Current Trends and Issues in Instructional Technology - Trend Analysis of Games

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Introduction to Video and Computer Games

This introductory analysis is the combined research efforts of Jennifer Cohen, Kristi Thorland, and Carole Vowell, and explores the current trends in video and computer games. Our focus is to provide insight into the current demographics of video game users, how games influence the 21st century workplace, and to describe the theoretical basis for the educational value of "real world" immersive games, serious games, and epistemic games.

Team Roles

Jennifer Cohen reported on serious games, epistemic games, augmented reality, evidence for the efficacy of learning games, and iterative design. Jennifer Cohen is the webmaster for the team.

Kristi Thorland reported on the evolution and history of video games, the educational system, and critical thinking, as well as presenting information on semiotic environments.

Carole Vowell reported on gamer demographics, video games and learning, implementation, and the 21st century workforce.

Games Defined

Table 1. Some differences between computer simulation and computer games.

Simulations	Games
Emphasize reality over entertainment	*Emphasize entertainment over reality*
Concern with scenarios and tasks	*Concern with storylines and quests*
Emphasis on task completion	*Emphasis on competition*
May not be interactive	*Necessarily interactive*
Not all simulations are games	*All games are simulations*

According to Alsip and Trollope, a game is defined as an activity characterized by competition, rules, and wining and losing. Electronic games can involve one to many players. Often, players compete with a computer or electronic gaming device rather than with another person. In addition, many simulations can also be considered games (as cited by Bitter and Legacy, 2008, p. 286).

According to Kirkley, Kirkley & Heneghan (2007), there are no standard, precise, widely accepted distinctions between games and simulations in the industry. In Figure 1, Fletcher and Tobias (2006) attempt to key on the differences in emphasis.

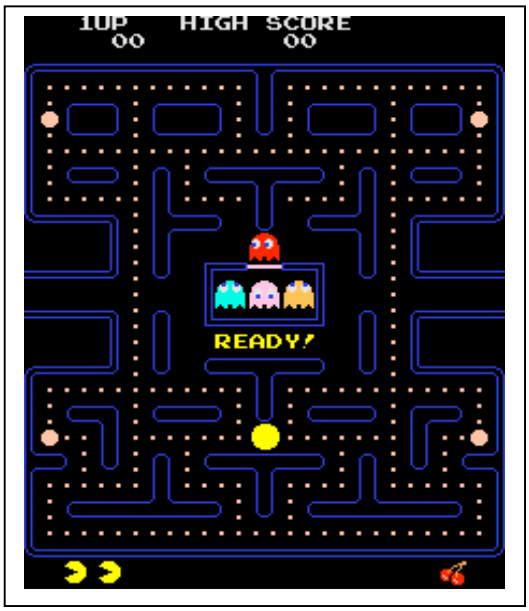
For the purposes of this discussion, the term "games" includes both games and simulations.

Developmental History
This very brief inclusion of the evolution of computer games illustrates how technology has taken us from electronic board games to three dimensional immersive video and computer games, allowing players to assume a new identity in a virtual world.

In **1974** Atari released the first home video game "Pong". Pong launched the modern video game era.

Pong was invented by
Nolan Bushnell long before personal computers were available ("The Great Idea Finder" n.d.).

Original Atari screen shot
Computer Early History Museum
1972

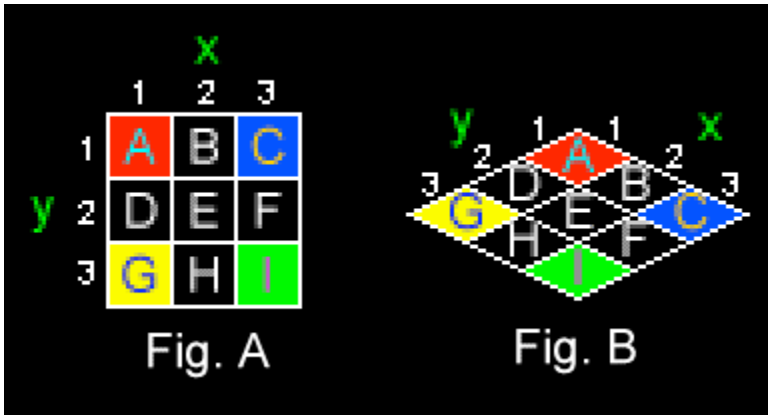


Another early game was Pac-Man. Pac-Man was released to video arcades in the **1980's,** and is considered to be one of the most famous video games ever (Green, 2002).

