The Inclusion of Interactive Gaming Technology In Education

As technology advances, so do the ways in which we present academic material. The addition of video games may be the next evolution in education.

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Summary

Today’s education is purely on the basis of having a lecture, and then afterwards being examined on the material. American Education isn’t what it used to be and the current statistical results of aptitude scores can prove this statement when comparing the progress and the results of other countries. But what if the current education system is flawed and is there a solution? What if the education was more interactive learning with games and less on learning from lectures? Currently, on the internet, there are many interactive games on various subjects such as chemistry, biology, physics, astronomy, mathematics and much more. Right now, a website called Spongelab Beta gives us free games after you sign up for an account on their website without any obligations. These games allow users to interactive and change certain things to show them different possibilities in how a particular concepts works. The service project consists of a proposal that a person, who’s interested in creating a public/private charter school with interactive technology such as games can implementing them in the school’s educational curriculum. This proposal consists of research on interactive technology and learning, the cost of individual games and materials needs to have access to them, examples of current interactive games already on the internet for free to be used by any users in various subjects and more. (EP)

Video Link

http://www.youtube.com/watch?v=4VSIVK9p4OU

Interactive Gaming as a Compliment to Today’s Educational Methods

I. The Idea of Gaming in Education

(PJW) In today’s society, technology has become integrated into our daily lives so much that it governs the many ways in which we communicate and share ideas with one another. Whether it
be through mobile phones or the internet, we are endlessly connected to the great cyber web of civilization. Yet, one of the most prominent technological vehicles of expression is video games. Ernst and Clark (2009), from NC State University, state that the gaming industry is now estimated to be worth nine billion dollars annually and that over sixty five percent of American homes play both video and computer games on a regular bases (pg. 25). Given these numbers, it is difficult to dismiss the ever-present influence gaming has on our population. Many argue that video games are a waste of time while others argue that they are, in fact, a means to expand the mind. Regardless of the individuals’ preference, it is equally difficult to deny the possibility of including gaming as an additional learning tool simply due to its ubiquity. As stated by DeKanter (2005), “The social nature of people, the increasing capabilities of technology and the demands of a nation for better education are putting into play the next big evolution in interactivity; networked game simulations” (pg. 26). If video games can immerse the player in a story that allows him or her to live through the agonist via vivid and intelligent game play, then it is equally possible for video games to be crafted in a way that facilitates learning.

Present research has indicated that the inclusion of gaming within the many disciplines found in today’s curriculum has provided substantial improvements in learning and comprehension. To be more specific, Ernst and Clark (2009) quote The Federation of American Scientists when saying, “…gaming is redefining education by increasing students’ analytical thinking, team building, multitasking, and problem-solving skills…” as it relates to the sciences, technology, engineering, and mathematics, or STEM (pg. 25). Video games aren’t just a past time; they can be used as a conduit through which to introduce complex puzzles, challenging problem solving scenarios, vivid conceptualization and most importantly, collaboration among teachers and students. Through this malleable cyber format, the teachers and students, as well as the game designers, can collectively participate in the learning experience – especially in the STEM arenas of education.

A key characteristic of learning is to be able to link a concept to something you already know; a concept you can link towards a personal experience or known experiences rather than having to recall it out of memory. Games can facilitate this process due to their ability to stimulate both our emotions and senses. As stated by Ernst and Clark, “Games use stories, characters, and other environmental elements that produce a unique experience allowing them to later recall addressed subject matter” (pg. 26). Not only do games facilitate retention of the presented concepts but it does so in a way that makes the material easier to comprehend and more adaptable to the student’s way of thinking. This, in turn, encourages the student to participate in the learning process with far more confidence. Bentley (2006) agrees with this notion when saying, “…whereas traditional blackboard learning sees the learner as a passive recipient of knowledge, game based learning allow students to become an active member of their education” (The Learning Game). You have only a five percent retention rate when presented with information during lecture alone (DeKanter, 2005). Thus, interactive education with the use of games removes the student out of the “traditional blackboard learning” experience and invites him or her into a more immersive educational environment.

