Healthy Learning Can Be Fun: Digital Media and Health Education

Kevin Kawamoto
University of Washington

Follow this and additional works at: http://commons.pacificu.edu/inter03

Recommended Citation

This Article is brought to you for free and open access by the Interface: The Journal of Education, Community and Values at CommonKnowledge. It has been accepted for inclusion in Volume 3 (2003) by an authorized administrator of CommonKnowledge. For more information, please contact CommonKnowledge@pacificu.edu.
Healthy Learning Can Be Fun: Digital Media and Health Education

Posted on October 1, 2003 by Editor

By Kevin Kawamoto <kawamoto@u.washington.edu>

INDEX:

.01 Interactive Learning
.02 Games as a Form of Reinforced Practice
.03 Health Education Applications
.04 Criticism
.05 Conclusions
References

.01 Interactive Learning (return to index)

One of the remarkable things about many kids who play a lot of video and computer games is how well developed their fine motor skills are as they interact with their computer using a mouse, keyboard, joystick, or other input devices. Kids who spend hours every day, or almost everyday, playing these games can become quite adept at maneuvering through digital space. Their fluid hand-eye coordination becomes second nature, the same way that people who have typed for many years no longer have to think about individual keystrokes as their fingers fly across the keyboard to convey a seamless flow of words and sentences.

Compare this acquired dexterity with people who are new to typing or new to using a mouse. Their movements are awkward and uncertain, their concentration strained, and their thoughts more incremental than fluid. They have to focus on where individual letters rest on a keyboard, for example, or how the moving of a mouse corresponds to the movement of a cursor on screen. Although people learn differently depending on their personal learning style and the subject or activity being learned, it is generally true that most people need to repeatedly practice and study a subject or activity (e.g., a foreign language, driving, ice skating, dancing, athletics,
math, statistics, mountain climbing, watercolor painting, carpentry, etc.) to acquire mastery over it.

With computer games, there are at least two kinds of learning going on simultaneously. One is learning how to use the technology – i.e., getting comfortable and acquiring a facility with the hardware and software used to play the games. The other kind of learning has to do with comprehending the content of the game, whatever that may be – planning a city, assuming a role in a mythical environment, or developing strategies for political and social survival (to name a few).

The early stages of both kinds of learning are often wrought with frustration and even disappointment. The technology doesn’t do what you want it to do, or the content is too complex. After a period of sustained practice and perseverance, however, the learner’s self-confidence and proficiency tend to increase. The results of learning are appreciable, and the players are no longer as consumed with the technical/mechanical aspects of the game, which have become more or less automatic with practice, and can focus their attention on mastering content. Through it all, new skills, insights, and conceptual associations are acquired. The goal of learning is being accomplished.

What does it mean to learn? The *American Heritage Dictionary* defines it this way: “1) To gain knowledge, comprehension, or mastery through experience or study. 2) To fix in the mind or memory. 3) To acquire experience of or an ability or skill in. 4) To become informed of; find out” [1]. A classic academic definition of learning is more specific: “a relatively permanent change in behavioral potentiality that occurs as a result of reinforced practice” [2]. Many people inherently know about the dynamics of learning because it is an activity they have all been doing since birth, except they may not have been conscious of all the processes, stages, and conditions involved. Once they seriously reflect on questions such as, “What motivates me to learn?” and “Once I am motivated to learn, how do I most effectively do it?,” they will probably be able to discuss more learning theory than they realized they knew. The formal research findings of educational psychologists can enhance this knowledge. These questions are deceptively simple, of course. Learning to walk, learning to ride a bike, learning to solve a difficult math problem, learning to play the lead in a tragicomedy, learning how to play the piano, and learning to perform neurosurgery do not necessarily share the same motivations, processes, and rewards. But they do result in a 1) relatively permanent change in behavioral potentiality; and 2) occur as a result of reinforced practice.

