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GAME-BASED LEARNING IN SINGAPORE HIGHER EDUCATION – A PILOT STUDY

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Abstract

Today's IT-savvy students are accustomed to multi-tasking, graphics, fun, and fantasy. They are said to have short attention span. Educators are finding it challenging to engage and motivate students with the traditional mode of teaching. They are increasingly seeking to tap the potential of game-based learning to engage and motivate learners. Game-based learning is also catching on in schools and higher education in Asia. Universities in Singapore are beginning to explore new ways to engage students in learning. It will examine how game-based learning motivates and engages students and whether game-based learning is an effective instructional strategy for engaging students in higher education in Singapore.

Keywords

Educational Technology, Game-based Learning, Learning, Pedagogy

1. Introduction

“Good teaching is open to change: it involves constantly trying to find out what the effects of instruction are on learning, and modifying the instruction in the light of the evidence collected” (Ramsden, 2003, p. 102).

Educators in the 21st century are in the midst of a paradigm shift. They are recognizing the growing need to redesign pedagogical practices to engage the 21st century students, who are accustomed to multi-tasking, graphics, fun, fantasy, and the Internet, and are incredibly bored by the traditional mode of teaching (Jukes et al., 2010). Today’s students would prefer to construct their own learning, and gather information, tools, etc from multiple sources. They prefer technological and collaborative experiences that exhibit clear goals, enhance motivation, and involve authentic activities (Brown, 2000; Frand, 2000; Oblinger, 2003). In view of this, educators are increasingly seeking to tap the potential of game-based learning to engage and motivate learners.

This paper seeks to examine whether game-based learning is an effective instructional strategy for engaging students in higher education in Singapore. It will examine whether instructional games can stimulate student interest and boost their learning motivation. It will also examine what aspects of game-based learning are engaging to students in Singapore.

2. Literature Review

2.1 Engaging the Digital Generation

Student engagement has been a key focus of educational research as it is a key factor in effective learning and a predictor of learning development (Carina et al., 2006; Li, 2011; Mason, 2011; Wong & Li, 2011). Effective educational delivery consists in getting learners engaged in learning activities or the learning process. This is particularly important given today’s internet generation who are exposed to computer games, twitter, face book and other social networks. Recent research suggests that students who have grown up in a digital environment are neurologically different from the generation of baby boomers (Small & Vorgon, 2008). This is because the digital world offers a direct connection between the effort expended and the immediate reward received. In contrast, rewards in class are often deferred until formal assessments or examinations are conducted. Students find such distant or deferred rewards too

far in the future to motivate them to learn. Digital learners also prefer learning that is relevant, active, instantly useful and fun. To engage them, it is essential to present work in the form of games and game play.

Renowned psychiatrist, William Glasser, asserted that there is a strong connection between fun and learning. Glasser's Choice Theory identifies fun as a basic need that drives human behavior. Students learn best when they enjoy what they are being taught. They have a strong need to connect and have fun (Glaser, 1998). Strauss (2010), in an article in *The Washington Post*, noted that brain researchers have suggested that fun is required for authentic learning and long-term memory. Neurologist and educator Judy Willis highlighted the learning benefits of fun. She noted that when joy, comfort and spontaneity are replaced by homogeneity and conformity, students' brains are disengaged from effective information processing and long-term memory storage. The joy of learning and discovery is the well-spring for the highest-level of executive thinking, making of connections, and "aha" moments (Willis, 2006). In the educational context, computer games have been known to offer several benefits such as engage learners in learning environments, increase motivation, intensify retention of information, and improve problem-solving skills. In addition, computer games also allow groups of learners to share knowledge, skills, resources, and cooperate for solving problems (Chiong, 2010). In these aspects they are consistent with constructivist, situated learning and collaborative learning theories (Them & Tham, 2011). In these theories it is stressed that learning is an active social process in which meaning emerges from experiences while solving situated realistic problems.

2.2 Game-based learning

There are many definitions of game-based learning. For the purpose of this study, the author has adopted the definition of game-based learning used by Carson Learning Services (2006, page 1) namely "Game-based learning is the process of taking an idea and creating an activity to deliver that idea in a manner that is motivating, challenging and fun, and has a measurable learning objective as a foundation". Game-based learning tools would include digital games, simulations, educational videos (where students would watch the video and discuss answers to the questions), and in-class group competitive games such as quizzes and crossword puzzles.

