Acceptability of Video Games Technology for Medical Emergency Training

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ABSTRACT

Using the technology acceptance model (TAM), this study aimed to investigate the acceptability of video game technologies (serious games) for medical emergency procedure and decision making training. Using the Triage Trainer, a prototype serious game for the triage sieve process, differences between gamers and non-gamers, males and females, and the effects of ratings of computer self efficacy (i.e. computer skill and gaming skill) and attitudes towards computers (i.e. enthusiasm and anxiety) on the acceptance model were also investigated. The results show significant correlations for computer self-efficacy and attitude variables with the perceived ease of use (PEOU), perceived usefulness (PU) and attitudes towards use (ATU) of the game. Multiple regression showed that 52% of the variance in ATU was explained by the PU and PEOU. However, none of the secondary variables (self efficacy or emotions) had a significant effect on the ATU, PU and PEOU over and above each other.

Keywords: Computer Self Efficacy, Emotions Towards Computers, Gaming Experience, Serious Games, Technology Acceptance Model (TAM), Triage

INTRODUCTION

As an alternative to real-world training, synthetic environments using virtual reality (VR) technology have found a number of applications in a range of fields (e.g. Stone 2002). One disadvantage of VR is that state of the art virtual environments are often costly to build and maintain (Lepouras & Vassilakis, 2005). A cheaper alternative to building training systems using virtual environment development toolkits is to use computer games technology.

Designed to educate, train and inform, systems that use such video game technology have been termed “serious games”. Acknowledging the motivational element of game-based learning (Moreno-Ger et al., 2008), serious games aim to reproduce the engagement generated during game play within the training environment. The objective is that this increased level of engagement will help the player of the game to develop knowledge, skills and attitudes that can be transferred from the game-playing environment to the real world (Bergeron, 2006).
With simulated visualisations, authentic problem solving and instant feedback, Ke (2009) highlights that computer games afford a realistic framework for experimentation and situated understanding and can therefore act as rich primers for active learning. In addition, the multisensory representations in computer games may also help in the construction and indexing of schema.

Using gaming technology may also be advantageous due to their ease of adaptation to create new content, using tools and source codes provided by the developers, their general robustness, and their ease of dissemination (Trenholme & Smith, 2008).

In the field of medicine, synthetic environments have long been employed as a training tool, specifically with the use of VR simulators for applications such as surgical skill training (e.g. Kundahl & Grancharov, 2009). Here games technology has also been proposed (e.g. Sliney & Murphy, 2008). These applications may not currently help train the motor skills employed in the surgical procedure, which may require specific and specialised input devices, but serious games may be appropriate to develop other medical skills. For example, the interactive trauma trainer (ITT) is a decision making trainer for a surgical procedure (Stone & Barker, 2006; Stone 2011). In the ITT, the user has to make appropriate decisions relating to the urgent treatment of an incoming virtual casualty. This involves making appropriate interventions, which have to be applied in less than 5 minutes in order to save the virtual casualty’s life. However, rather than replicate the dextrous surgical handling skills the user would already possess, the ITT employs a simple gaming interface, using a mouse control for viewpoint change, option selection and instrument acquisition. The purpose of the ITT serious game being to develop the decision-making skills of the surgeon and develop inter-personnel interaction skills within the surgical team.

Evaluation of training tools, such as simulators, often involves comparison of performance variables with real world metrics or by transfer of learning measures (Gopher et al., 1994, La-than et al., 2002). Evaluations of the usability of simulators, virtual environments and virtual reality products and the methods employed for such evaluations have also been reported (Gabbard et al., 1999; Bowman et al., 2002; Karaseitanidis et al., 2006). These evaluations go some way to determining the likely effectiveness of the systems. However, a factor that may be overlooked during these evaluations is the acceptance of the technology by the user. Here, acceptability refers to constructs that affect the intention of the user to use the technology. Systems with low acceptability may well meet technical performance standards but may still not be widely adopted.

The technology acceptance model (TAM) was developed to explain a potential user’s intention to use a technological innovation (Davis, 1989). The basic model consists of two primary predictors—perceived ease of use and perceived usefulness, and their relationship with the behavioural intention to use and subsequently with actual usage of the technology. The TAM has been used for a wide range of studies of the acceptance of novel technologies, including the adoption of medical technologies (Hu et al., 1999), where the model has been found to be reliable, valid and robust (King & He, 2006).

Recent studies suggest that serious games may be acceptable for medical training. Vidani et al., (2010) evaluated the acceptance of a serious game for emergency medical services (EMS). Using a questionnaire that included elements associated with perceived ease of use and usefulness, they concluded that the high ratings they obtained for an EMS decision-making game are an indication that training with serious games could be well accepted by nurses. However, an examination of the relationship and interaction of predictors of their acceptability was not carried out.

With the proposal that serious games technologies could be used for medical training, the aim of this study was to develop a framework, using the TAM as a basis, for examining the acceptability of serious games in general, and to test the model with an example of a game developed for emergency medical training.
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