supporting students learning of engineering

Richard Joiner

Department of Psychology

University of Bath

Ioanna Iacovides

Department of Psychology

University of Bath

Jos Darling

Department of Mechanical Engineering

University of Bath

Benjamin Drew

Department of Mechanical Engineering

University of Bath

Martin Owen

FutureLab

Bristol

Carl Gavin

Lateral Visions

Liverpool

Stephen Clibbery

Lateral Visions

Liverpool

Abstract

This paper reports a study which evaluates an online racing car simulation game designed to support undergraduate students learning. A game based learning community was created to support undergraduate students learning of engineering at the University of Bath. One hundred and sixty one students (146 males and 15 females), aged between 18 and 22, average age 18, participated in the study. The results indicated that there was a significant increase in the students' knowledge of engineering. They also felt that Racing Academy was motivating. They found it enjoyable, they felt competent playing the game and they put effort into the game. The analysis of the qualitative data is ongoing and will be focussed on investigating whether the students felt that Racing Academy helped their learning. Preliminary analysis suggests that the students did feel that Racing Academy supported their learning, but that further work is needed to fully embed Racing Academy into the course.

Racing academy: A preliminary evaluation of a online racing car simulation game for supporting students learning of engineering

James Paul Gee argues that computer games are "little learning engines" that are carefully designed to be learnt through practice and active play and that "affinity groups" of players with common interests in specific titles or genres coalesce informally around these. It is through social interaction and use of material artefacts that members of such groups access knowledge about the games, series of games or genres. Thus computer games can be seen as a dynamic social learning system.

Racing Academy was created and developed by Lateral Visions to support such a community of practice based not on fictional qualities, but on a real-time vehicle dynamics simulation system more advanced than anything currently being used by mainstream games developers. Capable of recreating the experience of driving any automobile, it accurately models in real-time how cars behave and react. The games engine has the capacity to allow users to manipulate over 1,000 parameters of their vehicles. This is particularly important as it will enable the students to change the vehicle parameters (such as the engine, transmission, tyres and suspension) in order to optimise the vehicle performance and get a better understanding of the system dynamics that influence behaviour. Players must engage with the underlying physics and work as a member of a community of practice where practice arises out of real physics and involves the social negotiation of understanding.

Two pilot projects were conducted to evaluate Racing Academy. Sandford & Williamson (2004) carried out an initial evaluation with two 15 year old age groups at two secondary schools. One group was an engineering class and the other a science class. Players were observed to use a trial and error approach and they used message boards to discuss ideas with each other.. The evaluation concluded that the students found the game engaging, challenging and rewarding. Similar findings were reported in a further evaluation conducted at the University of Bath with undergraduate engineering students (Iacovides 2005).

The above findings were encouraging but further work was needed to investigate how Racing Academy can be integrated into the teaching of science and engineering; investigate whether this

promotes learning and investigate whether it supports a community of practice. The aim of this paper is to report a study which addressed these questions.

A game based learning community was created to support undergraduate students learning of engineering at the University of Bath. One hundred and sixty one students (146 males and 15 females), aged between 18 and 22, average age 18, participated in the study which was a compulsory laboratory project and an assessed part of the course. The students were organised into racing teams consisting of 3 to 5 students and the teams designed a racing car in Racing Academy which was used to compete in a drag race for the best time. Each team had their own private discussion forum, where they could discuss how best to set up their car. Engineering support was provided through an open discussion forum, where a graduate student provided information concerning the engineering behind Racing Academy. The laboratory project lasted two weeks and at the end of two weeks there was a grand final where the teams raced against each other and there was a prize for the winning team.

Racing academy was evaluated with a pre-test which was administered a week before the project started and a post-test which was administered a week after the project finished. The pre-test consisted of an assessment of the students' knowledge of engineering, attitudes towards engineering and their attitudes towards computer games. The post-test was exactly the same as the pre-test, but it also included a measure of how motivating Racing Academy was in the context of their laboratory project. The students were also asked to keep a learning diary and there two focus groups were held after the laboratory project had finished.

The findings were very interesting. The quantitative measures provided support that Racing Academy facilitated students' learning. The results indicated that there was a significant increase in the students' knowledge of engineering. They also felt that Racing Academy was motivating. They found it enjoyable, they felt competent playing the game and they put effort into the game. The analysis of the qualitative data is ongoing and will be focussed on investigating whether the students felt that Racing Academy helped their learning. Preliminary analysis suggests that the students did feel that Racing Academy supported their learning, but that further work is needed to fully embed Racing Academy into the course.