Screenshot of the original arcade version of Pac-Man.
(http://en.wikipedia.org/wiki/Pac-Man)

The early computer and video games were modeled after existing board game conventions. The player is external to the game while moving game pieces. All the action of the game takes place in a two dimensional frame space with a bird's eye view of the game space.

1990s With the progression of more advanced computer graphic technology the progressions and integration of isometric and 3 dimensional views became possible. Video and computer games moved to a much more sophisticated level.

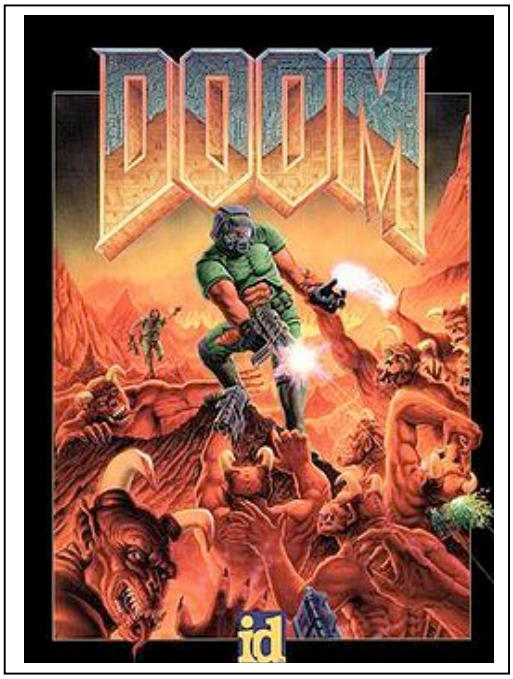


Basic conversion from two dimensional to three dimensional view (Golden T Studios)

Throughout the 1990's some very successful games, like Civilization II and Diablo, used a fixed isometric perspective.

In this screenshot of *Civilization II,* most of the game world has been discovered (Wikipedia –The Free Encyclopedia, n.d.)

With the availability of affordable graphics accelerator cards and faster processers, game designers have been able to create increasingly more sophisticated game space environments. Games such as Quake and Doom marked the departure of external player positioning and moved the player into the environment by using the first person point of view (POV). Dickey, M. (2005) noted that the result of this shift is that players became part of the environment, no longer viewing the entire game space within one or several frames but, rather encountering events, actions and activities as they move through the graphical environment (as cited by Riddle, 2002).



In 1993 id Software released its landmark title, Doom, the first-person shooter game, and the *first* first-person point of view computer game. It is widely recognized for pioneering immersive 3 D graphics, and networked multiplayer gaming supported for custom expansions on the PC platform (Wikipedia The Free Encyclopedia (2)(n.d.)).

Why should we care about the progression of computer games into 3D first-person environments?

Two leading educators and futuristic thinkers, Mark Prensky and James Gee would be very quick to tell you that there are multiple reasons for educators to stand up and take notice of the dynamic possibilities to provide real world skills training through immersive games.

Is our Education System Obsolete?
According to Marc Prensky,we have an obsolete educational school system that lags behind current trends in technology (Prensky, 2001). Prensky has popularized the term "digital native." These are students who have grown up surrounded by digital devices such as computers, videogames, cell phones and other tools and toys from the digital age.

