

## Chapter 54

# The MORPG-based Learning System for Multiple Courses: A Case Study on Computer Science Curriculum

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### ABSTRACT

*This study aimed at developing a Multiplayer Online Role Playing Game-based (MORPG) Learning system which enabled instructors to construct a game scenario and manage sharable and reusable learning content for multiple courses. It used the curriculum of “Introduction to Computer Science” as a study case to assess students’ learning effectiveness on the subject of “computer network”. The sample was 56 freshman students, who were randomly assigned to two groups, one of which used the game-based learning and the other one the Web-based video lectures. Furthermore, this study also conducted the System Usability Scale (SUS) to measure satisfaction, usability and learnability of the developed management system for instructors. Five instructors were invited to participate in the practical use and evaluation. The results showed that game-based learning could be exploited as effective learning environments and game design system was usable and learnable for instructors to create learning games.*

### 1. INTRODUCTION

Games are a fundamental part of human existence, and the original motivation for all game-playing is learning. In other words, game-playing is a vital educational function for any creature capable of learning (Crawford, 1984). The emerging computer science, information technologies and Internet development brings game-design and game-playing from real worlds to virtual environ-

ments. Computer games have come into the mainstream in the past two decades. The fundamental motivation of learning from game-playing has been obliterated and replaced by other motivations such as proving oneself, social lubrication, looking for excitement and releasing pressure. The educational function of games has been substituted for entertainment purposes. Recently, a new term “edutainment” which is coined to mean the integration of “education” and “entertainment”

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has been defined for the domain of educational technology. “Edutainment” is a hybrid genre that relies heavily on visual material, on narrative or game-like formats, and on more informal, less didactic styles of address (Buckingham & Scanlon, 2000). The purpose of edutainment technology is to attract and hold the attention of the learners by engaging their emotions through a computer monitor full of vividly colored animations (Okan, 2003). According to the summarization by Embi and Hussain (2005), “edutainment” can be defined as “a place where children could enjoy what they learn with a combination of many media (sound, animation, video, text, and images) by simply using a computer mouse to point and click on a particular picture, word, or button; and stories as well as information that will come alive on a computer screen” and usually exists in the form of educational electronic games. Therefore, one approach to realize “edutainment” for effortless and entertaining learning is a well-designed computer game which attempts to integrate educational theories and various learning materials, the so-called “digital game-based learning (DGBL) (Prensky, 2003)”.

After years of research and proselytizing by proponents, DGBL has become more and more important in the past decade. Many studies were conducted to investigate the effectiveness of educational computer games for various courses, such as mathematics, software engineering, civil engineering, business, computer science, geography, language learning and decision science (Hwang & Wu, 2012). This trend of widespread public interest in games as learning tools is because of the combined weight of three factors. The first factor is the ongoing research conducted by DGBL proponents. The second factor involves today’s “net generation,” or “digital natives,” who have become disengaged with traditional instruction. Finally, the third factor is the increased popularity of games (Van Eck, 2006). Thus, research over many years have indicated that game-based instructional programs are more effective on learning and the

instruction that incorporated game features can increase students’ learning motivation (Burguillo, 2010; Dickey, 2011a; Garris, Ahlers & Driskell, 2002; Harris & Reid, 2005).

On the previous research work, Malone (Malone, 1981) identified three main ways in which games were able to motivate players: fantasy, challenge and curiosity. Prensky (2003) considered that an effective educational game design must balance between fun and educational value. Recently, a review of the literature has indicated that games can lead to better cognitive, skill-based, and affective outcomes (Wilson, Bedwell, Lazzara, Salas, Burke, Estock, ... & Conkey, 2009). Papastergiou (2009) proposed a computer game to assess the learning effectiveness and motivation on learning computer memory concepts. The result showed that the gaming approach is both more effective in promoting students’ knowledge and more motivational than the non-gaming approach.

Currently, there are still lots of researches which focus on the investigation of the relationships between learning effectiveness, students’ motivation and computer games for different courses on different game designed concepts (Afari, Aldridge, Fraser & Khine, 2013; Boyce, Campbell, Pickford, Culler & Barnes, 2011; Florryan & Woolf, 2011; Kaufman, Sauvé & Renaud, 2011; Shin, Sutherland, Norris & Soloway, 2012; Wang & Chen, 2010; Yien, Hung, Hwang & Lin, 2011). The results showed that educational computer games can enhance the learning interest of students, increase their learning motivation and further improve their performance.

In general speaking, educators have three approaches to integrate games in learning processes: (1) Using multimedia technologies to facilitate content presentation for entertainment purposes; (2) repurposing commercial off-the-shelf (COTS) games to assisting in learning for educational purposes; and (3) a hybrid way to design specific games that seek a balance between fun and educational curriculum (Moreno-Ger, Burgos, Martínez-Ortiz, Sierra & Fernández-Manjón,

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