Game-Based Learning at the University Level

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During the last week of July (2011)--in association with the University of Economics and Finance (UEF), Ho Chi Minh City, Vietnam--I assisted a colleague who delivered a workshop on the methods and techniques of teaching at a multi-disciplined university. This week-long workshop was very competently organized by UEF administrators and staff and was well attended by UEF adjunct and full-time instructors. The presentations were quite comprehensive and covered the basic elements of instruction that would be encountered by university professors and instructors at a typical American campus. Even though the information was presented from a perspective associated with higher education in the U.S., the ensuing discussion focused on the instructional challenges inherent within the typical university classroom in Vietnam.

Due to the time limitations associated with workshops of this type, not all of the questions from the participants were able to be specifically addressed. There were numerous questions which throughout the workshop served as opportunities to provide generalizable responses that were applicable to most in attendance. Perhaps the most repeated question or series of questions which attracted the attention of the participants was how can instructors motivate students to learn. Subset inquiries following the general theme of the motivation question focused on instructional tools that would both entertain and teach, and perhaps make the classroom learning experience fun.

Fun and its associated term play, are not often used in the same sentence with words such as

"The freedoms of play are present even in mediocre games, yet they are all too rare in school." (Klopfer, Osterweil, and Salen, 2009)

learning and classroom. Yet fun and play are motivating factors as to why adults spend countless hours learning games such as golf, poker and tennis. The question begs to be asked, if fun and play stimulate the learning of non-academic subjects then why aren't they welcomed around academic subjects? The likely response to this question is because a university education is a

serious enterprise, and learning is primarily hard work.

It is true, learning is often hard work. I am trying to learn Vietnamese and it is very difficult to advance without painstaking effort. But even though I understand the commitment that I must make to be conversant in Vietnamese, I am also looking for language applications to install on my iPad that will make my learning process a bit more fun and a little less tedious. With technology now able to satisfy individualized learning needs--an ever increasing number of learners (like myself) will be expecting ever greater connections between technology, learning and play. UEF students in the near future will become much more comfortable learning with technology and perhaps will even look to the university for

a meaningful balance between serious learning, technologically-enhanced instruction and play.

In the past few years educational researchers, educational technologists, curriculum developers and cognitive scientists have been intently investigating the use of fun and play in the form of games as a means to promote learning. Many of these educational experts have taken the concept even further and believe that fun is an important factor in education from "which relaxation and motivation can appear in the learning process: while motivation fosters student's effort without resentment, relaxation enables learners to understand things more easily" (Mirela, Padros, Ariadna, and Romero, July, 2011). The relationship between play and serious games is considered to be a worthy area of research and study because of the educational benefits which result from the association.

In 2008 the term Serious Games was advanced as a means to distinguish between games for pure entertainment versus games for learning. "The focus of the Serious Games movement is most commonly associated with what may best be described as 'Games for Training'. Serious Games were initially conceived as being designed to train people for tasks in particular jobs" (Klopfer, Osterweil, and Salen, 2009). For example, many medical schools use game simulations to train future practitioners on the delicate aspects of patient care. Other industries such those involved in computer security often use computer-based simulation games to train prospective employees on how to follow the trail of computer hackers.

Serious Games, which can also be referred to as Game-Based Learning (GBL), has spread from the training rooms of business and industry to the challenges of the university classroom. GBL, in the classroom context, is "defined as a form of student-centered learning that uses electronic games and simulations for educational purposes" (Mirela, Padros, and Romero, July, 2011). GBL, by design, can also consist of traditional face-to-face classroom games in addition to the more contemporary digital/computer games. But in reality the future of GBL, particularly as a motivational learning tool, resides in the realm of digital educational game development.