Enjoying an activity – or what an activity can lead to (e.g., more money, a good job, satisfying relationships, attention from others, feeling “smarter”) – is an important motivator for learning, even if the learning process is difficult. A student who hates football will probably not work hard, if at all, at becoming good at it. Enjoyment, in this case, would be the missing incentive. A student who loves the drums is more likely to practice it on a regular basis and, eventually, become good at playing it. Enjoyment, however, is not the only incentive to learn something. A good grade in class or the prospects of a career in international relations may motivate a student to study a
particular language and do well in it, even though he or she may not really enjoy the learning process. Along the same lines, a person may not enjoy daily exercise but may enjoy the results of it – i.e., feeling healthier, staying in shape, and “looking good.” If enjoyment is missing in either the activity itself or what it can lead to, reinforced practice is less likely to occur. Hence, enjoying an activity helps make “reinforced practice” more likely.

Computer games, both for children and adults, can be an effective educational tool if played under the right conditions. The interactive nature of the games, the physical and mental repetition and reinforcement they require, and the heightened level of arousal they often trigger can all lead to knowledge gain, comprehension, and mastery.

.02 Games as a Form of Reinforced Practice (return to index)

It is no surprise that people who play certain kinds of computer games actually become more proficient at a specific skill or develop skill sets that were not well developed before the game playing. Whether online or offline, game playing shares certain characteristics. Games tend to:

- be fun, something that the player enjoys doing (despite the physical and mental demands it may require);
- entail practice over time to become good;
- yield greater rewards and satisfaction (e.g., mastery over the game, higher scores, etc.) over time;
- provide opportunities for social interaction (although some games can be solitary) or at least interactivity with a computer program;
- be immersive, occupying a significant amount of the player’s time and attention; and
- possibly trigger physiological changes in the brain resulting in what Kimble called “a relatively permanent change in behavioral potential…”

Computer games are a diverse genre. They run the gamut from cute animations intended to teach the alphabet or colors to young children to sophisticated virtual reality environments simulating air flight, car racing, or medical operations. Some computer games require considerable planning, strategy, design, diplomacy, team-building, business management, and critical thinking skills. Others, the more controversial ones, contain violence, combat, and anti-social themes. Content-wise, it is difficult to generalize about computer and video games. Web sites, publications, and electronic discussion groups accessible on the Internet are good sources to learn about sub-genres in the computer game industry and specific titles. Other ways of learning about the content is to visit a store that sells these products and scan the titles and content description or talking to aficionados who have first-hand experience with computer games.

Although computer games are already being used for educational purposes, the field of computer-based educational gaming is still in gestation. Developers have only scratched the surface of the field’s potential. Part of the problem, perhaps, is with the label of “game” itself,
which for many people suggests something of a trivial pursuit, a way to pass the time, and a frivolous activity. Games, however, have been used in education and training long before their online manifestations have appeared. Their key feature is that they are supposed to be enjoyable, and what is enjoyable sustains attention more easily than what is not enjoyable. Educational games can be found just about anywhere and in elementary school classrooms. Games can be stressful, especially if there is a competitive component to them, but it’s a challenging kind of stress and ultimately all part of the fun. As students get older, however, games tend to occupy less of their formal education and are replaced by more “serious” methods of teaching and learning as educators enforce stricter boundaries between entertainment and education.

With the increased integration of technology in education and the pervasive popularity of computer and video games in society (it is reported to be a $10-plus billion industry and growing), the prospect of computer-based educational games – for children and adults – is receiving thoughtful consideration in both business and academia. This subject as an academic area of interest already exists at a number of colleges and universities, as an August 15, 2003 Chronicle of Higher Education article alludes to – although not everyone agrees that computer games have a place in education. One person who does believe in their potential as a learning tool was interviewed for the Chronicle article. A distinguished professor of education at the University of Wisconsin-Madison, Professor James Gee advocates using computer games to enhance students’ education. Although he has his detractors, he believes well-designed computer games can help teach students about “systems” in an “elaborately interconnected world.” He believes that game designers can improve their games’ relevance to education by “creating games within the context of a curriculum” [3]. These ideas are gradually gaining ground with scholars and researchers interested in the usefulness of computer games in education.

