

Chapter 14

Towards Modelling Effective Educational Games Using Multi-Domain Framework

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ABSTRACT

Game-based learning (GBL) has dominantly become an emerging teaching industry in 21st century. To provide an effective development of educational games (EG) with assurance of effectiveness, modelling and design methods are highlighted. To model EG, game developers must understand existing elements' interaction and relationships. The elements of EG have been documented in literature; however, the relationships are not well documented. Hence, this research has established these relationships by conducting a literature survey and identifying the relationships between different elements. Consequently, they are validated by eight game-based learning experts via qualitative methods and the validation results are interpreted using the hermeneutics method of the interpretivism paradigm. In this chapter, the authors present the relationships that they found most crucial to validate since they have the least literature evidence. With the relationships identified and documented, game developers will have better understanding of the interaction between each element and can produce better models of EG.

INTRODUCTION

The use of game-based learning (GBL) as a common medium for educational deliverance, as opposed to pure entertainment, has gained immense popularity in recent years. Main attention has recently been diverted towards the impact of gaining knowledge, engaging, and motivating learners through playing educational games (Azadegan et al., 2014; Romero, 2015). Game-based learning (GBL) is an act of appropriate game mechanics, scenario recreation, and problem oriented learning processes to ensure learning objective is accomplished (Poulsen, 2011). Designers and developers need to enhance the educational tools by integrating game domains and elements to maximize the tools' effectiveness, hence, increase learning outcomes, level of engagement and motivation. To understand the link between multiple domains and elements of GBL, there is a need to fit multiple widely known instructional approaches with experts such as game designers, developers, educators, and software engineers.

For GBL development process to be effective and reliable, it is vital to provide emphasis on involving theoretical foundations with game rules, and fun with authentic learning for learners, thus, providing an precise base for learners to gain knowledge (Hays, 2005; Kebritchi & Hirumi, 2008). The innovative learning approach derived from EG possess educational values or even different kinds of software applications that compiles into knowledgeable aspects such as teaching enhancement, assessments and evaluation of learners (Tang & Hanneghan, 2010). Nevertheless, game technologies are specifically used for accessibility of simulated and modelling environments and visualization.

Educational games are designed through a process of modelling, depending on diverse criteria such as how one element can relate to another element or types of domains used in EG. When the game developers initiate the development of EG, challenges occurs in terms of planning from gathered requirements, verifying, and cross-check to ensure several possibilities occurrence. This is due to a mixture of pedagogical, educational, and fun elements needed to be collaborated accurately. Furthermore, an effectually designed pre-model unfolding the relationships amongst game elements, and their domains is highly recommended. Therefore, a modelling technique is needed to conceptualise the elements/components in the EG and provide a holistic idea based on how domains and their related components can be modelled to provide a promising modelling and developing process.

The objective of this chapter is to study the relationships among EG elements in order to provide game developers, software engineers, and game designers; a medium of understanding connections, interrelations, and interactions between game elements and game domains. Furthermore, they should be able to map the relationships to model out an effective educational games during developing process.

BACKGROUND

This section mainly explains how the evaluation and modelling strategies adopted or proposed in designing of EG to provide a unified modelling techniques during development process of EG.

EG Evaluation and Modelling Languages

GBL evaluation is carried out to ensure design quality (Di Loreto & Gouaïch, 2010), identify usage (Djelil, Sanchez, Albouy-Kissi, Lavest, & Albouy-Kissi, 2014), and verify instructional outcomes (Casey, Baghaei, & Nand, 2014). However, the complex nature of GBL is not well-structured (Djelil et al., 2014).

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