Education Through Video Games

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Overview:

Games and simulations have been around since humans first started to learn. Any kind of training or practice for an actual event can be considered a game or a simulation. This started with the first hunters practicing how they would trap game and has evolved today into large scale interactive computer systems that create virtual environments.

The question remains how do we harness this very useful learning tool and apply it to the teaching? Since the late 1960s articles have been published regarding the use of simulations and games in the classroom, Ochoa (1969), Abt (1970), Lumsden (1970). These mainly dealt with role-play and personal interaction, there were a few that involved the use of computers but the machines of the time were so large and bulky that their use was not effective or efficient. An important element that did come from this era was the term "Serious Games". This was coined by Clark Abt to differentiate between games played for fun and those used to train or educate.

A recent development has grown over the past twenty years to incorporate the use of video games into the way that we teach and train. The term "Serious Games" has developed with this trend and now refers to functional video games and simulators. The games that this article refers to are not merely games for entertainment or even the "Edutainment" games that are directed towards children, these serious games are generally fully interactive simulations that have a sense of reality built into them and enable their users to become participants in a fully interactive world.

Why use games in the classroom?

Games make sense in a number of arenas of learning, military, finance, even urban planning. It is much easier to run a few games or simulations to see which strategies work than to spend time, money, and lives implementing bad ideas. Most classroom instruction is composed of lecture with the assistance of slides. This focuses mainly on only one aspect of learning, audio with some additional support from visual. According to Foreman, this is contrary to the very nature of a productive learning environment and is used throughout academia because it is the most cost effective teaching method. One instructor can be used to instruct as many people as a facility can accommodate.

There are many advantages to using games as opposed to the standard lecture. The first is that games can be interactive and encompass many different learning factors at once. Second, they can be distributed via a medium such as the World Wide Web, allowing for students to access the game or simulator from their own home. And third, they allow for students to learn by doing instead of just listening and taking notes.

A great example of use and success of this is the U.S. Army's LandWarNet University. This is a centrally based server that any Soldier can access and receive training on a wide range of items, including equipment simulations that allow the individual to push buttons and move cables and the simulation reacts accordingly.

Forman also discusses many disadvantages with using games in the classroom. The first and foremost is the cost associated with the development of the product. Developing a fully interactive video game can run into the millions of dollars and take many years to develop. Add on to that upgrades and improvements that need to be made to keep up with current trends in the field and implementation can become prohibitive. In addition to the cost is the expertise that is required. To develop a lecture an educator needs to sit down and lay out whatever course work they would like to discuss across the semester. In order to develop a video game that can replace that lecture that same professor needs to translate their knowledge and views to a computer programmer who then needs to develop a game system around that premise. Finally, the game needs to be implemented correctly. If the instructor does not implement the game well into the classroom it can be more of a distraction than a benefit.

Design and Implementation.

These two aspects can make or break the whole premise of using video games for educational purposes. They are two complete and separate topics but must work hand in hand to be effective.

The foundation of any course is its design; if the video game is not designed correctly it will not meet the intent of the learning environment.

Joseph Daniel outlines six points for game design:

1. Be easy to use
2. Span learning stages – initial exposure to applying concepts
3. Accommodate different learning styles
4. Be flexible enough to fit into new updates
5. Adaptable to different levels of instructions, introductory, intermediate, and advanced
6. Not just a supplement but integrated into course

Game designers and instructors that use these six points as a guideline when designing their games for educational use in the classroom will create a game at its foundation that is geared towards learning and is flexible enough to adapt to changes in students and material.

Like any other educational tool, video games can be a benefit or a hindrance and much of this depends upon how the instructor uses that tool. An instructor may have the best game ever designed, one that hits every point listed above, but if they do not implement it correctly than it is just another wasted material.

Lumsden's article reviews the use of free market game in an economics class. He identifies the fact that the students are having fun and seem to be interested in the otherwise dry material but that there were not set methods or procedures in place to analyze whether or not the students were retaining any of the knowledge or skills gained in the game. This is just one of many problems that can occur if a game is not implemented correctly.

Cruickshank addresses these issues and outlines a six step plan for using games in the classroom.

Step 1. Know your objective, choose the correct game, and thoroughly plan the implementation

Step 2. Stage the introduction correctly. Too fast and some students will not fully understand the game or its mechanics, too slow and the students will be bored.

Step 3. Assign roles according to students needs.

Step 4. Distribute team assignments with diversity; avoid providing advantage to one group.

Step 5. Shift instructor focus from center to facilitator, let the game play out.

Step 6. Continually monitor and provide and receive feedback.

Utilizing these six steps will easily integrate the game into classroom, not overtax or bore the students and determine whether or not the game is effective as an instructional tool.

Games versus Simulations

These two terms are used interchangeably in many situations and even so to an extent within this paper, however, they can be quite different.

A game has defined ends, a way to succeed, means to accomplish this end, a defined set of rules, and fun. A simulation, on the other hand, is a model of a system or process that can be used to reflect reality (Emerich). This can be viewed as a sliding scale with games of fantasy at one end and simulations at the other with a blending of the two as the scale gets closer to the middle. This center of the spectrum is the simulation game (Ochoa).

A simulation game is the ideal addition to the classroom, providing the realism of a simulation while having the fun factor of a game, the true test of the instructor is finding that perfect blend of the two. There are times when straight simulations are needed such as conducting equipment training when equipment supplies are short. However, if some form of competition against others or additional 'fun' aspects can be added, it will lend to a better learning environment.