Pensky believes that this generation of students process information differently than "digital "immigrants," those of us who have had to acquire digital technology skills by taking computer training classes or make concentrated efforts to learn new technologies. According to Prensky, digital natives are used to receiving their information fast and they like to parallel process and multi task. They function best when networked and thrive on instant gratification and frequent rewards. He argues that digital natives think and process information differently than previous generations.

Knowing the characteristics of this generation, it comes as no surprise that older methods of teaching like lectures and step-by-step instructions and teaching to-the-test,do not engage or motivate today's students. These students are bored with linear, logical thinking and need to be challenged in more complex and comprehensive ways. Educational games or "Serious games"

can provide virtual learning environments that will engage students in a digital medium that they are accustom to.

How can immersive virtual games provide critical thinking opportunities?

In his book *What Video Games Have to Teach us About Learning and Literacy* (Gee, 2007), James Gee describes the characteristic of good game design that results in active learning, critical thinking and reflective thinking. He begins by stating that to learn a new video game the player must learn the characteristics of the semiotic domain. Semiotic domains are the salient characteristics that make up the virtual world. These characteristics include: words, symbols, images and artifacts that have specific and significant meaning to the culture of the game (page 25). Once the player has begun to learn through trial and error how these items work together he can begin to use his knowledge to strategize the negotiation of the game's challenges. Another critical element to learning the game is to participate in what Gee calls an "affinity group." This may be other players in the game or contacts the player makes through searching for information about the game in the internet and in blog or support networks online.

Gee summarizes 5 learning principles that are built into good video games and can be incorporated into any teaching plan (Gee, 2007):

1. Active, Critical Learning Principle -All aspects of the learning environment are set up to encourage active and critical, not passive learning.

2. Design Principle- Learning about and coming to appreciate design and design principles is core to the learning experience.

3. Semiotic Principle – Learning about and coming to appreciate interrelations within and across multiple sign systems (*learning domain elements- this author's terminology*) (images, works, actions, symbols, artifacts, etc.) as a complex system is core to the learning experience.

4. Semiotic Domain Principle- Learning involves mastering, at some level, semiotic domains, and being able to participate, at some level, in the affinity group or groups connected to them.

5. Metalevel Thinking About Semiotic Domains Principle- Learning involves active and critical thinking about the relationships of the semiotic domain being learned to other semiotic domains

Video Games and Learning
Gee is convinced that playing video games is not a waste of time. He writes about 36 principles that are "equally relevant to learning in video games and learning in content areas in classrooms." (Gee, 2003)

In a 2003 interview with GameZone, Gee gave some examples on how video games help people learn. He notes that it's difficult for humans to learn when you inundate them with lots of verbal information. So it's best, like games, to "give verbal information 'just in time' when and where it can be used and 'on demand' as the player realizes he or she needs it." (Bedigian, 2008)

Good games also create routines and "cycles of expertise." Players are faced with problems but are given the opportunity to form good strategies and to practice them, until they reach a newer and higher routine set of skills. Then throw "a new problem at them that forces them to undo their now routinized skills and think again before achieving, through more practice, a new and higher routinized set of skills." (Bedigian, 2008)

Another example is that good games solve the motivation problem by having the player virtually feel that their bodies and minds have entered another environment. By having this new virtual identity, the player is empowered and "thinks and learns in new ways or at least thinks about new values, belief systems and world views." Gee believes that "we could do better at teaching science in school if kids really invested in a scientist identity."(Bedigian, 2008) Gee points out the argument in his book "is not that what people are learning when they are playing video games is always good. Rather, what they are doing when they are playing good video games is often good learning." (Gee, 2003, p.199)

Gee believes that "most companies making games for school don't get it." It's not as much as the hand-eye coordination of operating a game at high speed levels or as he says "twitch speed." It's about the "interactive world that the player partly creates through his actions and decisions." He also believes that "people are too hung up about learning content in the sense of facts." He discusses that we need to have people learn and "think deeply about complex systems where everything interacts in complicated ways with everything else and bad decisions can make for disasters." (Bedigian, 2008)

