Mixed Reality Games

Jean-Charles Marty, LIRIS, UMR5205, F69621, Université de Lyon, France & Université de Savoie, France

Thibault Carron, LIP6, UMR7606, Sorbonne Universités, Paris 6, France & Université de Savoie, France

Philippe Pernelle, DISP Lab, Université de Lyon, Lyon, France

Stéphane Talbot, Université de Savoie, Chambéry, France

Gregory Houzet, Imep-Lahec Lab, Université de Savoie, Chambéry, France

ABSTRACT

The authors research work deals with the development of new game-based learning (gbl) environments. They think that the way of acquiring knowledge during a learning session is similar to following an adventure in a role-playing game and they apply the metaphor of exploring a virtual world, where each student embarks on a quest in order to collect knowledge related to a learning activity. In their university, the authors have set up numbers of experiments with students using gbl environments. They revealed weaknesses for specific learning activities. Sometimes, learners seem to acquire a skill in the game, but they are not able to reuse it easily in the real world. This is particularly the case for skills that require concrete manipulation of real objects to be acquired. Gbl environments thus lack of means to learn know-how aspects. Some of the learning processes involving real world objects are very difficult to reproduce in gbl environments and there is an essential technological issue in mixing virtual and real aspects in gbl environments. In this article, the authors describe the possible problems that can appear when using this mixed approach, give hints on how to avoid them and illustrate the proposition with examples issued from the electronic domain. The authors focus on issues linked to the transition between virtual and real worlds and they explore how new electronic features can facilitate this mixed approach, where identification, localisation and update of the user models are key issues.

Keywords: Face-to-Face Learning Tasks, Game-Based Learning Environment, Know-How Activity Evaluation, Mixing Numeric, Mixed Reality Games, Online Multiplayer Game, User Model

INTRODUCTION

Due to their large educational features, Learning Games are currently spreading out (Squire, 2003) (Bogost, 2007). Indeed, they are used for science teaching (Muratet et al., 2012) (Parry et al, 2008), language (Wagner et al., 2003), history (Schrier, 2006). We can also cite more recent and promising ones that are close to commercial standing (very accessible) and less research work: Blockly Maze, Refraction, Prog&Play or Dragon Box. Both industrial and academic institutions want to use them in order to have motivating and flexible environments.
to train their employees / students (Ouhlaci et al., 2013)(Pernelle et al., 2013). The complexity of Learning Games development is thus increasing significantly, since lots of new needs and possibilities appear (Whitton, 2009): new up-to-date functionalities are often wanted: collaborative aspects, observation features for awareness purpose, and links to tangible user interfaces, less expensive, interoperability with other devices, easy access, support for metacognition (Dimitracopoulou, 2005). The requirements for these learning environments imply building several components aiming at supporting specific activities (games of “snakes and ladders” type, puzzles, animated MCQs, mimicry, alea, racing game, time trial) (Djaouti, 2008) (Mariais, 2009). Some of them may be used as competitive, collaborative or even “coopetitive” ones (Asaro, 2010)(Henrysson et al., 2005).

In light of this observation, there is an obvious need for realistic and reliable assessment about students’ skills, actions or behaviours especially for the teacher (Felicia, 2009). Indeed, for certain specific domains, the teacher needs to evaluate his/her pedagogical session according to several points and some are particularly difficult to assess with such learning environments. Certain domains present for example the particularity of exhibiting both theoretical knowledge and practical know-how (operations in manufacturing or medicine, for example) (George and Serna, 2011). For such contexts, the current Learning Games are not efficient enough concerning this second point: a unique and full digitalisation of the objects alone is not sufficient to guarantee both effective learning and assessment of the techniques (Schrier, 2006): in such cases, it is mandatory to come back to the real world and thus develop a mixed-reality learning game.

In this article, we will focus on two points: a new way of know-how assessment and the possible enhancement of learning games via communicating objects. We first give a short description of a general game-based learning environment called “Learning Adventure” and point out the need for a new kind of assessments that can’t be supported entirely by a digital/virtual learning session. We then focus on integrating both new communicant objects and learning content concerning the electronics domain in order to set up a mixed reality learning game. The main point of this article is to consider how to take into account the new issues due to the mixed reality. We also want to clarify how to use communicant objects to enhance the features of a Learning Game. Finally, in the last part, we will illustrate most of these points by means of a concrete example and set out a way via a real experiment to evaluate both theoretical content and practical know-how in the electronic domain via such learning environments.

A GAME BASED LEARNING ENVIRONMENT: LEARNING ADVENTURE

Short Description of Learning Adventure

In order to set up new learning sessions with our students, we have developed a Game Based Learning Management System called Learning Adventure (LA) and based on a role-playing approach (Baptista, 2008). Our approach is focused on game with intrinsic metaphors (Fabricatore et al., 2000). The latter can be defined as “a virtual environment and a gaming experience in which the contents that we want to teach can be naturally embedded with some contextual relevance in terms of the game-playing [...].”

LA is a multiplayer 3D environment where the learning session takes place (see Figure 1). A particular map (environment with buildings, lakes, mountains and hills) is dedicated to a particular learning activity, for a particular subject. Each part of the map represents the place where a given (sub) activity can be performed. The map topology represents the overall scenario of the learning session, i.e. the sequencing between activities (Kinzshuk, 2006). Figure 2 shows an example of such a scenario in a recent experiment that has been achieved.
Behavioral Evaluation of Preference for Game-Based Teaching Procedures
www.igi-global.com/article/behavioral-evaluation-preference-game-based/77315?camid=4v1a