Teaching Teachers about Serious Games

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Abstract

The author designed and taught the first course on digital game based learning at the author's institution which was also one of the first of its kind in North America. The course has been taught twice: once in the spring of 2005 and again in the summer of 2006. The design of the course is outlined and participant reaction is profiled. Topics discussed in the class included violence in games, up-to-date research on gaming and gamers, and how games might be used effectively in classroom settings. Also included in the paper are comments on some of the games that were examined, as well as the nature of the projects completed by the participants. Key elements crucial for teacher preparation are discussed.

Introduction

Digital games can no longer be considered a pastime enjoyed mainly by children and adolescent boys. The average age of gamers is over 30 and there are in fact more adult women who play games than there are teenage boys who do (ESA, 2006). Digital games have become one of the most popular entertainment pastimes of the current generation, and interest in the use of games for learning in school settings is once again increasing. A recent report produced by the Federation of American Scientists suggests that "research on games in education should be a part of a coherent research program in learning science and technology" (Federation of American Scientists, 2006, p. 7) and that "(s)chools of education and teacher professional development providers should create new training materials and make developing skills to support game-based learning an integral part of new and incumbent teacher training." (ibid. p. 10)

According to the 2001 Canadian Census[1], the average age of teachers (including professors) is 41.8. Given that the average age of gamers is over 30, this would imply that teachers are not, for the most part, gamers. Whether or not they are gamers themselves, teachers are beginning to be asked to consider this new medium for the purposes of education. Unfortunately, regardless of how much potential may be contained in digital games and game technology for learning purposes teachers can not be expected to accept digital games as a tool for learning if they don't know anything about them. As with any other technology used in this way, teachers must be confident in their ability to use games effectively to enhance learning before they should be asked to take advantage of this medium.

To that end, the author designed and taught a graduate level course on digital game based learning intended primarily for teachers, which was first offered in the spring of 2005 and taught for a second time in the summer of 2006. It was designed as a seminar style course and intended as an introduction to digital games and gaming for instruction and learning. In it participants explored some of the theories, possibilities, considerations and constraints related to the use of learning and commercial entertainment games in classroom settings. While game design was also discussed it was not emphasized as this course was meant to serve as an introduction to learning with digital games. Game design in general is a complex subject so it was decided that the primary focus would be on the use of existing games which included selected commercial entertainment titles, games designed specifically for education, and those in the larger category known as "serious games".

[1] http://www12.statcan.ca/english/census01/release/index.cfm, visited Aug 14, 2006

Barriers

Many teachers have indicated they are interested in trying games and simulations[2] in their classrooms (Becker, K. & Jacobsen, D. M., 2005). Even so, most teachers don't actually use games in their classrooms except as a reward for when the "real" work is done, and games remain contraband in many schools. The study conducted by Becker and Jacobsen (ibid.) confirmed that there are real and significant barriers to adoption, not the least of which is a lack of knowledge about games. Along with real interest in using games there is also uncertainty and a certain degree of suspicion, which are hardly surprising. Teachers have little time to learn yet another new technology and should not be faulted for balking at the prospect of adding even more to their already heavy workloads. Reports in the media do little to help alleviate concerns: they range from stories about games as saviours (Healing Games: Harris, S. D., 2006), to games as the root of all evil ("Nobody shoots anybody in the face unless you're a hit man or a video gamer," (Minton, J., 2006)). It's hard to tell what's true and what's not.

A justifiable part of that suspicion comes from past experiences with new technologies. Media hype about new technologies and the changes they will afford is hardly new: the new instructional media of the 40s (films and slides) programmed instruction in the 50s, Instructional Systems Development (ISD – 1960s), and most recently the Internet itself (Anglin, G. J., 1995) have all been held up as solutions to our educational problems. However, none of these methods or technologies has solved all of the problems their proponents claimed they would, and all have created brand new problems. Teachers can hardly be faulted for their caution.

Even teachers who really want to use games in the classroom have their work cut out for them. Where can a teacher turn if (s)he wants to know what games might be suitable for tomorrow's class for example? If they do manage to find a list of games that could be used in the classroom, how can they find out how to use them? The body of knowledge on Digital Game Based Learning (DGBL) is certainly growing, but most of the papers and articles are written by researchers who are either reporting on their work in a fairly traditional scholarly fashion or writing about games for a general audience. Neither of these kinds of articles are especially useful when preparing for tomorrow's lesson. Teachers are not typically allotted time for research - they rarely have the time to locate, review, and synthesize findings from scholarly publications and then create lesson plans from scratch, especially when video games are an unfamiliar technology for most of them.