Serious Games: Learning in the Real World
The Serious Games-Engaging Training Solutions project (SG-ETS) defines serious games for learning as, applications that use the characteristics of video games, to create educational and engaging learning experiences, and deliver specified learning goals (de Freitas, 2008).
Serious games are "hard fun" (Papert, 1980), the kind of fun you have when you work on something difficult, something that you care about, and finally master (Kirkley, Kirkley & Heneghan, 2007). According to Scheffer (2007), what makes a game a game is neither "fun," or "wining or losing," nor even the idea that the game is "safe," since games can have very real consequences such as injuries in football or losses in gambling games. The real world requires

people to think like creative professionals, synthesizing facts from many different sources. The epistemology of computer games is the study of how we come to know something through the use of computer games. Epistemic games are the building blocks of serious games that require the learner to think in ways that build bridges from learning in the game world to learning in the real world.

Epistemic Games

Epistemic games are games that result in the creation of epistemic forms. Epistemic forms can be diagrams, lists, maps, models, or any other representation that organizes knowledge. Epistemic games have entry conditions, moves and actions, and rules and constraints that govern the game. An example of a very simple epistemic game is the hierarchical arranging of food products into food family groups (Sherry & Trigg, 1996). Squares containing terms such as meat, dairy, legumes, plants, nuts, etc., are arranged randomly. Each player draws one type of food product per turn, and positions it into a hierarchical diagram onscreen. The player then draws connecting lines to join the new card to existing cards.

The process of creating a hierarchical diagram is epistemic because the player is acquiring knowledge through the process of creating a diagram. An epistemic game requires the learner to gain knowledge through independent thinking and actions, as opposed to simply being given the diagram and told to learn it. Learning from epistemic games gives players an opportunity to solve problems in a real world way.

Shaffer (2006) describes epistemic computer games as authentic learning through role-playing games (RPG) designed to simulate reproductive practices. Reproductive practices, such as internships and apprenticeships, are what particular fields do to train new people. Thus, epistemic computer games recreate the process of how people in the real world learn to think like creative professionals.

Augmented Reality

Games that are situated in the real world with mobile devices may involve competition, but are often designed around the theme of collaboration. Augmented reality handheld games (ARHGs) are location based simulation games. The goal of the ARGHs is to capture authentic learning opportunities by engaging in games in real spaces. The hand held device displays the real environment on screen with an overlay of virtual information. The virtual overlay could be people or objects. Both real and virtual information play a significant role in the game (Klopfer, 2008). Environment Detectives (ED) is an ARHG developed by the Games to Teach project at MIT. Student teams are given information about a toxic spill. The teams then visit the location of the spill site with the handheld device, and go to work assessing the situation. Teams use information from the augmented reality environment in combination with the real environment to develop a collaborative solution to the problem.

Do Serious Games really teach?

Though there is a lot of excitement about the educational possibilities for serious games, there is little empirical evidence to prove that they actually work. Britain's 4-year, 3 million dollar research and development program, the SG-ETS project, is developing a series of evaluation techniques to measure the effectiveness of game based learning. Some of the key questions asked by the SG-ETS project include, "what are the instructional design principles for effective

learning for serious games?" and "what type of learning objective is best satisfied with games?"(de Frietas, 2008). The SG-ETS project concludes in 2010.

Until more conclusive research is done proving the efficacy of serious games for learning, there is compelling evidence to suggest that computer games are useful. Games have been found to have positive benefits for certain user groups, in particular under served, more visual, and younger learners, (de Freitas et al, 2006). Studies have not yet confirmed the full power of educational games for older learners (de Freitas, 2008). However, according to a UK Home Office report, "those who play computer and video games regularly are more likely to be academically successful, to go to University and to have better employment prospects" (Krotoski, 2005).

