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Enhancing Information Lliteracy in Hong Kong Higher Education through Game-based Learning

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Abstract: *With such advantages as being fun, effective and interactive, game-based learning has become a new trend in education field. In the course Web Intelligence (INT 4029), one of the major difficulties for students to complete the assignment and to meet the achievement of the expected learning outcome is the lack of information literacy skills. To facilitate the development of students' information literacy, the present research developed a game based on an online role-playing platform called MEGA World. Twenty students participated in the project. Pre-questionnaire and post-questionnaire surveys were conducted to collect data concerning the students' attitudes towards the game-based learning experience. The results showed that students believed that game-based learning effectively facilitated the development of their information literacy.*

Keywords: game-based learning, information literacy, MEGA World

1. Introduction

As an important factor of improving students' learning performance, game-based learning has been recognized as an effective approach in stimulating students' learning motivation and enhancing students' interaction (Chen & Hwang, 2014; Chen & Huang, 2013). The nature of game-based learning is to deliver knowledge via game, which has a greater motivation potential than other media (Lin et al, 2012), thereby increasing children's desire to learn. Thus, a well-designed game-based learning can enhance students' learning attitude (Prensky, 2003; Lin & Liu, 2009; Papastergiou, 2009). Nowadays, various disciplines, such as English, mathematics, computer science and so on, have adopted digital games as media of teaching (Lin et al, 2012). Nevertheless, few studies have been conducted in information literacy education.

Information literacy, a catalyst for educational change, is inextricably associated with information practices and critical thinking in the information and communication technology environment (Bruce, 2002). With it, special challenges in searching, evaluating, understanding and using information effectively were posed.

One of the main expected learning outcomes of the course Web Intelligence (INT 4029) is to apply web intelligence in the real-world situations. To assess students' achievements in this respect, the group project requires students to obtain a deep understanding of recent developments of web intelligent techniques (e.g., decision trees, neural networks, support vector machines, etc.), and to master basic skills on how to search, read and evaluate research articles on web intelligent techniques. All these need information literacy,however, there is no specific course material that is particularly designed to meet such needs. The project, therefore, aims to fill this gap by developing a multimedia courseware to help students

master the essential knowledge and skills concerning search information, distinguish relevant and irrelevant information, evaluate and analyze information, and make use of appropriate information to complete group assignments.

2. Method

In this project, we designed a game on enhancing information literacy, in which twenty students participated. The game was built on a web-based online platform called MEGA World (Chang & Kinshuk, 2010). Chang and Kinshuk (2010) stated that, for the game to be fun, the avatar and the game world should look like a game rather than a learning environment. To make the learning progress entertaining, we set up a scenario with an interesting preface:

The narrative starts with a conditional offer of ultra-Ph.D. degree from Hogwarts School of Witchcraft and Wizardry, well-known as Hogwarts, which asks you to go to Eduwarts to learn magic literacy. The magic literacy means the ability to identify, locate, evaluate, and effectively apply that magic skills for problem solving.

The preface adapts an analogy of famous movie series to excite students' interests and to help them understand the game. Under this scenario, we created 3 worlds hierarchically； Eduwarts I, Eduwarts II and Eduwarts III, and in which player will be certificated as Bachelor of Summoner, Master of Summoner, and Ph.D. of Summoner respectively.

In each map, there is a campus named Eduwarts where players can learn the teaching materials, a Summoner's Canyon where players can complete tests after learning of the materials (Figure 1 shows two parts of the map).

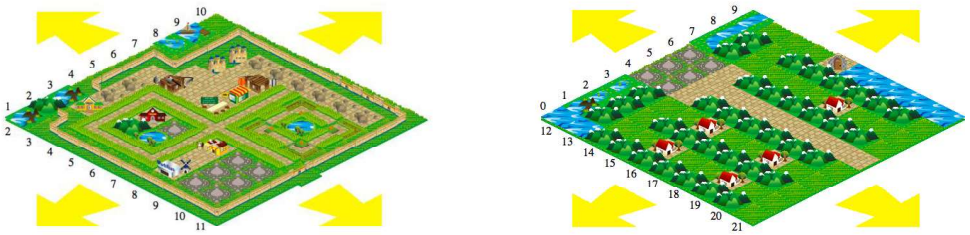
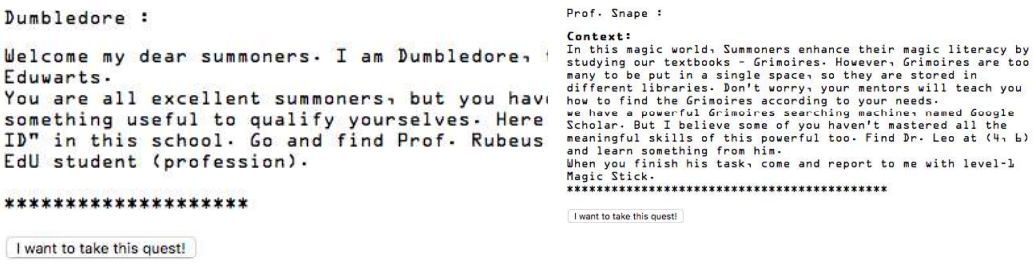