The value of GBL is vested in its ability to enhance the learning process of the university student. Students now entering UEF and

other universities in Vietnam are quite adept at using the latest digital electronics for communication and entertainment. They have become dependent upon the immediacy of the medium and their expectations for timely feedback have been associated with other aspects of their non-digital life--these expectations have also extended into the classroom. "There is credible research that suggests that today's students have a different learning style, enabled by gaming" (Hetzner, Pannese, Pappa, and Protopsaltis, July, 2011). University educators are still discovering how this new learning style will respond to traditional classroom instruction. But with the assistance of GBL, teachers may be able to understand how to connect with the learning patterns of their digitally-stimulated students.

Even considering that current undergraduate university students may be forming new learning styles through their use of digital technology and communication, it is important to note that GBL also reinforces some very traditional and effective learning techniques. "In Game-Based Learning making a mistake - or trial and error - is a primary way to learn and some consider it to be the motivation for players to keep on trying. In games, we learn through failure and consequence and feedback is provided in the form of action (as opposed to feedback in the form of the text explanation that is provided in instructional material)" (Pivec, 2011). Trial and error, also known as learning from one's mistakes, is an interactive learning technique where failure is viewed as a valuable form of feedback. In a GBL environment students are expected to work towards a goal, often with a win or lose outcome which stimulates their

play and often results in learning. Students will "make mistakes in a risk-free setting, and through experimentation, they actively learn and practice the right way to do things. This keeps them highly engaged in practicing behaviors and thought processes that can easily transfer from the simulated environment to real life" (Trybus, 2009). Game-induced stress minus any real-world negative consequences seems to have a stimulative effect upon students' efforts to continuously recommit to learning irregardless their temporary moments of failure.

An educational game that is to be considered stimulative and motivational should challenge "learners to become personally involved with playing it in an emotional and cognitive way. By engaging in a dual level, their attention and motivation is increased and that assists their learning"

(Hetzner, Pannese, Pappa, and Protopsaltis, July, 2011). Student motivation in the learning process is not an automatic occurrence nor is it easily attainable. This understanding was well expressed by many UEF faculty and instructors during the discussion periods of the July 2011 University Development Workshop.

Student motivation may be reason enough for some educators to use GBL in the classroom, especially considering that there may be associated gains in student achievement. What is significant about GBL is the understanding that in addition to motivation there are other notable attributes which are even more academically and personally beneficial for the student. Educational researcher Patricia Marks Greenfield believes that based upon her studies, new cognitive abilities that are important in 21st century life are developed through the use/play of video games. Some of these cognitive abilities include, (Groff, Haas, Klopfer, and Osterweil, 2009)

- The ability to process information very quickly;

- The ability to determine what is and is not of relevance to them;

- The ability to process information in parallel, at the same time and from a range of different sources;

- Familiarity with exploring information in a non-linear fashion;

- A tendency to access information in the first instance through imagery and then use text to clarify, expand and explore;

- Familiarity with non-geographically bounded networks of communication and;

- A relaxed approach to 'play' the capacity to experiment with one's surroundings as a form of problem solving.

Competencies which are specifically related to student use of GBL include improved skills in interpersonal and group communication, teamwork and collaboration, problem solving, decision making, debate and critical thinking. Following are several quotes from educational researchers who verify that use of GBL can indeed assist students in the development of high-level cognitive abilities.

"Computer games can help players to think critically when they are required to construct connections between virtual and real life" (Koskinen, Pivec, and Tarin, 2011).

"Researchers found out that collaborative decision making games are good training tools not just for business-major college students but also for corporate managers." (Mirela, Padros, and Romero, July, 2011).

"Serious Games offer learning experiences that engage users and, through the use of novel pedagogic approaches assists in developing higher levels of cognitive thinking." (Hetzner, Pannese, Pappa, and Protopsaltis, July, 2011).

Using GBL to help develop needed workplace competencies such as group communication, collaboration and problem-solving is a worthwhile consequence. But if a UEF classroom teacher decides to use a GBL program as an instructional augmentation, that decision will likely be due to more short-term outcomes--helping

students to meet the learning objectives of the course.