This question asks students to work with census data and do some mathematical figuring. Because the government did not ask the same questions on each census, one can ask students what the different questions asked might signify about historical change and about government interest in such information.

.03 Health Education Applications (return to index)

The potential for using computer and video games for health education is enormous for all age levels and with different target audiences in mind. Games that teach non-professionals (children and adults) about basic health, nutrition, and self-care (and generally any age-appropriate adaptive skills) would advance the awareness of prevention, early intervention, and personal responsibility issues, especially with health problems like childhood obesity, diabetes, sexually transmitted diseases, and others posing current public health concerns.

More challenging games could get into the science of diseases, illnesses, and injuries, integrating subject areas such as biology, chemistry, physiology, and other sciences with real life scenarios.

Problem-solving games involving cases, symptoms, and diagnoses could be used to enhance students’ learning of terminology, procedures, and real life applications. An example of a
A sophisticated computer game could even prepare medical students for complex surgeries, allowing them to practice tedious and sensitive surgical operations in a virtual reality environment instead of using real cadavers or animals. These kinds of simulations could develop hand-eye coordination skills, fine motor skills, self-confidence, anatomy and physiology knowledge in virtual 3-D space, and more. Virtual health education and training are already being developed and used at some medical facilities, often requiring interdisciplinary research participation by medical, computer engineering, art, education, and usability experts. Developers would not necessarily characterize their product as a computer game, but many of the elements of the product parallel simulation games and would be at least classified as virtual reality. Simulated surgeries, for example, would enable the student to take part in a surgical procedure and, using VR hardware and software, experience almost everything a surgeon would feel during an actual surgery, including tactile sensations while handling surgical instruments and making incisions, for example.

Here are several examples of virtual surgery and other computer-mediated medical projects that use computer simulation technology:

Georgia Tech Biomedical Technology Interaction Center
http://www.bitc.gatech.edu/bitcprojects/surgsim.html

University at Buffalo (SUNY) Virtual Reality Laboratory
http://www.vrlab.buffalo.edu/

University of Washington HITLab
http://www.hitl.washington.edu/projects/

There are many other examples of VR being used in the service of training and education. Drs. Veronica S. Pantelidis and Lawrence Auld of the Virtual Reality and Education Laboratory, College of Education, East Carolina University (Greenville, North Carolina) have compiled a list of VR and education Web sites on their home page:
http://www.coe.ecu.edu/vr/otherpgs.htm

Although VR is a technology that is used for both entertainment and education or training (e.g., flight simulation, military applications, virtual museums), it would be controversial to refer to it exclusively as a “game” since the word has many connotations. In a broad sense, however, it does fit the criteria for a game mentioned earlier in that it tends to be fun (most users enjoy and are fascinated by VR technology); it allows the user to practice techniques or experience content repeatedly over a long period of time, if necessary, until a certain mastery and comfort level is achieved; it can provide opportunities for social interaction and/or human-machine interactivity; it
is generally immersive, occupying a significant amount of a user’s time and attention; and it can result in what Kimble called “a relatively permanent change in behavioral potential…” It is also probably a good example of where the line between education and entertainment blurs. If the user finds it fun to fly a plane or explore a museum or remove a gall bladder in a VR simulation, he or she will probably not mind doing it over and over gain, especially if improvements in skill and knowledge are measurable (e.g., assigned scores based on mastery and speed) and visible to the user. Perhaps the most that should be said is that VR simulation can be like a game.

Does the brain change as it learns, even in adults? Some recent brain research suggests that it does. Scientists have long asserted that the infant brain grows rapidly in terms of neuron or brain cell development. According to the American Academy of Pediatrics, the first three years of life “are a critical time for stimulating the learning process … The brain undergoes its most rapid development in the first three years of life, and in this development the environment plays a central role. Nerve connections that are associated with specific skills such as language are developed during this critical period” [4].