The following example illustrates the point. Suppose a teacher wishes to use a WebQuest[3] to help students learn about flight. For this one can find many resources freely available on the web: a Google® search for 'WebQuest' returns nearly three million hits, and in just the first dozen links there are sufficient resources to allow most teachers to put together a WebQuest on virtually any topic – some links even offer databases of ready-to-use WebQuests. In fact, the very first link (http://webquest.org) contains a database of WebQuests, and a search there for "flight" returns eight ready to use quests. A second search using the keywords "flight WebQuest" returns over 70,000 hits, and the first page contains links to several WebQuests that can be used just as they are. There is even a choice of grade levels. Our experiment of locating a suitable WebQuest for tomorrow's lesson took approximately 10 minutes, and we were successful. Now suppose the same teacher wishes to find and use a digital game for the same topic. Even if one tries to narrow the search to "flight 'computer game' education", one still gets nearly thirteen million hits, and none of the first few dozen links have anything to with which games to use in a lesson or how to use them. A few of the first links lead to articles *about* using games, but even these don't provide any readily usable information on how. In the same time it took to locate and download a WebQuest to use in class, nothing usable could be discovered about digital games. Devoting an entire day to this quest would still not have guaranteed success.

If digital games are to become viable technologies for classroom use, teachers need access to resources that are readily available. Even if the typical resistance to the use of games in the classroom on the basis of frivolity can be overcome, the preceding 'casual' experiment demonstrates that digital games are not yet ready for use as educational technology by any but the most determined of teachers. If games are going to be put to use as technologies for teaching and learning, teachers must not only be taught how to use them, but the resources they

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[2] The number of teachers interested in using games is somewhat dependant on how we define the word 'game'. Various alternate descriptions were used in the cited study, including: interactive demonstrations, simulations, and edutainment.

[3] "**WebQuest** is a research activity in which students collect information, where most of the information comes from the World Wide Web. It was first invented by Bernie Dodge in 1995." (Wikipedia)

need in order to do so simply must be made available and easy to find. Another requirement is the development of teacher preparation courses that include the use of digital games.

There are several areas of inquiry that relate directly to the ultimate goal of preparing teachers to use digital games effectively in the classroom. The most direct one deals with teacher training itself at the post-secondary level, but at the time of this writing (Oct. 2006), there are few institutions[4] offering courses for teachers on how to use and design games, and even fewer resources on how one might design such a course for teachers.

Much research on the educational use of games is still very basic, but the field is growing (Amory, A., Naicker, K., Vincent, J., Adams, C., & McNaught, C., 1999; Egenfeldt-Nielsen, S., 2005; Kirriemuir, J. & McFarlane, A., 2004; Prensky, M., 2006). Games have the potential to offer an inquiry-based, constructivist approach that allows learners to engage with the material in an authentic, yet safe environment. That said, "Instructional technology only works for some kids, with some topics, and under some conditions – but that is true of all pedagogy. There is nothing that works for every purpose, for every learner, and all the time." (Mann, D., 2001, p 241) Interestingly, a common demand made by sceptics when introduced to the idea of using digital games for learning is that they want to see proof of the technology's effectiveness before considering it. While such desires are understandable, it is also known that the effectiveness of any educational technology is heavily influenced by the facilitator or teacher using it.

What Should Teachers Know About Games?

More than twenty-five years after the development of the personal computer, many teachers still find themselves playing catch-up with technology (Sprague, D., 2004). Often through no fault of their own, teachers lack the skills and knowledge to integrate technology effectively into their classrooms, and so rather than do it badly, they stick with the technologies they know. Technical support staff, when it exists at all in schools is often preoccupied with maintaining the hardware, and many have little time left over to perform such tasks as reviewing potential software applications or tutoring teachers. We seem locked into a cycle that has really not yet been significantly altered in spite of valiant attempts to do so: school administrators are often experienced, "senior" teachers who have spent their careers teaching using fairly traditional methodologies. As a result they tend to resist changes that would place them in unfamiliar territory. Part of the reason for this is that they themselves were taught in traditional ways. Add to that the fact that many teacher preparation programs still teach teachers in fairly traditional ways, taught by faculty who were themselves taught in traditional ways and who themselves are not especially comfortable with technology... How can we expect teachers to teach using digital technology when they themselves are still often taught using lectures and textbooks?