The initial reason to incorporate GBL in the classroom "is to help engage students with complex material and processes" within the subject area of the course, "not to pretend that they are 'having a break' from the hard business of their education" (Pivec, 2011). The process of "creating authentic learning experiences is perhaps the most critical aspect and benefit to digital games and simulations-- bridging the all-too-well-known gap between the classroom and the real world" (Groff, Haas, Klopfer, and Osterweil, 2009). Each game within the GBL context should provide the teacher with "materials that help relate the student's game experience to existing curricula" (Klopfer, Osterweil, and Salen, 2009). Games, while very effective in many aspects of the learning process, are not a replacement for the required rigors of study.

Most academic subjects will involve a degree of menial work and even some amount of rote memorization as a part of the instructional process. But games should NOT be involved with that aspect of instruction. If GBL were to become associated with the mere toil of learning it loses its power of play "and ceases accessing those creative impulses so fundamental to play" (Klopfer, Osterweil, and Salen, 2009). An appropriate game for a course of instruction should, as previously noted, motivate students to discover a deeper understanding of the content. And even though GBL is not to be viewed as a substitute for well designed curriculum, a game "can help many students advance beyond

the temporary memorization of facts and procedures" (Klopfer, Osterweil, and Salen, 2009).

A challenge may be in getting teachers comfortable with using GBL because of their lack of experience in the use of gaming even for personal entertainment. Recent research by Futurelab indicates that "teachers just don't know enough about the learning potential within games"(Royle, 2009). This study also noted that "42% of teachers never play computer games for their own leisure; 34% play at least once a month or more frequently. The fact that over 40% never play games at all is likely to be a contributing factor to the lack of knowledge and skills in gaming often cited as a key reason for teachers not to use games in schools" (Royle, 2009). There may be other reasons besides a lack of gaming experience why teachers would decline the use of GBL in the classroom. Some teachers may feel that GBL is an intrusion upon the required discipline of the classroom. And other teachers may acknowledge the benefits of using GBL but are unable to comfortably incorporate games into the course curriculum.

As a preliminary step for reluctant teachers it may be advisable to first explore the applications of non-digital GBL and learn how to incorporate its use in course lesson plans. Teacher reluctance to work with digital GBL is understandable and any hesitation to participate should be respected. The use of digital games in the classroom may not be universally accepted and its use could be phased in as teacher training and technology comfort levels improve. Just as there will

be reluctant teachers there will also be 'first users'. These 'first users', through their own system of trial and error, will develop the institutional knowledge that will be vital in broadening the appeal and application of GBL.

Considering the current state of GBL development throughout the world, there will likely be a delay in having access to open source games in Vietnamese. Vietnamese language GBL may require some level of UEF enterprise rather than waiting for games to hit the educational market. With the continued availability of new and improved open source authoring systems and other GBL development tools, it is feasible that talented UEF faculty could design games specific to their instructional purposes. A little technical talent, a curricular purpose and a dose of creativity could result in some effectively produced GBL.

The majority of GBL resources, whether they are commercial or open source, are generally directed to younger learning audiences and are overwhelmingly in English. The GBL resources which would be most applicable for higher education are fewer in number but still significant in construct and design. UEF teachers may determine that even a limited use of GBL in the classroom could provide a minimal motivating influence among their students. Following is a sample listing of open source games which may be of interest to teachers of certain academic disciplines.

Problems and Programmers. This is the only non-digital GBL mentioned in this listing. Problems and Programmers is an open source

card game "intended to simulate the software development process from conception to completion. The instructions and materials needed to make a copy of the card game (including 120 unique cards) can be found at http://www. problemsandprogrammers.com/ downloads.html.

SimSE. An open source game produced by the University of California, Irvine.