More recently, rapidly accumulating scientific literature is suggesting that neurogenesis (the production of new brain cells) can occur in adults. Much of the research is based on experiments with animals, but the implications for human neurogenesis is exciting [5]. Brain research, like the brain itself, is complex, and provisional findings must be regarded with caution. Any single or even group of findings are but building blocks for greater understanding of how the brain works. Even if neurogenesis does occur, it is currently not clear exactly what role it plays in learning, brain cell survival, memory, or any other aspect of brain function. Nevertheless recent brain research is having an impact on theories of learning.

One particularly interesting brain study involves nearly 700 elderly Catholic nuns. Referred to informally as The Nun Study, this longitudinal research project studies “the causes and prevention of Alzheimer’s disease, other brain diseases, and the mental and physical disability associated with old age.” The study has found that writing styles and optimistic emotions earlier in life may correlate to brain health later in life. The study is both complex and fascinating and can be explored more fully through both academic and popular publications [6].

Educational psychologist and veteran educator Rita Smilkstein wrote a “reader-easy” book called, We’re Born to Learn: Using the Brain’s Natural Learning Process to Create Today’s Curriculum, in which she discusses physiological changes in the brain related to learning that involves attention, exploration, experimentation, thought, and practice. The book is geared to a lay audience and makes the important point that “[o]ur brain is our survival organ. It is born with the natural impulsion and ability to figure out – through logic, through seeking patterns and solving problems – how the world works so we can survive.” Smilkstein discusses how dendrites, synapses, and neural networks work when learning takes place, and how these processes form important physiological connections that result in neural development. “However,” she adds, “if these particular structures and connections are not used subsequently, because that skill or idea is not used or practiced, they can be ‘pruned.’ That is, the brain apparently is economical: If a
dendrite or synapse is not being used for a period of time, it can be eliminated” [7] – the “use it or lose it” rule.

The use of computer games in learning allows for self-paced exploration, experimentation, thought, and practice. One characteristic of games is that people tend to play them over and over, especially if their challenge levels are variable (e.g., gets gradually more difficult as mastery is demonstrated). Relatedly, Web-based health education products, such as the Visible Human Data Set accessible on the National Library of Medicine Web site, http://www.nlm.nih.gov/research/visible/visible_human.html, offers an innovative approach to learning. One can use the data set to study the human anatomy at one’s own pace, in whatever way seems most effective. Or one can use the data set to create related projects, building upon the basic data. Here are some examples of projects:


Prior to sophisticated imaging technologies and a host of digital-based software and hardware, not to mention the Web itself, this kind of project would not be accessible to the millions of people who can use it today, either as is, or as a launching pad for further creativity, innovation, and education.

With all the medical technologies available today (e.g., MRI, ultrasound, CAT Scan, PET Scan, etc.) as well as massive private and public databases, libraries, and research centers containing all manner of health information, the content is available to create useful, practical, and effective computer-based health education games for students at all levels and anyone interested in lifelong education.

.04 Criticism (return to index)

Not everyone thinks highly of computer games as an educational tool. Some critics think it represents a “dumbing down” of the curriculum and that learning should not be entertaining. (As mentioned earlier, part of the problem here may be due to use of the word “game” to describe a method of learning.) Computer games also have a negative reputation because they have been blamed, at least partly, for a number of social problems. It was reported that some perpetrators of school violence, including those who committed fatal shootings, were active users of violent, combat-oriented computer games. According to some researchers who have studied the relationship between violent computer games and anti-social behavior, these games not only improved students’ shooting skills, making them practiced marksmen, but also desensitized them to the act of killing. While the link between the violent genre of these computer games and anti-social behavior needs to be studied further, the assertion that skills development and perhaps even attitude change occurs as a result of playing the games is plausible. One would hope that socially beneficial effects would likewise occur with different kinds of content and skill building activities.
More research needs to be done about computer games effectiveness as a teaching and
learning tool. It may be that there are other effects (positive and negative) that may result from
veering too far off from tried-and-true methods of pedagogy. But it may also be that certain
personal learning styles are better accommodated through this form of educational technology –
enhancing learning for students who have not done well with traditional modalities.