Researchers in educational technology may be on the cutting edge when it comes to ways to use the many tools available and the effects that these can have on learners, but this information rarely makes it into the hands of the practicing teachers. They have neither the time nor the opportunity to read the journals (Sprague, D., 2004) and they often lack the freedom to deviate from prescribed curricula.

Digital games make popular headlines: they appear to be responsible for everything from youth obesity to violence. However, negative reactions to new media are hardly novel, and similar dire warnings were issued when television was new, as well as film, and even books (Williams, D., 2006, in press). Whether or not these effects are real, the questions are likely to come up whenever the prospect of playing games, especially COTS games (Commercial Off-The Shelf) are discussed in educational settings. Thus, teachers must be prepared to address the inevitable concerns of parents and administrators. For those interested in the connections between obesity, violence and video games, it might be enlightening to point out that youth crime in the U.S. has been declining for about the same amount of time that video games have been popular (Jenkins, H., 2004), and some American school districts are now using *Dance Dance Revolution* (Konami Corporation, 2001) as part of their physical education program (Lash, C., 2006). It is certainly true that many commercial video games are inappropriate for most classroom environments, but there are also a great many films and books that are similarly inappropriate for classroom use[5].

[4] The following website maintains a list of those institutions offering courses for teachers: http://www.minkhollow.ca/KB/PF/PFGacademe.html#courses

[5] It is worth noting that the books banned in some districts are studied as important literature in others. The same is likely to become true of digital games.

The inappropriateness of some instances of a technology should not diminish the value of the entire medium. However, teachers do need to understand the issues surrounding video games so they can make informed decisions about if, when, how, and which games might be appropriate for their particular situation.

If we are to make progress towards an acceptance of games as instructional technology, teachers must also be able to find suitable games as well as adequate support material. Most teachers have little free time to search for and evaluate games so it is crucial that this information be well publicized, easy to find, and up to date. Evaluating an application for suitability is time consuming and it will be important to find ways to share information easily. There are several advocates and researchers who are doing this now (Kirriemuir, J., 2006; McFarlane, A., Sparrowhawk, A., & Heald, Y., 2002; Prensky, M., 2006) and it is expected that more will join in.

Course Design

The course described here has been offered two times: once in the spring of 2005 and again in the summer of 2006. The course was delivered as a seminar style class with weekly readings that are presented by members of the class and discussed. The main project involved either: 1) the design of an educational game, complete with a High-concept Design and a prototype of the learning game; or 2) the design of a lesson or unit that made use of a COTS or other existing game, including lead-up activities, game-play with goals, and de-briefing.

The course included various readings and discussions were guided along various themes, including: The Current State of Games and Gamers; Current state in Media Studies and Games Theory (including a discussion of violence in games); Is Learning Fun? (Games and Pedagogy); What Can Games Do? How important are fidelity and validity? Instructional Design for Games; Making Games, and Resources for making games; and Assessing Games for Learning.

One of the key features of this class was an opportunity to examine and try various games as it was thought that first-hand experience was important. Games examined in the class included:

- America's Army, *the United States Army's free online recruitment game;*
- Ben's Game, *a freely available game designed by a 10-year-old boy about fighting cancer;*
- Black & White, *a COTS game that plays with the consequences of ethical choices;*
- Carmen Sandiego, *a COTS game series that was very popular in the late 80s and early 90s dealing with history and geography*
- Civilization III, *a COTS game whose use in the classroom has been studied quite extensively;*
- Food Force, *another freely available serious game produced by the United Nations;*
- FowlWords, *a simple word game freely available on the web.*
- Mathblaster, *a well-known math drill game*
- Nation States, *a free online game with acknowledged educational applications and online educational support;*
- Oregon Trail, *an example of an excellent education game dating back to the 80s;*
- RealLives, *a commercial educational game that uses real global statistics;*
- Sims 2 *[COTS]; the best selling game franchise of all time*
- Virtual Leader, *a serious game design to help develop leadership skills*
- Virtual U, *a free downloadable game designed as a serious game;*

Playing the games was a key feature of the course design, and something that made this class unique among the education classes available. It was important to expose participants to a wide variety of games because teachers need to be able to experience for themselves what some of these games could do. Playing games must be seen as part of games literacy in the same way that reading books is essential to traditional literacy. Because school technology resources typically lag behind, it was important to expose participants to games that were freely available for download, or those that offered substantial discounts for educational use were featured whenever possible (such as Ben's Game, Virtual U, Food Force, FowlWords, and SimSchool). It was also noted which games could be made to run on old machines, or potentially on any machines. We also examined some online games (like Nation States and Tropical America) but the fact that they had to be accessed over the net made it less likely that they could actually be used in local classrooms as many districts have fairly restrictive internet access policies.