When viewing an interesting video created by RSA Animate, the narrator, Sir Ken Robinson, mentioned that today’s educational platform is lacking emphasis on collaborative learning (Changing Education Paradigms). Especially in the college setting, the extent to which a
professor interacts with his or her students, more often than not, extends no further than the use of lecture slides. However, this is not by choice; it is extremely difficult to connect with your students when a single class may have up to 50 students and with such limited time to cover all the necessary material. Yet video games just might be the answer to fostering a shared learning experience among students and teachers, as well as in increasing the efficiency at which the academic material is delivered. DeKanter (2005) also supports this claim when saying:

…a properly designed video game creates a common ground between distracted students and time-starved teachers. This ground becomes fertile territory for teaching the way it was meant to be – with full and active participation of motivated students (pg. 29).

Imagine a virtual environment where the student is completely immersed in the learning process; all of the senses and cognitive functions are engaged and focused on the presented material. For the student, there is no fear of failure because to do so is essential to the game progression. The idea of failure is further eliminated because every action done within this virtual learning environment is purposeful and educational; in making a mistake, the “how” and “why” of the subject matter is further clarified. In short, “…the students are there in body as well as in spirit, and thus memory is enhanced.” (Oblinger, 2004). Thus, the core of an affective learning experience is to have the student become completely involved within the lesson, both mentally and emotionally.

References Cited


II. Potential Companies w/ Interactive Games

(EP) The interactive games offered online for years of 9-12, the high school years, were limited, but there were few, who had interactive videos as well as games. The four websites that are listed below are NeoK12, North Dakota State University’s (NDSU) virtual cell animation collection, PhET, a University of Colorado funded program, and the most promising, Spongelab Beta.

About Us (NeoK12)

At NeoK12, we believe that kids learn best when they 'see' how things work, when, where and why they happen. Watching educational videos is a great way to learn because it allows kids to build a visual picture or model in their mind. The visual dimension not only helps them understand concepts better, but also stimulates curiosity and encourages self-learning. Educational videos are possibly one of the most effective learning tools, and honestly, even most grown-ups will find them enriching and entertaining as well (About Neok12, 2011).

NeoK12 also features Web2.0 tools for learning and teaching. Our School Presentation tool, a mashup of Flickr and Wikipedia, allows users to create and share interesting school presentations online. Our Quizzes, Interactive Diagrams and other Educational Games & Puzzles are a fun, interactive way to improve learning. These are also excellent interactive whiteboard resources for the classroom. Other tools allow teachers to create and share video playlists with notes and instructions for their students; find and recommend new videos for NeoK12 (About Neok12, 2011).


About PhET

PhET provides fun, interactive, research-based simulations of physical phenomena for free. We believe that our research-based approach- incorporating findings from prior research and our own testing- enables students to make connections between real-life phenomena and the underlying science, deepening their understanding and appreciation of the physical world (About PhET, 2011).

To help students visually comprehend concepts, PhET simulations animate what is invisible to the eye through the use of graphics and intuitive controls such as click-and-drag manipulation, sliders and radio buttons. In order to further encourage quantitative exploration, the simulations also offer measurement instruments including rulers, stop-watches, voltmeters and thermometers (About PhET, 2011). As the user manipulates these interactive tools, responses are immediately animated thus effectively illustrating cause-and-effect relationships as well as multiple linked representations (motion of the objects, graphs, number readouts, etc.)
To ensure educational effectiveness and usability, all of the simulations are extensively tested and evaluated. These tests include student interviews in addition to actual utilization of the simulations in a variety of settings, including lectures, group work, homework and lab work. Our rating system indicates what level of testing has been completed on each simulation (About PhET, 2011).

All PhET simulations are freely available from the PhET website and are easy to use and incorporate into the classroom. They are written in Java and Flash, and can be run using a standard web browser as long as Flash and Java are installed (About PhET, 2011).


**About Spongelab Beta**

Spongelab is a group of scientists, teachers, animators, artists, and programmers passionate about science education and with a desire to help foster learning through gaming. To get started they discussed education issues, learner and educator needs, and concerns about using technology in classroom around the world (Spongelab Interactive, 2011).

Some of their findings: Education is the foundation of all communities and is necessary to thrive. Teaching, and doing it well, is an exceptionally hard job. Education is really expensive. Because education is expensive, there is vast difference in accessibility and quality in both resources and personnel (Spongelab Interactive, 2011).

So being game makers, they set a game-like challenge for our team and our community.