Recommendation:

Video games can be a vital resource but their use needs to be balanced. Instructors need to ensure that students get away from "gaming" it, focusing too much on winning the game as opposed to learning the correct actions and techniques.

The use of video games in the classroom can be a tremendous benefit, a great distraction, or a complete waste of time. To be effective the game must first be designed correctly and second it must be implemented well. With a well designed game and a thoughtful implementation the use of video games can bring a sense of realism to the classroom that was previously impossible.

References

Annetta, Leonard A. et al. (2006). Serious Games: Incorporating Video Games in the Classroom. *Educause Quarterly*, November, 16-22.

A great overview of the subject of Serious Games and how to develop those games for use within the classroom. The article reviews a course from North Carolina State University that developed a distance learning course that incorporated content and pedagogy with a multi-player educational gaming engine (MEGA). They list out 4 main objectives: 1. Demonstrate an understanding of game theory. 2. Prove competence in developing skills to support, motivate, and monitor students. 3. Show developing knowledge, skills, and dispositions. 4. Develop an understanding of technology and integration of science in the classroom.

Cruickshank, D.R. & Telfer, Ross (1980). Classroom Games and Simulations. *Theory into Practice*. Volume XIX, Number 1, 75-80

This is an older review of implementing the use of games and simulations in the classroom but many of its points are still relevant today, especially the differentiation of games versus simulations. The article discusses many advantages and disadvantages of using games in the classroom that still hold true even with the current advanced technology. One of the most useful parts of the article come from the six step process for implementing the use of games and simulations into one's classroom.

Daniel, Joseph I.(1999) Computer-Aided Instruction on the World Wide Web: The Third Generation. *Journal of Economics Education*. Spring p163-174.

Daniel mainly focuses on applications geared towards economics but details how systems can be used on the World Wide Web as multimedia and distributed learning tools. He also has a six point set of criteria but this involves the development of the courseware itself.

Der Derian, James (1997). The Simulation Syndrome: From War Games to Game Wars.

Describes war games and why/how they are used. Der Derian elaborates on the Simulation Syndrome, a blending of simulation and reality by using the example of a U.S. Navy ship that attacked an Iranian passenger airliner, postulating that the attack occurred because of the recent simulations that the crew was conducting. In the minds of the crew the blip on the radar screen was an enemy because they trained themselves to see it as such. He defends wargames as important for showing people the reality of war without the consequences but these games can be a double edged sword.

Emrich, Alan. (2008). What is a Wargame? Battlesson Supplement.

Discusses wargaming by breaking down the word and analyzing each piece individually, war and game. It defines games and why we play them. The article provides a good rubric for differentiating a wargame from a regular game with three aspects: 1. Quantification 2. Laws of Probability 3. Roleplaying.

Foreman, Joel (2003). Next-Generation Education Technology versus Lecture. *Educause*. July/August, 13-22

Postulates that it is much better to use video games instead of the standard large auditorium style lecture. Discusses the advantages and disadvantages of both sides. The main disadvantage of the lecture hall is that it is a one way medium and mainly uses hearing with some slight video support via the slide show, while video games on the other hand can immerse the student in three dimensional environments where the architecture student, for example, can walk amongst the gothic structures of European churches without leaving their seats.

Lumsden, Keith G. (1970). The Promises and Problems of Games and Simulation. *The Journal of Economic Education*. Spring, 85-90.

Games used for education must be structured in a way that is both fun and educational. These games must continually be analyzed in order to ensure they are meeting both objectives. Lumsden discusses the use of games in an Economics classroom. The scenario shows that students have fun and are interested in the material but the test group does not show whether or not the students are retaining the information. His main point is that with continual analysis and feedback, games can be used effectively but if there is not a long term strategy in place then while there is immediate gratification, there is no real learning taking place.

Ochoa, Anna (1969). Simulation and gaming: Simile or Synonym?. *Peabody Journal of Education*. September, 104-107.

Relays the difference between the term simulation and gaming. Simulations and games are on a sliding scale with reality simulation at one extreme and fantasy games at the other. This scale allows for movement throughout and blends them together at the center.

Websites:

Serious Games Initiative – http://www.seriousgames.org/

Provides videos, discussion boards, and sponsors events regarding serious games.

Serious Games Institute - http://www.seriousgamesinstitute.co.uk/

A United Kingdom based and focused website that providing case studies and support information for those looking to design and implement Serious Games in education.

LandWarNet eUniversity – https://lwn.army.mil

U.S. Army Signal Regiment's online training site

Army E-Learning Program - https://usarmy.skillport.com

U.S. Army Online training site that provides computer based training on everything from language, to computers, to accounting.

Additional Reading:

Abt, Clark C. (1970). ***Serious Games*****. Maryland: University Press of America, INC**.

The book that started created the phrase "Serious Games". Though it is almost 40 years old, it still provides a great foundation for this subject.

Bergeron, Bryan (2006). ***Developing Serious Games*****. Charles River Media Inc. Hingham, MA**

In depth look into how to develop a serious game. Provides methodology for developing, discusses new technologies, and provide tools to create the games.

Michael, David & Chen, Sande (2006). ***Serious Games: Games that Educate, Train, and Inform. Thompson Course Technology*****, Boston MA**

Details how games can be designed and implemented, providing specific information for each separate area, Military, Government, Education, Corporate, and Political, Religious, and Arts.

Prensky, Marc (2001) ***Digital game-Based Learning*****. St. Paul, MN: Paragon House**

How learning can be enhanced with digital games and why it is becoming a much more effective teaching tool.