"SimSE allows students to practice a virtual software engineering process in a fully graphical, interactive, and fun setting in which direct, graphical feedback enables them to learn the complex cause and effect relationships underlying the processes of software engineering."

h t t p : / / w w w . i c s . u c i . edu/~emilyo/SimSE/downloads. html

Lure of the Labyrinth. This game was originally developed for middle school pre-algebra students but because the game gives students a chance to think like a mathematician it could be used for short-term instruction in a basic collegiate math course. "It includes a wealth of intriguing math-based puzzles wrapped into an exciting narrative game in which students work to find their lost pet.

http://labyrinth.thinkport.org/ www/index.php

Gamestar Mechanic. This product is the result of a collaboration between the University of Wisconsin-Madison and Gamelab. "It teaches students about game design by asking them to develop hypotheses for their designs, implement and test those designs while simultaneously describing and defending their designs to

their teammates, becoming socio-technical engineers."

http://gamestarmechanic.com/

Free Rice. This game is very simple in its production but quite clever in its application. It allows for personal or group competition for those who are able to advance through the 60 levels of vocabulary in the game. As one progresses up the levels he/she is also earning rice for donation to the United Nations World Food Program. This would be an excellent game for ESL students at UEF or other Vietnam universities who want to improve their English vocabulary in a simple yet fun setting. It seems too easy at the start but by the time one progresses toward the 40th levels--even native English speakers will feel challenged.

www.freerice.com

INNOV8. This is a team-based simulation game that has been produced by IBM but has been successfully used as a teaching tool by major universities such as the University of Southern California. The game "gives both

IT and business players a better understanding of how effective Business Process Management impacts an entire business ecosystem."

http://www-01.ibm.com/software/solutions/soa/innov8/index.html

IT Manager 3: Unseen Forces. In this game "you play the IT manager of a small company with global ambitions. Part of your job is ensuring that everybody's desktop PCs, laptops and servers keep running smoothly. A huge number of things can--and will--go wrong. This is produced and offered free by Intel. (However you will need to sign in for access.)

http://itmanager3.intel.com/en-us/default.aspx

Better Business Choices. This game was produced by British Telecom and it is a simulation game "about managing social and environmental issues in a business. The player takes on the role of corporate CEO. The game's contents are drawn from general business dilemmas across all

industries."

http://www.btplc.com/Responsiblebusiness/Ourstory/Interactivegames/BetterBusinessChoices/index.htm

Alice. This is "an educational software that teaches students computer programming in a 3D environment. It is used in 10% or all US universities and has been downloaded by several high schools and universities in Vietnam. This program was conceived and developed by Carnegie Mellon University.

http://www.alice.org/index.php?page=what_is_alice/what_is_alice

Molecular Workbench. "MW provides, visual, interactive computational experiments for teaching and learning science. While it presents many existing simulations that are ready to use in the classroom, it is, however, also a modeling tool for teachers and students to create their own simulations and share them with collaborators."

http://mw.concord.org/

modeler/

The above listing of available GBL games is merely a sampling of what is currently available for use in the university classroom. The popularity of GBL and the desire to bring back fun and play into the learning process is resulting in an increase of game production. The Bill & Melinda Gates Foundation has recently (April 27, 2011) pledged $20 million (USD) to support new GBL applications in the disciplines of math, English and science.

The majority of attention is still being given to the integration of GBL in the K-12 classroom, but many universities such as Carnegie Mellon, MIT, Stanford and the IT University of Copenhagen as well as educational consortiums in Europe, such as LUDUS, are working to broaden the reach and appeal of GBL. As more and more K-12 classrooms begin to incorporate GBL into the curriculum of instruction there will be a generation of students who will eventually enter higher education with a fundamental knowledge of GBL and an expectation for its use on the university campus. What will eventually be needed at the university level are increasing numbers of teachers who have the interest and the creativity to appropriately use GBL in the classroom. The learning assistance provided by GBL--increased creativity at play and motivation to participate and study--equips university teachers with an additional tool to support the learning needs of their students●

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