We did examine some commercial games that were thought to contain little educational content (like *Halo 2*, *Deus Ex*, and *MapleStory*) to help the participants gain game literacy and to help them get a sense for what is possible in game environments. Some of the COTS games that are or have been used in classrooms were examined (such as *SIMs, Civilization III*, and some of the *Tycoon* titles) as well as some that have not been used in classrooms, but that were thought to have potential (like *Black & White* and *The Typing of the Dead*).

The Projects

Although participants were encouraged to work on their projects in groups it was not required so as a result there was a mix of both approaches. Altogether out of ten total projects only two groups chose to design their own games. Five groups made use of existing games while the remainder (three groups) developed lessons around educational websites containing numerous games and other resources. What follows is a brief description of some of the interventions that were designed using existing commercial or serious games and those who designed their own games.

Custom Designed Games

How to Get to Carnegie Hall

This game was designed to integrate math into an arts immersion program for upper level (grade 5-9) learners, and was designed by one of the least technologically inclined members of the class. The prototype for this project came in the form of a PowerPoint presentation that contained active internal links, and although the prototype was fairly simple, it was clear that the design had been carefully thoughout and included many details, each of which could be tied into the overall learning objectives. The high-concept result was a game intended to help develop organizational skills, strategic thinking, and basic math that involved the player as a musician trying to 'get to Carnegie Hall'. It was designed as a role-playing game, where the player took on the role of a young or beginning musician. Players could choose from among several predetermined characters (both male and female) and were required to manage various aspects of their lives such as finding a place to live, finding a suitable tutor, finding a means of income and so on. They were required to develop and maintain a budget and game kept track of their progress.

Munchland (Jaeger, S., Mason, J., Ross, K. A., Martell, S., & Hogan, J., 2005a)

This game was designed by a group of five people and was one of only two groups that included members who had programming experience. The game was targeted at K-6 health studies, and was designed using a development tool called GameMaker (Overmars, M., 2005) The game itself had several levels and players could navigate through a maze-like house environment choosing (eating) and/or avoiding various foods. The player's health meter keeps track of the player's progress and 'good' foods add to the health meter while 'bad' foods take away from it. Players can choose to balance healthy and unhealthy foods to keep their health meters up, thereby helping them learn to make choices. This design also required players to 'exercise' by taking a predetermined number of steps before being allowed to progress through to the next level. (Jaeger, S., Mason, J., Ross, K. A., Martell, S., & Hogan, J., 2005b)

COTS Games

Rollercoaster Tycoon (Frontier Developments Ltd., 2004)

This group chose to use a managerial strategy game where players must build and operate an amusement park. Players have an allotment of money and must use it to build the rides and facilities for an amusement park. They can choose how and where to build the rides, how much to charge for admission and various other elements related to managing an amusement park. If they make wise 'business' choices, they will have plenty of happy patrons and the park can expand. The proposed use of this game was for a Math Integrated Occupational Program at the grade 10/11 level. Learners would be required to strategize, solve problems and make decisions based on data collected by the game and the goals laid out for them. In addition to the skills learned during gameplay, at the end of the session the learners were also to be required to pool their data and create various charts and graphs.

Civilization III (Meier, S., 2001)

Civilization III has previously been studied in classroom situations (Squire, K., 2003) and the proposal submitted for the current course was somewhat similar. "Players control one of 15 Civilizations (Aztecs, Egyptians,

Russians, etc). Each Civilization has its own particular strengths and weaknesses -- some are more scientific, for example, while others have stronger cultural or military attributes. The point of the game is to expand the influence of your civilization through resource management, conquest, or trade with other civilizations. As game time progresses from ancient times through the modern era, your Civ will acquire new technologies, which in turn enable interesting new abilities and enhanced power." (mobygames.com, 2001) The context for this project was to be Grade11 social studies, where students were to work towards a better understanding of the French Revolution. While this game does contain known factual errors, it nonetheless allows learners to experience the effects of various historical choices.