According to Marc Prensky (2001), there are six key characteristics of games which lead

to strong engagement of students: rules; goals and objectives; outcomes and feedback; conflict/competition/challenge/opposition; interaction and representation or story. Computer games can be categorized as adventure games, simulation games, competition games, cooperation games, programming games, puzzle games, and business management games (Hogle, 1996).

2.3 Game-based Learning as an Instructional Strategy in Asia

Some universities around the globe are beginning to utilize game-based learning to motivate students. This is evidenced in the recent work of Ebner & Hollinger (2007); Virvou & Katsionis (2004), where competitive games and virtual reality games were used to support the learning and practice of civil engineering, and geography, respectively.

Game-based learning is also catching on in schools and institutes of higher education in Asia. A study conducted by Zhi Han and Zhang Zhenhong (2008) on a large university in Nankai, China, showed that students learnt more from quasi-game-based learning than from purely face-to-face classroom instruction. The study involved 150 third-year undergraduate computer majors (aged between 19 to 22) enrolled in the Software Engineering course at Nankai University.

In Singapore, however, the use of game-based learning as an instructional strategy to engage students is largely confined to schools. Two recent studies by Chee & Lee (2009) as well as Gwee et al., (2010), showed the effectiveness of game-based learning in engage students aged 14 to 15 years in deeper learning. Chee & Lee (2009) noted that the use of well-designed game-based learning promoted learning and the acquisition of problem-solving skills and collaborative knowledge building skills among students.

However, universities in Singapore are beginning to explore new ways to engage students in learning. Three large local universities, National University of Singapore; Nan yang Technological University and Singapore Management University have introduced the use of the clicker (a hand-held palm-sized device) in their weekly graded lecture quizzes (Lei, 2011). Multiple choice quizzes are flashed on a screen and students will select the answer using their individual clickers. Lecturers noted that the clickers encourage students to become more involved during lessons. Students felt they were playing a game. One lecturer said that students found the lessons to be more fun with the clicker. The use of the clicker in lecture quizzes

incorporates two essential elements of games in education which motivate student learning, namely, “making learning fun” and “learning through doing” (Kirriemuir & McFarlane, 2004, p. 10).

3. Method

3.1 Qualitative study

3.1.1 Background

The researcher taught a course at an institute of higher learning in Singapore. The course was on the Contemporary Issues in IT. The researcher was informed that previous cohorts who studied this course have found the lectures boring and consequently class attendance was poor. The course was structured around lectures using power point slides. Against this backdrop, the researcher decided to introduce game-based learning to trigger student interest in the subject, to boost class attendance and ultimately to achieve good learning outcome.

3.1.2 Method

To engage the students, the instructor introduced game-based learning using a blend of multimedia tools such as educational videos (where students watch the video and discuss answers to the questions) to facilitate understanding of concepts taught, as well as team competition in solving quizzes, puzzles and games requiring students to search for information using internet sources. The games usually last about half an hour and are intended to engage students in the subject taught, enhance retention of information, as well as improve problem-solving and team skills. Scores are awarded to each team and the winning team is awarded a mystery prize. Before the game-based learning session, students were briefed on the goals and rules of the game.

A focus group interview was conducted at the end of the course. The focus group interview was conducted with a group of 36 young adult Singaporean full-time students aged between 20 to 25 years enrolled at an institute of higher learning in Singapore. These Year 3 students comprised 11 females and 25 males. They were from the same class and familiar with each other.

The following questions were posed to the focus group:-

- Did you enjoy the game-based learning introduced in this course? Please provide reasons

for your reply.

- Which aspect of game-based learning do you find most effective in engaging your interest: challenge, fun, or reward?
- Has the game-based learning trigger your interest in the subject taught?
- Does game-based learning motivate you to engage in self-regulated learning?

Apart from game-based learning, what other factors would motivate you to study and do well in this course?