Figure 1. The map of the Campus (left) and Canyon (right)

The MEGA World provides 5 options of quests making: greeting quest, delivery quest, multiple-choice/true and false quest, fill-in-blank quest and coding quest (Chang and Kinshuk, 2010). In our project, we adapted 3 kinds of quests: greeting quest, delivery quest, and fill-in-blank quest. Greeting quests are used to guide players to designate area for coming up quests. An example of greeting quest is shown in Figure 2(a), where players are required to meet Prof. Rubeus (NPC) at (6, 6) to learn a new profession. The interactions between players and Dumbledore (NPC) build up the mainline of the game Extension quests are composed of visits to different mentors for learning and completing follow-up testing quests. To better connect the two quests, delivery quests are introduced. In Figure 2(b), an example of delivery quest is shown, where players need to complete an extension quest by visiting Dr. Leo (NPC) at (4, 6) and obtaining specific item (Level-1 Magic Stick) to report this quest. Fill-in-blank quests are embedded in the testing section of each extension quests . An example of a fill-in-blank quest is shown in Figures 3.



(a) (b)

Figure 2. Examples of the greeting quest and delivery quest.

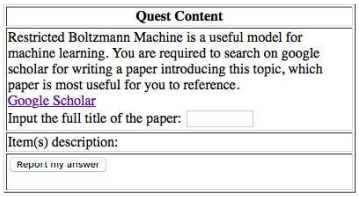


Figure 3. Example of the fill-in-blank quest.

We designed a 3-part course to deliver knowledge about finding academic papers by google scholar and library system of the Education University and professional academic databases (as Part 1); evaluating the quality of a paper by referencing the impact factor of the journal or conference that the paper is published (as Part 2); and learning courses on the Massive Open Online Course platform (MOOCs) (as Part 3). The three worlds of the game cover each part respectively. The testing questions are closely related to the learning materials. In case of students would not have time to read the materials, we rose the portion of instructions in the context of the questions. Players need to search and extract needed information following instructions.

To develop comprehensive materials for this project, we adopted contents from Education University library workshop, third party websites, and teaching materials of experienced scholars. Screen captures of how to use different platforms to search information are embedded in the PPTs to ensure the intuitive deliver of the knowledge.

A pre-questionnaire was conducted to evaluate students' past experience and their attitudes towards game-based learning. In the last section of the game playing, the students were also asked to complete a post-questionnaire which focuses on their learning experience, attitudes and perceptions of this game.

3. The pilot study and initial results

The preliminary results indicated that most of the students held positive attitudes towards the course and the game-based experience, and the majority agreed that game-based learning is a good way to learn knowledge.

Table 1. Students' evaluation of the game-based learning experience

Opinion	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
This course is meaningful	52.6%	26.3%	10.5%	10.5%	0.0%
It's worth to learn this course	47.4%	42.1%	10.5%	0.0%	0.0%
I prefer the courses with computer usage	42.1%	36.8%	21.1%	0.0%	0.0%

Game-based learning is a good way to learn	42.1%	21.1%	10.5%	15.8%	10.5%

However, due to the low participation rate, there are several limitations of this pilot study: (1) **Time limitation:** the game was open to use in late November, when Hong Kong students were under pressure of the final examinations; (2) **Not easy to play:** The complicated operations may be a bit confusing, which makes students focus too much on how to play rather than the learning material; (3) **Female students:** some female students commented the narrative of this game may not be that attractive and unfamiliar terminologies increased difficulties of the game.

4. Conclusion

In this project, we prepared learning materials and designed an online game to help students enhance information literacy. Key principles of searching, locating and evaluating information were taught during this project. According to participants' feedbacks, most of them found the delivered content useful. The results of two questionnaires showed that students were willing to learn through game-based learning approach, which was more interesting than learning through reading. However, some problems are identified during the implementation of the project, we therefore aim to further improve the design of the game to provide better user experience in the next phase of the research.

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