What is clear is that computer games are a dominant media used by many school-aged children.
One should keep in mind that television and videos were not always part of the educational
curricula. Whether computer games will find a more pervasive place in the curriculum than it
occupies now has yet to be seen.

This exercise provides a small window into a non-teaching aspect of their instructors’ lives. It
opens the possibility of discussion about what faculty generally must do to become university
professors and what they do for their careers when not teaching. This assignment works well in
an introduction to research/methods course or a first-year introductory course.

.05 Conclusions (return to index)

Computer games, no matter how educational, cannot replace good teachers, parents, and
other humans who are committed to enhancing a student’s learning. Computer games can,
however, be part of the whole “system” or network of resources that help students achieve their
learning goals. These include people, textbooks, lectures, experiential opportunities, and other
components. Educational computer games will be more effective for some subjects than others.
Also, computer games may be better suited to some learning styles than others.

Educational computer games are not a panacea to bored or unmotivated students. A boring,
non-student-oriented game is just as ineffective as a boring, non-student-oriented class lecture
or textbook. The goal of these educational games, as should be the goal of any learning tool,
should be to help students reach their full potential as learners.

Moreover, in light of research about brain health for adults, computer games could play an
important role in lifelong learning, allowing adults to keep their minds active through challenging
interactive games played on a daily or almost daily basis. It could be that in addition to prescribing
exercise, good nutrition, and a few pills a day to keep the mind and body healthy, a challenging
computer game or two could be added to the mix. Many older adults use crossword puzzles for
their daily dose of intellectual stimulation, or play card games, or take a class now and then to
keep their brain cells charged. Why not an intellectually stimulating computer game as well?

Whether for children or adults, for the layperson or specialist, for school, work, or play, the
potential of computer games to enhance human learning is a topic ripe for further research and
development.

References (return to index)
The words “behavioral potentiality” is fodder for discussion. I take it to mean that learning results in a potential change in behavior (e.g., being capable of speaking a foreign language, or speaking it better than before, although whether one actually exhibits that change in behavior is another matter; at least the potential is real). Another example: A non-swimmer takes lessons to learn how to swim. He learns and has the ability to swim, but chooses not to. Whether or not he actually swims after learning how to do so, he has the potential to swim.


A Web site about The Nun Study can be accessed at www.nunstudy.org. A list of articles about The Nun Study can be found at http://www.mc.uky.edu/nunnet/PopularMedia.html#Popular. A book about The Nun Study called Aging With Grace is also available in hardcover and paperback.


From the Chronicle of Higher Education:

VIDEO GAMES 101


The study of video games is a growing field. Here are just a few of the places to find out more about it:

Web sites
* Game Research– a site that discusses the art, science, and business of computer games:  
http://game-research.com

* Game Studies– “the international journal of computer game research”:  
http://www.gamestudies.org

* Games-to-Teach Project– designs educational games at MIT:  
http://web.mit.edu/cms/games/education.html

* Joystick101.org– “a community of gamers, designers, critics, academics, and researchers interested in the in-depth study of video games”:  
http://www.joystick101.org

* Ludology.org– a site that archives opinions, articles, academic papers, and news about conferences and other events in video-game studies:  
http://ludology.org

* MetaGame Group– a project at the University of California at Irvine that, in part, seeks to “develop the study of games and game culture as a serious academic field”:  
http://www.calit2.net/meta-game

Books


* Digital Game-Based Learning, by Marc Prensky (McGraw-Hill, 2000)


* The Nature of Computer Games: Play as Semiosis, by David Myers (Peter Lang, 2003)

* What Video Games Have to Teach Us About Learning and Literacy, by James Paul Gee (Palgrave Macmillan, 2003)

SOURCE: Chronicle reporting

This entry was posted in Uncategorized by Editor. Bookmark the permalink. [http://bcis.pacificu.edu/interface/?p=2814] .

ONE THOUGHT ON "HEALTHY LEARNING CAN BE FUN: DIGITAL MEDIA AND HEALTH EDUCATION"

cork board ideas
on February 5, 2014 at 2:53 PM said: