

The Challenges & Potential of Educational Gaming in Higher Education

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Abstract

Educational gaming is increasingly being hyped as the next big thing in eLearning both for the higher education and corporate sectors. Digital gaming has been a great success story both in the entertainment and military industries over the last few decades, and has today evolved into a multi-billion dollar industry. Digital games are increasingly being used as a learning tool in the kindergarten, primary, and even secondary schools. Educators in higher education have also been exploring the potential of using gaming as a learning tool in recent years, embedding games into courseware and developing games such as Virtual U. However, before we get too excited about this ongoing educational gaming revolution we should seriously reflect and understand what we are getting into, before investing huge sums and realizing our educational games could end up being nothing more than impressive 3D immersive multi-player gaming environments without much learning taking place in relation to the learning objectives, outcomes, and expectations we originally set out to achieve. This paper will reflect briefly the current educational gaming scenario in higher education, and examine its potential value in facilitating a more motivating, engaging, challenging, collaborative and social learning environment for students. It will also look at the implementation challenges faced in terms of developing games, expertise, cost, pedagogy, and

motivating educators to use games in their courses. Finally, it will briefly highlight two educational gaming projects undertaken at UNITAR to enable even non-IT savvy educators to develop their own games. This paper is especially useful for those higher education institutions planning to or venturing into educational gaming.

1. Introduction

The digital gaming industry has been a great success story both in the entertainment and military industries over the last two decades, and has today evolved into a multi-billion dollar industry (18-25 billion US dollars), which exceeds that of the US movie industry (Kirriemuir, 2002). For example, by the time the current generation of college students graduate in US, virtually all of them will have had some kind of experience with digital games. Digital games have increasingly become a cultural and social force (Oblinger, D., 2003).

Although, universities have been researching and developing digital games for many years, games have yet to have a major impact on the teaching and learning methods. Though, this might change significantly as the Internet, computer, and gaming technologies are evolving at a tremendous pace. Actually, many today believe that educational gaming is going to be the next big thing in eLearning. According to the Horizon Report (2005), educational gaming will see significant adoptions in universities within two to three years. Especially exciting

is mobile gaming and the prospect (reality for some already) of students playing games on their mobile phones and PDAs, and learning anything from languages to nuclear sciences.

In this paper we will not focus so much on the gaming technologies, but more on the non-technological, human, and pedagogical issues that need to be dealt with and reflected, such as the challenges educators might face embedding games into the course curriculum, and the benefits and values games can have to facilitate the learning process, and make it more enjoyable and engaging.

2. Current Scenario & Challenges

Until recently, not many educators in the tertiary sector thought of gaming as a revolutionary method to facilitate the learning process. For example, Joel Foreman (2003) argues that despite waves of IT-driven transformation sweeping through the higher education system, many obsolete academic structures remain obdurately intact. He argues further that the “most worthy of change” is the large lectures such as those found typically in undergraduate introductory courses, which mainly exist because they are cheap and pragmatically useful. He envisions that someday they will be replaced by the kind of immersive 3-D digital environments that have been popularized by the videogame industry, such as EverQuest, in which hundreds of thousands of players can simultaneously interact in graphically rendered immersive worlds (Paavilainen, J., 2004). In other words, students can enter and explore a screen-based simulated world and learn, which some might argue, is the next best thing to reality.

Virtual U is one example of an educational game success story, which is used as a critical higher education administration-teaching tool, and to date it is used in over 800 institutions in over 90

countries. It was conceived way back in 1997 and cost more than one million (US Dollars) to create, and today is used in courses in many colleges and universities, including Harvard, George Washington University, Stanford, New York University, and University of Virginia.

However, Joel Foreman (2003) argues further that Virtual U does not use leading edge game technology; although it is considered one of the most sophisticated digital games for higher education.

According to him, a good example of a game that uses leading edge technology is the infamous Grand Theft Auto 3, which provides an immersive 3-D gaming environment. Overall, creating educational 3-D immersive gaming environments with current technologies and methods would require huge investments, skilled manpower, and time beyond most educational institutions budgets and competency levels. To make this a success it would require educational institutions to collaborate, and perhaps create alliances with the corporate and government sectors.

The easiest way to get started with educational gaming though is to explore freely available games (check the “Social Impact Games” site), and see if any are suitable for your course. Another alternative would be to invest in existing off-the-shelf digital games (e.g. Civilization III, Rise of Nations, Revolution, and SimsCity IV) already on the market and relate them to individual courses (Squire & Jenkins, 2002). Otherwise, you could always initiate games with a bit of creativity using common online tools many educators today have access to and use, such as the e-mail and online forum.

There have been some arguments that most educational games have failed, however, this problem could actually have more to do with the quality of the games used than the usage of games to enhance the students’ learning environment. As there are bad lecturers, so you will have

bad games (Squire & Jenkins, 2002).

According to Dr. Dan Lim (2003), there are ten (10) criteria “that will help learning games become sustainable and attractive to educators and trainers:

1. Contains substantial amount of learning content
2. Draws learners toward the learning content (not distracting)
3. Engages learners to spend hours “playing” with the learning content
4. Balances between easy and difficult learning content
5. Maintains learners’ interest and motivation throughout the gaming experience
6. Uses compelling visuals and motion graphics to enhance user experience
7. Allows educators and trainers quick and easy design options to create games
8. Integrates with other learning management systems to record and/or track learners’ progress
9. Allows a variety of gaming objects to retrieve and deliver the same content from one source
10. Delivers games in multiple platforms - web-based, PDA, standalone, etc.

Dr. Lim’s own Flash learning games project has shown that games can enhance learning in a curriculum driven course. Dr. Lim’s research findings indicate that it can strengthen technology integration into the curriculum, and has had a positive impact on learning, grades, self-learning and retention. In addition, it has made learning more fun and difficult content easier to learn. Finally, he noted that a majority of those using the games did better in tests, and there was an overwhelming response recommending games for all courses.

In addition to these two major educational gaming initiatives, there are increasingly more educational gaming stories evolving, which include a growing trend to

embed gaming or simulation elements into courseware and online courses (e.g. business, problem-solving, role-play, Web Quest, and puzzle games).

Having said that there are still many challenges ahead before educational gaming can become a learning approach of choice for tertiary courses. The biggest challenge is perhaps the task of convincing older professors and lecturers of its value and potential. Other challenges include creating games (if needed) suitable for the courses. If you are planning to embed some simple quiz like games such as Jeopardy, tools like StudyMate and Knowledge Director are useful options. Though, if you are planning to incorporate business simulations, or 3D immersive tailored games to course objectives and outcomes, you would certainly need to invest reasonably in tools, manpower and expertise to ensure quality. The good news is that there is a growing new breadth of user-friendly authoring tools that can enable you to do some really exciting stuff (e.g. Second Life, Experience Builders, Captivate and Rapid Builder).

Assume you have succeeded to embed some meaningful games into your course curriculum, you still have another daunting task, which requires you to motivate your students to play these games, and you must remember that the competition for students’ attention is not other boring page-tuning courseware, but the actual multi-million dollar 3D massively multiplayer online games that students play often every day for hours and hours (e.g. Warcraft, Halo 2, Anarchy, and Sims Series). However, the most important thing (besides being attractive and engaging) is that the game has some educational value in relation to the learning objectives, outcomes, and expectations that you want to achieve. In addition, you need to also ensure that the game’s visual elements and additional fun does not overshadow or distract the learners from learning what you want them to learn (a

balance is needed). Otherwise, it is better to incorporate some other form of interaction.

Another challenge is the common perception that digital games are addictive, violent, sexual and anti-social, which is true to some extent. But, if we start creating or using games that teach them what we want and facilitate collaborative/network learning, then we are on the right track.

If you are using online games, some students might not have appropriate Internet access to play them, which needs to be considered and dealt with. Games that can both be played online and offline are ideal.

Finally, if you are worried that only boys and children play games you need not to, because recent research findings (Paavilainen, J., 2004) show that 43 percent of game players are women, and that the average age of a player is 28 years old.

Having looked at some of the challenges, we would surely like to know what benefits and educational values games could bring to higher education.