FIFA World Cup Soccer (Electronic Arts Inc, 2004)

This game was to be used in an Adult Ed ESL class. Soccer is a sport that the adult students taught would be familiar with according to the lesson designer and therefore the in-game commentary has a ready-made context. Additionally, as is typical for many games, certain moves within the game trigger certain predictable reactions and comments form the non-playable characters (NPCs) within the game. When the game is played in English, these comments (phrases) can be elicited at will and that repeatability can be a big advantage to someone struggling to learn a new language. (Wang, Z., 2006)

Tiger Woods PGA Tour (Electronic Arts Inc., 2004)

In this example the game was to be used in a high school physical education class. The intent was to use the game as a means of introducing learners to the basics of golf before going out to practice on a real course. Often there are a great many things to remember when first learning a new sport or activity, and this can result in wasted time and resources. By learning the basic rules and techniques using the video game, it was hoped that students could make the most of their time on the course once they got there. In addition, through the game the students have access to a tutor that will never loose patience and they can repeat any part of the "lesson" as often as they wish. With the ever rising costs of field trips, there can be a real benefit to having students learn the terminology and acquire some of the basic skills before they even begin. Although much of this is already done as a precursor to many outings, being able to use a game that emulates the environment they will encounter "in the field" helps to place it in context.

Serious Games

Food Force (United Nations World Food Programme, 2005)

One group chose to use a game that was designed specifically for educational purposes. Food Force (http://www.food-force.com/) is a free downloadable game designed and developed by the United Nations World Food Programme and is specifically targeted at learners aged 8-13. There is substantial educational support on the website and this group chose to augment that by creating specific ties into the grade five social studies curriculum as defined by Alberta Learning.

Post Mortem

At the start of each class several participants expressed concern that excitement over games was simply the latest veiled attempt to replace teachers with more technology. Most were relieved to hear that games are not viewed as teacher-replacements by most serious game researchers. In fact, some games are likely to require more teacher involvement rather than less. The idea that games could be used as a springboard into or supplement for more traditional modes of instruction was a new one to the course participants. For example, the notion that *the Sims* can be used for language learning (Purushotma, R., 2005) was one that even the *SIMs* players in the class had not considered. The gamers in the class hadn't thought about the games they play from an educational perspective and this opened up new possibilities for them. Oddly, there were some games that they preferred to keep as 'just for fun' – as though school and leisure were not to be mixed: learning and fun were still somehow distinct. This persistent separation of 'school' and 'fun' has been a recurring theme in the author's studies, but is beyond the scope of this paper. One very encouraging note is that a number of students who took this course went on to continue work in the use of games (Ross, K. A., 2006; Wang, Z., 2006)

Games when viewed as a medium for communication and expression have as their prime distinguishing feature a demand for interaction. Whereas the author's generation grew up with television, which is what Will Wright, the creator of the enormously popular *SIMs* game franchise has referred to as linear media (Wright, W.,

2003), the current generation is growing up with a pastime that demands interaction. “Games, on the other hand are most directly dependent on something else entirely: the concept of agency. Agency is our ability to alter the world around us, or our situation in it. We are able to act, and that action has effects. This is probably the first thing we learn as babies. This is the crucial distinction between interactive and linear entertainment.” (Wright, W., 2003, p. xxxii) If the preferred pastime of most of today’s youth involves interaction and agency it should not be surprising that these same learners lack patience for modes of learning that are relatively passive such as books and lectures. Traditional lecturing approaches require passivity and acceptance.

Conclusions

A recent report states that as many as 60 schools and universities are now holding virtual classes in the game world known as *Second Life*, http://secondlife.com (Lamb, G. M., 2006). Current pre-service teachers are likely to find themselves in a very different teaching and learning environment from the one most their professors told them about. Many more courses like this one are necessary. Professional Development offerings are desperately needed as ways to provide basic games literacy as well as to help develop teachers who can add this new medium to their repertoire. School administrators must also be provided realistic and up to date information on how games can be used in the classroom. Many still refuse to allow games at their schools – and while some of their reasons for doing so are valid, others are woefully out of touch with the new reality of the twenty-first century.

Teachers must be both allowed and encouraged to play games, not to turn them all into gamers, but to promote literacy in a medium that is rapidly becoming second nature to the people they will try and educate. Teachers must learn how to assess whether a specific game might be useful for them in the classroom, and if so, under which conditions. If we would not expect a teacher to teach a unit about a novel like *To Kill a Mockingbird* (Lee, H., 1960) without ever having read it, how can we expect a teacher to use a game like *Rollercoaster Tycoon* in class without ever having played it? Expecting teachers to use games they have not played is like expecting teachers to use books without them ever having read one.

Millions of people of all ages are already learning with games informally. Ultimately, the success of digital games as a medium for learning in formal situations depends on the abilities of teachers and administrators to take full advantage of this medium.

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