Chapter 46
Motivational and Cognitive Aspects of Applying Educational Games as a Learning Tool

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ABSTRACT

In this chapter, the authors present a study conducted among university students with the purpose of acquiring empirical evidence to support the claim that game design can be used as an effective form of learning. The authors measured the effects of different learning approaches with the respect of individual differences in cognitive styles. Use of game designing opens the ability of better understanding the subject matter. Learning motivation is another relevant factor of learning performance. Since the authors were uncertain if this way of conveying educational process really has a positive impact on learning effect, they decided to observe the effect of different learning contexts both on exam results as the measure of learning outcome and subjectively reported level of motivation. Initial results provide a good argument for use of game design as a student learning tool. In addition, the authors report some influence of cognitive style on effectiveness of using game design.

INTRODUCTION

Today students have grown up using devices like computers, mobile phones, and video consoles for almost any activity; from studies and work to entertainment or communication. This has probably altered the way in which they perceive and interact with the environment, both physically and socially (Prensky 2007). Nevertheless, most teaching strategies ignore these social changes and remain anchored in traditional text based instructional formats, provoking problems like arising lack of students' motivation (Sancho, Fernandez and Manjon 2008).

Modern video games may develop higher order thinking skills such as problem solving, strategic thinking, analysis, planning and executing, resource management, multi-tasking, and adapting to changing work scenarios (De Aguilera and Mendiz 2003; Estallo 1995). Also, achieving increased player engagement involves adding deep emotional experiences to video games (Van Lent and Swartout 2007).

Organizing a course to respect these notions is by no means a simple task. There are usually many limitations in conducting a course by use of games, either video or standard games. These limitations include group size, adequate interaction, sharing responsibilities between students etc.

Our interest in this matter triggered when realizing the drop of motivation and interest in the subject among students at the course of Computer Networks. That course is conducted during third year of study at Faculty of organizational sciences, University of Belgrade, Department of informational systems. We discussed an idea of modernizing the course through the use of educational games. The need for better student involvement occurred. In order to increase the motivation of students, better understanding of the subject matter as well as improving collaboration, new form of teaching was required. Best possible way of animating new generation of "digital na-

tives" (Prensky 2007) is by approaching them in their own language, the language of video games.

Use of game designing opens the ability of better understanding the subject matter (El-Nasr and Smith 2006; Johnson and Johnson 2004). If a student had a task to adequately integrate knowledge in to an educational game, it is fair to assume that higher understanding of that subject matter is required. Also by forming groups that need to cooperate on this task, we hope to provide a good basis for development of collaborative skills. Furthermore, collaborative learning also provides opportunities for developing social and communication skills, acquiring positive attitudes towards co-members and learning material, and building social relationships and group cohesion (Mayo 2007). There are scientific evidences that motivation is positively related with the learners` perceptions of each others` presence in online courses (Pintrich and De Groot 1990; Yang, Tsai, Kim, Cho and Laffey 2006).

As learning motivation is very complex phenomenon and one of the key factors, along with cognitive abilities, for learning output (Wang at al. 2008; O`Reilly and Chatman 2003; Wang and Liu 2000), there is no doubt that we had to include motivational aspects in our study. Wang and Liu (2000) found that learning is influenced by different factors, of which motivation is dominant one. Also, the main reason for considering motivation with higher respect than other elements of learning is that motivation is susceptible to modification through different learning conception. The level of one`s motivation could be alternated according to the situational factors, i.e. by the context of studying (Cordova and Lepper 1996)..

BACKGROUND

It is a common fact that new generation of students finds traditional methods of teaching unacceptable. Our students are no longer the people that our educational system was designed to teach (Sancho,

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