3. Educational Values

If games are used appropriately and have course relevant content meaningfully embedded into the game's storyline, they can potentially have a major impact on the learning process. I think Squire's (2005) Game-Based Learning: An X-Learn Perspective Paper, Prensky's (2001) 12 statements in "Why Games Engage Us", and Squire and Co.'s (2005) presentations about "How Games are Reshaping Business & Learning" provide good insights on how games can make learning more motivating, engaging, interactive, social and challenging. Some of the values and benefits games can bring to education, include:

??**Try on a new self** - Imagine taking on the role of being a prime minister, CEO, doctor, lawyer, pilot, or creating your own character through avatars (e.g. Second Life). Games with such stories and capabilities can enable us to

explore situations, roles and scenarios in a much more visually (e.g. 3D) stimulating and motivating way compared to a book with text and pictures.

??**Perform before Competence** - With games you don't have to read encyclopedias before getting the chance to explore demanding/dangerous roles or professions such as operating lethally injured patients, flying fighter jets, testing lethal chemicals, dealing with violent patients, etc. Exploring or trying something before competence can also reinforce a learner's interest in a particular subject or topic.

??**Problem Solving** - Most games require players to solve structured, semi-structured, or unstructured problems. This helps them indirectly to improve their problem solving and creativity skills by exploring proactively different techniques and approaches to achieve the goals of the game.

??**Challenge/Conflict** - Most games provide some form of challenge or conflict, which the player(s) must deal with to achieve the goal. This gives us adrenaline and excitement. It is also indirectly a venue to deal with stressful and uncertain situations, which is a very much needed in today's working life.

??**Interaction** - Games are all about interaction in a one-player, two-player, or multi-player mode.

??**Collaborative/Social Learning** - Games can enable learners to collaborate and interact with other learners carrying out team-oriented tasks in a socially and visually stimulating environment such as building a city, fighting a war, managing an organization, etc.

??**Outcomes and feedback** - Games usually provide immediate feedback

and outcomes (e.g. loose or win, succeed/continue or not). Learning outcomes and feedback are crucial to ensure that learning takes place.

??**Adaptive & Student-centric Learning** - Games give us flow and often we can select the level (e.g. Beginner, Novice, Expert) before playing a game. Games have difficulty levels, which is usually based on a succession of more challenging tasks to complete.

??**Emotional Learning** - Games can tickle most of our senses (except perhaps for our taste buds) and emotions in a very realistic, interactive and stimulating way, which is important to facilitate a more emotional and engaging learning experience.

??**Discovery, Exploration & Experimentation** - Games allow us to explore, experiment and discover things, facilitating inquiry-based learning.

??**Critical & Systems Thinking Skills** - Games require you to think critically, systematically and often out-of-the-box to deal with the challenges and scenarios of the game.

??**Risk Taking** - Games encourage players to take calculative risks to find ways to succeed against the challenge or conflict. Eventually, learners become more willing and experienced in taking chances and risks, which, for example, is important for entrepreneurs.

??**Make Mistakes Without Real-World Consequences** - Games allow us to do things usually not possible due to certain constraints (e.g. cost, capability, danger) in the world without any real-world consequences such as traveling to the moon, flying a Concorde, investing billions in stocks, trouble shooting a nuclear plant facility, etc.

??**Multi-Tasking** - Games often require players to deal with or manage multiple challenges (or threats) at the same time, providing a great training ground to improve multi-tasking skills.

??**Fun & Play** - Games are about fun and play, making learning more enjoyable and worthwhile. Imagine playing, having fun and learning at the same time. Yes, then everyone would simply love higher education.

In addition to these educational values there are many more we can add. It is important to highlight here that games do not necessarily have to be visually stimulating with virtual reality or advanced 3D animated graphics to be of educational value (e.g. text-based adventure game). The most important thing in an educational game is still the actual content or storyline, which needs to express the learning objectives and outcomes you want. Also, it is important to realize that you can utilize and adapt games into basically any course and the categories of games are only limited by our imagination and creativity (e.g. history, business, medicine, science, biology, and accounting).

4. UNITAR's Current Gaming Projects

Over the last two years UNITAR's R&D team have been working on two educational gaming projects, which are the:

??Role-Play Simulation Editor (Since March 2003)

??EduGame Creator (Since September 2004)

4.1 Role-Play Simulation Editor

The Role-Play Simulation Editor (RPSE) was designed to:

??Enable educators to develop simple single-player multi-path online simulations.