Can they…

A. Create stunning content and tools to learn about science?

B. Build a community to bring together amazing content from around the world?

C. Make these tools and the content open and free for everyone?

D. Collect all this great content in a web-based tool that allows you to easily:

   1. Find resources
   2. Save it
   3. Organize it
   4. Share it
   5. Assess if those viewing your ‘shared’ content are using it and how they are using it.

And here they are with the new Spongelab.com. A science community game where you play to earn credits and experience points (Spongelab Interactive, 2011).
To make this site a success, people not only have to use it, but need to contribute to it. So the site itself you'll find is kind of like a game. For everything you do on the site, you are rewarded with experience points and credits. Experience points help you level-up and unlock some of the advanced features. Credits are needed to unlock some content and some advanced tools. The designers use this system to encourage people to participate but they can always bypass collecting credits by buying credits. So the challenge is to become users and aspire to become a contributor. Earn credits and points for your participation and see if you can become a Spongelab Master! (Spongelab Interactive, 2011)

Why game-based learning?

Think ‘Game’ and what comes to mind? Soccer? Football? Chess? Pong? Packman? World of War Craft.? ‘Game’ or an interactive simulation with objective and challenges as it is described in some circles, is at its evolutionary roots, an innate method of learning (Spongelab Interactive, 2011).

We are highly adaptive social animals who live to “play” and our discoveries are limited only by our own imagination. As we all arrive, develop, and learn in a bright, noisy, interactive world, our brains are wired to explore, question, and solve within that context. Educational tools should be designed around the way our brains learn (Spongelab Interactive, 2011).

- [http://www.spongelab.com/slxdev/browse/index.cfm#1](http://www.spongelab.com/slxdev/browse/index.cfm#1) (Spongelab Explore, 2011)

**About BrainPOP**

Founded in 1999, BrainPOP creates animated, curriculum-based content that engages students, supports educators, and bolsters achievement. It was conceived by Dr. Avraham Kadar, M.D., an immunologist and pediatrician, as a creative way to explain difficult concepts to his young patients.

All of their resources are supported by individual BrainPOP Educators totaling over 135,000 members with in the teacher community. BrainPOP features educational websites with hundreds of short animated movies for students in grades K-12 (ages 6 to 17) covering the subjects of science, social studies, English, mathematics, arts and music, and health and technology, free lesson plans, video tutorials, professional development tools, graphic organizers, best practices, groups and forums, and much more. All products are fully compatible with interactive whiteboards, learner response systems, projectors, Macs, and PCs. No downloading, installation, or special hardware is required as it is all accessed online. Additionally, BrainPOP hosts more than 11 million visits to our web sites each month.

- [http://www.brainpop.com/about/](http://www.brainpop.com/about/)
III. Service Project

The service project is to create a proposal that guidelines someone to present this document to a state legislative to receive appropriate funding for the materials and equipments for embedding interactive games in the standard school curriculum. In order to create a game, there are many aspects to be looked at and considered before moving on such as production team, which includes a programmer, expert in given discipline, game writer, graphic artists, funding, the distribution rights of each individual games, required hardware such as laptop vs. desktop vs. iPad (tablets), online or installed, also considering the operating system compatibility (windows vs mac), and the level of interaction like touchscreen vs. mouse. According to Bill Crosbie, a Computer Science professor and Game design and development coordinator at Raritan Valley Community College, the average game runs around the cost of $25,000 and more if it involves more interactions and details with better graphics. Mr. Crosbie indicated that average time for a game to be completed matters on the amount of detail involved within a game itself, but it takes about 2-3 months for completion. A hired company said by Mr. Crosbie called Hidden Agenda has also made games for clients and has production team.

In addition, another company that can be hired to create custom games is the company mentioned before, SpongeLab Beta. The company resides in Toronto, Ontario and the person, who handles the customer contract, is Dr. Jeremy N. Friedberg. SpongeLab does custom production for educational games and simulation-based training tools across multiple platforms such as Microsoft Windows, Mac, Linux, and others. They also have worked with major publishers and are well acquainted with designing alongside textbooks. In order to place an order
of custom games for any purpose, the buyer must call 416.703.9753, Canadian phone number, and speak with Dr. Jeremy N. Friedberg. The office’s address is 590 King Street West, Suite 201 | Toronto, Ontario, M5V 1M3, Canada. Again, the game’s total cost can be only determined by how many the games are detailed too the textbook or whatever information that the games are trying to provide to the users.

References


The classic study by National Training Laboratories, represented as "The Learning Pyramid", demonstrates the lasting impact of interactive learning on a person's ability to retain information. Below are the average retention rates associated with different methods of presenting information:

- teach others/use immediately - 90%
- practice by doing - 75%
- discussion group - 50%
- see a demonstration - 30%
- learn from audio/visual - 20%
- reading - 10%
- lecture - 5%

Based on the governing principles of a "constructive learning environment", the characteristics of interactive game simulations can complement these objectives (Dekanter, 2005). They are, as follows:

\textit{Theoretical Principles of Constructivism (Savery and Duffy, 1995)} (PJW)

1. Anchor all learning activities to a larger task or problem.
2. Support the teacher in developing ownership of the overall problem or task.
3. Design an authentic task.
4. Design the task and the learning environment to reflect the complexity of the environment they should be able to function in at the end of learning.
5. Give the learner ownership of the process used to develop a solution.
6. Design the learning environment to support and challenge the learner's thinking.
7. Encourage testing ideas against alternative views and alternative contexts.
8. Provide opportunity for reflection on both the content learned and the learning process.

\textbf{Letters to the Editor}

(PJW)

The Star-Ledger
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Dear Editor:

In today’s society, technology has become integrated into our daily lives so much that it governs the many ways in which we communicate and share ideas with one another. Whether it be through mobile phones or the internet, we are endlessly connected to the great cyber web of civilization. Yet, one of the most prominent technological vehicles of expression is video games. The gaming industry is now estimated to be worth nine billion dollars annually and over 65% of American homes play both video and computer games on a regular basis!

Some claim that video games are a waste of time while others argue that they are, in fact, a means to expand the mind. Whatever the argument, it is important to consider the countless possibilities of interactive technology. From online educational videos, such as those provided by BrainPOP, to interactive gaming simulations found in the math and sciences, the partnership between technology and education should be celebrated and encouraged.

In the end, video games aren’t just a past time; they can be used as a conduit through which to introduce complex puzzles, challenging problem solving scenarios, vivid conceptualization and most importantly, collaboration among teachers and students!

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Interactive Games and Education

Today’s education is purely on the basis of having a lecture, and then afterwards being examined on the material. I’m sure you’ve heard that American Education isn’t what it used to be and the current statistical results of aptitude scores can prove this statement when comparing the progress and the results of other countries. But what if the current education system is flawed and is there a solution? What if the education was more interactive learning with games and less on learning from lectures? Well, there is a movement by certain people to change the education system from all the way
from 1st grade to 12th grade into having less lectures and exam based education curriculum to more interactive learning of concepts from games. Currently, on the internet, there are many interactive games on various subjects such as chemistry, biology, physics, astronomy, mathematics and much more. Right now, a website called Spongelab Beta gives us free games after you sign up for an account on their website without any obligations. These games allow users to interactive and change certain things to show them different possibilities in how a particular concepts works. An example or a game on their website called Neuron allows users do those things, where the users can add different protein channels and regulate the flow of Na+ ions and K+ ions as well as Ca^{2+}. Once correct amount and charge within and outside of neuron is placed in the stimulation, you’re allowed to stimulate action potential, which will show the users what happens to the flow of ions and how different protein channels open or close. Within the current school system, sometimes students who have mental disabilities can’t manage to learn productively due to current perceived lecture and exam basis education system. It also clear that not all students are the same and thus not all students can perform and gain as much as those who excel in the current education system. Scientists, who are researching predominately on how learning takes place in a physiological and environmental manner, have said that the interactive learning with games tends to excel majority of the students in improving their analytical thinking, team building, multitasking, and problem-solving skills when compared to the current standard system of lecture and examination. These games can facilitate this process due to their ability to stimulate both our emotions and senses. Currently, a charter school called MaST Community Charter School in Philadelphia, P.A. is implementing interactive technology such as smartboards, video cameras, laptops, computers, over 80 different software programs, and much more in their educational curriculum. The statistical success of their students graduating in the past five years from the school has been 100 percent and those graduates having a college acceptance is in 90 percentile with every year growing by 2 percent. Since, today’s education has been lacking in motivating students in participating and better learning, interactive learning with games and technology could be a solution that promotes a revolution of new education system in America.