Establishing an Educational Game Development Model: 
From the Experience of Teaching Search Engine Optimization

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ABSTRACT
This article describes how different literatures have suggested the positive role of educational games in students’ learning, but it can be hard to find an existing game for student learning. Some lecturers may try to develop a game for their courses, but there were not many effective models for educational board game development. The authors have formed a team for developing a game with the purpose of teaching Search Engine Optimization (SEO) in an undergraduate course, and observed the design meetings and the game trial sessions. They have developed a spiral educational game development model based on the observation and the game deliverable, and have provided other suggestions for developing educational games based on the students’ and designers’ feedback.

KEYWORDS
Board Game, Case Study, e-Marketing, Game-Based Learning, Information Systems Education, Serious Game Development Model, Serious Games Design

INTRODUCTION
Previous literatures have confirmed the role of games in learning processes, but they have not adequately addressed the steps taken to develop, design, pilot and track efficacy of educational games. Inexperienced teachers may find it difficult to develop a suitable game for their courses (Wu, 2015). On the other hand, the need for establishing a science of Game-Based Learning (GBL) was emphasized by some scholars (Sanchez, Cannon-Bowers, & Bowers, 2010). The existing literatures on educational game development mostly focused on the elements to be included in the game at a high level. However, there is less discussion on the actual development processes, design tradeoff, and implementation issues.

We have developed an educational game related to SEO with the assistance from some postgraduate students as game designers. The game was played by a group of undergraduate students in a digital marketing course. A post-game survey was conducted to collect the student’s feedback on the game based learning process. Based on our post-game interview with the designer leader, our observations of the game design meetings and feedback from the students, we have established our educational game development model.

The role of educational game in teaching information Systems (I.S.) courses has been highlighted by previous studies and educational games were used in the teaching and learning of different I.S. sub-
disciplines such as project management, digital marketing, knowledge management and Information Security (Lui & Au, 2017; Au, Fung and Xu, 2016, Lui and Kong, 2017, Lui, Lee and Ng, 2015; Lui et. al., 2015). As an important component in digital marketing, SEO is a suitable context for the study of game-based learning and establishment of the educational game development model.

This paper is structured as follows. After the introduction and research value, we will present our literature review, followed the explanation of the research methodology and presentation of the game. We will then show our results, which will be the foundation of establishing our game development model and other suggestions for developing educational games in the next section. After that, we will conclude and suggest future research directions.

**RESEARCH VALUE**

Our model will contribute to the science of game-based learning, by providing a comprehensive process model for developing educational game (Annetta, 2010), in response to the complexity and time required for developing these games (Felicia, 2013). Previous literatures about educational game development were more related to the elements to be included. Our model focuses more on the educational game development from the developers’ perspective with more details on the development issues and processes. Future educational game developers may adopt our model to enhance the development process and learning outcomes.

**LITERATURE REVIEW**

**Game-Based Learning and Educational Game Development Methodology**

The advantages of game-based learning include promoting engagement, learning attitudes, and communication skills (Sprengel, 1994). Additional advantages include enhancing the understanding of some critical concepts (Ganesh, 2014), as well as filling up the teaching gap in school (Crockett, 2015). Its advantages are particularly highlighted in fields which require multi-disciplinary knowledge and connection between theories and reality (Fukuchi, Offutt, Sacks, & Mann, 2000; Hall, 2014) such as Information Systems (Au, Fung, & Xu, 2016). However, the existing educational games may not always fit the curriculum well. As a result, teachers may need to create their own game from scratch (Bazil, 2012).

The development of educational games may begin with the purpose and objective, followed by the game idea, hardware design and software design. (Hussain, et al., 2010; Bazil, 2012). Different sources, such as case studies, class exercises and theoretical models, may provide the game ideas. Based on these ideas, developers may determine the game structure and coverage of concepts and theories (Hussain, et al., 2010; McDaniel, Fiore, & Nicholson, 2010). Rather than starting with a complex mechanism, the development should begin with a simple game design, followed by expansion of the game idea. Economic calculations in the game, if any, may be simplified, but realistic proportions should be maintained (Bazil, 2012).

**Elements and Features of Educational Game**

The gaming elements to be considered along the developmental process (game purpose, idea, hard and software) include game system, abstraction of concepts and reality, goals, rules, engagement, reward structures, the curve of interest, progression, storytelling, investment, fulfillment and replay (Freeman & Freeman, 2013; Hussain, et al., 2010). Some common gaming features in educational games are shown in Table 1.
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