- ??Reduce the dependency on the courseware development team for simulation development.
- ??Reduce the time and cost for simulation development.
- ??Facilitate a more simulated and contextual eLearning environment for the learners.

However, creating multi-path (or even single-path) simulations is not easy, as it requires authors to come up with a correct storyline and in addition add multiple deceiving storylines (2-4), which requires a lot of work, planning, expertise, and creativity. Also, authors are very likely to get lost in a pyramid of paths and nodes, as it is not easy to manage a multi-path simulation. In short, most educators don't have the expertise or time to do it.

Overall, the major headache in creating multi-path role-play simulations is more the actual story or stories needed, than the screen layouts and linking between action nodes. After realizing this problem, we began conceptualizing a game generator, which would require as little input as possible from educators, and a lot of output from the system. After digesting Dr. Dan Lim's (2003) ten (10) criteria mentioned earlier, we realized that the key was to take away most of the coding and complexity from the eyes of the educator, and let him or her focus on adding course related quiz items, and the system will take care of the rest, including storyline, scoring, graphics, etc.

4.2 EduGame Creator

The main objectives for developing the **EduGame Creator** were to:

- ??Enable educators to create and publish online enjoyable educational games based on pre-defined game templates (e.g. Jeopardy).
- ??Enable multiple pre-defined games to be developed from the same set of quiz

items/questions (e.g. multiple choice and fill-in-the-blanks).

- ??Have a centralized quiz item bank, which will enable educators to reuse and share quiz items.

The idea behind developing this game generator is to enable educators to create enjoyable games on-the-fly based on pre-defined game templates with curriculum related quiz items. Though, we have yet to examine how effectively and how much learning actually takes place when students play such games (EduGame Creator is still under construction). However, Dr. Dan Lim's (2003) research has shown that this form of games can have a positive impact on the learning process in terms of retention and motivation.

5. Conclusion

As innovative gaming technologies and creative game designs continue to evolve, we will increasingly see amazing games enabling us to use our senses, body parts, and mind to experience and learn things in a more engaging and immersive way, which we only dreamt about in the past. Just to mention a few, which include virtual/augmented reality, holographic, cross-media, and real-life games (e.g. wireless camera and smart object games).

In conclusion, I would argue that educational gaming is going to increasingly be part of the way we learn and acquire knowledge and skills. The real question educators need to ask themselves is not whether they should utilize or integrate educational gaming into their course curriculum, but what, how, when, and where they can implement games, and whether they are off-the-shelf, self-made, or freely available games. My recommendation is to start experimenting with games now, before students demand you to.

6. References

- [1] Foreman, J. (2003). “Next-Generation Educational Technology Versus The Lecture” - *EDUCAUSE Review*.
- [2] Kirriemuir, J. (2002). “The relevance of gaming and gaming consoles to the Higher and Further Education learning experience”, –*JISC Techwatch commissioned report*.
- [3] Lim, D. (2003) “Flash Learning Games Research @UMC” (First Draft), University of Minnesota.
- [4] New Media Consortium (2005).*The Horizon Report – 2005 Edition*.
- [5] Oblinger, D. (2003). “Unlocking the Potential of Gaming Technology”, Pre-Conference Paper
- [6] Oblinger, D. (2004). “The Next Generation of Educational Engagement”, *Journal of Interactive Media in Education*, 2004.
- [7] Paavilainen, J. (2004). *Mobile Games: Creating Business with Nokia N-Gage*. Starcut Ltd. New Riders (p. 90,100)
- [8] Prensky, M. (2001). *Why Games Engage Us* from Digital Game-Based Learning.
- [9] Squire, K. & Jenkins, H. (2002) “The Games-to-Teach Project: Initial Research Findings”. Presented to the Association of Educational Communications and Technology, Dallas, TX.
- [10] Squire, K. (2005). *Game-Based Learning: An X-learn Perspective Paper*. MASIE Center, e-Learning Consortium.
- [11] Steinkuehler, C. Squire, K. & Gee, J. (2005). *How Games are Reshaping Business & Learning*. University of Wisconsin-Madison ADL Academic Co-Lab (Video presentation).

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