4. Findings

The focus group interview showed positive results. Twenty-two of the 36 students said they enjoyed the game-based learning. They like being involved in finding their own answers and learning from peers during group discussions. They felt that the instructional games provided an enjoyable learning experience compared to merely and taking notes during a lecture. Four students however felt that the games did not affect their motivation to study the course. They said that achieving good grades for the course was the key motivator. They would be attentive in class even in the absence of games. As for which aspects of game-based learning was most engaging, all students agreed that it was the team work, inter-team competition, instructor feedback and recognition which motivated them most. They deemed game-based learning enjoyable in that it connected them with other students socially and provided a new non-stressful environment for learning. Students enjoyed the collaborative team work in solving puzzles and quizzes as it gave them a higher sense of social belonging.

The game-based learning approach acted as a good trigger in getting students interested in the lessons. Students felt that the use of games stimulated their interest in the subject. Active participation in games and related activities reinforced their learning and helped sustain their interest in a “boring” subject. The outcome was good class attendance throughout the 13 week course. Students said they look forward to the class.

Students felt that the 30-minute game session was sufficient as an interest trigger. It would however not affect their motivation to engage in self-regulated learning, which is determined more by the need to achieve good academic results to enhance their future career prospects. Apart from games, students said that their personal aspirations and ambitions play a

vital role in motivating them to study hard. Some students mentioned that gaining their parents' approval and recognition were the most important factors motivating them to study and perform well academically.

4.1 Discussion

This paper seeks to examine whether instructional games can stimulate student interest and boost their learning motivation and identify aspects of game-based learning which are engaging to students. One major finding of this research is that competition or challenge plays a major role in making instructional games enjoyable (Csikszentmihalyi, 1990) and motivating (Malone, 1981; Malone & Lepper, 1987). Our instructional games required students to interact and compete as a team. The competitive element created a lively atmosphere in class- there was enthusiasm, attentiveness and excitement among students. This friendly, lively atmosphere and the rapport built set the right mood for the instructor to introduce the subject at the end of the game session. Students said that the recognition gained in winning the game enhanced cooperation within their teams. The findings of this research are in line with the observations of Malone & Lepper (1987) that games appear to strongly motivate players to engage in problem solving and critical thinking, due to three interpersonal motivating factors: cooperation, competition and recognition. Learners would be much more highly motivated if the success of independent tasks (highly desired) would be dependent on the efforts of group members. Endogenous competition and recognition are also strong motivators in fostering learning.

In our study, students found the instructional games beneficial as they were able to garner new information or knowledge. The game-based learning was scaffolded by instructor guidance, support and feedback. Students also expressed that the briefing, clear learning goals and pitching the games at the right level is not too difficult to attempt were important. Debriefing and feedback from the instructor at the end of each game session were valuable. They could learn from their mistakes and gain new knowledge through the instructional games. It was not playing games for the sake of fun alone. The importance of instructional support and debriefing is also discussed by de Jong & van Joolingen (1998); Crook all (1992); Garris et al., (2002). Debriefing and feedback give the learners the opportunity to reflect on their experience with the game and understand how this experience supported the instructional objectives of the course or program of instruction.

4.2 Conclusion

This study showed that game-based learning can be used as a transformative pedagogy to motivate students to engage in learning at a deep, personal level (Chee & Lee, 2009). It is however, important to ensure that instructional games embody sound educational principles and offer learners an experiential, immersive, and engaging, problem-based learning experience. As noted by Oblinger (2006), games carry an enormous potential to create immersive, experiential learning environments, draw students into a project, and enhance their capabilities in information processing, decision making, knowledge application, problem solving and group collaboration. Ignoring the educational power of games dismisses a potential valuable learning tool. Game-based learning can be a useful learning resource to initiate and/or sustain a learning process.

One limitation of this study is that learning gains were not measured. While students were able to provide the right answers during the game-based learning, the degree of learning was not established. In addition, the findings of this study are based on one group of students in a tertiary institute in Singapore, future study involving a larger cohort of undergraduates from different universities in Singapore would provide a more conclusive study on whether game-based learning is an effective instructional strategy to engage and motivate students in learning. Future work is also needed to examine which instructional design aspects of game-based learning motivate students to engage in deep, personal learning.

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