Assessment of success is important to understanding the efficacy of any instruction. Assessment of game based learning is typically derived from the game's objective quantifiable outcomes, such as wining points for completing a task successfully. Shelton and Wiley (2007) point out that designers need to be careful not to implement disengaging activities within the design that disrupt the flow within the game. Stating the designer's objectives, such as skill testing for each activity while the game is in play, would seriously disrupt the users interest. An alternative to testing for objective quantifiable outcomes is to allow the players to define their own goals, and to assign their own values to those goals (Klopfer, 2008), possibly resulting in a more authentic assessment of a learner's success.

Despite the lack of empirical evidence for the use of serious games, there are many motivating forces generating interest in serious games. The "green revolution" is pushing major corporations like IBM and SAP to experiment with virtual world technology as a way of saving on energy and operational costs (Au, 2008). Also motivating the move toward serious games is the pervasive popularity of technology, especially among the net-savvy Generation Y (Au, 2008). Pressures from the learners themselves will likely motivate industry and education to incorporate serious games into training (Derryberry, n.d.).

Iterative Design

Games for learning need to be designed to work for a large variance in user characteristics. People learning from games come from different locations, different levels of education, achievement, ability, and technical skills. Indeed, the games may or may not be chosen by the learners themselves. So while commercial game developers know their target demographic, educational game designers do not necessarily start with all the information they need about their users. Software developers use iterative design procedures to ensure that games can be altered as needed to suit new audiences.

Software engineers, working together with instructional designers and other contributors, use the iterative process to develop games that are continuously evaluated for success. Iterative design procedures require that a game design is continuously evaluated and re-designed until the product's requirements are fulfilled. The iterative design process has five steps (McGonigal, 2007): Mission statement, prototyping, play testing, evaluation, and re-state mission, if necessary, and re-design. Evaluation areas ask: is the game accomplishing its goals? Do players

understand what they are supposed to be doing? Do the players want to play again? Could they play it differently the next time?

According to Kam, Ramachandran, Devanathan, Tewari, & Canny (2007), iterative design is critical when designing educational software games, particularly for underdeveloped regions. Iterative design is indicated when:

1. It is difficult to obtain an accurate understanding of the user's educational baseline.
2. The user's limited computing experience implies iterating for usability.
3. Local stakeholders and designers do not share a common cultural background, which involves continuous co-learning and iteration until the design is consistent with the local culture and social norms.

Implementation into the classroom

There are several practical and logistical questions to ask to determine if game use can be played at your school. "Analyzing the games, learners and environment prior to incorporating a game into the design of instruction is critical." (Gilkas & Van Eck, 2004)

Some questions to ask about the learners: Do they play games and at what level? Will the chosen game consider individual differences? Will your learners have access to computers? Have their hardware requirements been considered? Will the instructor have computer access to play the game during instructional time?

Some questions to ask yourself as the instructor: Do you play games and are you interested in playing games? Will your learners all have the same sequence of events happen to them while playing or can they make individual choices and face individual challenges? Will the speed of play effect the overall outcome of the game? Have you played the game thoroughly to determine where any potential problems may arise, or to identify what game components can be implemented into your instruction?

Some questions to ask about the environment: Will the computer hardware support the game being played? Who will install the game? What are the time constraints on the computers in the learning environment? Will students be able to save games on the computers in the learning environment? (Gikas and Van Eck, 2004)

Demographics and Social Impact

According to the Entertainment Software Association 65% of American households play computer or video games today. It's not only the stereotypical "geeky" male teenager sitting in front of his computer for hours. Women constitute 40 percent of gamers. The Entertainment Software Association also points out "that women over the age of 18 represent nearly twice as much of the gamer population, than do boys age 17 or younger." TechNewsWorld writes that "the average gamer is 35 years old and has been playing video games for 13 years. Though only one out of four gamers is under 18, nearly half who play video games are between 18 and 49."(Haskins, 2008)

Chief executive officer of WomenGamers.com, Phaedra Boinodiris, said that "women typically spend less time in a single sitting playing than their male counterparts." (Haskins, 2008) There still seems to be a need to change the looks of female game characters for the female market. Robyn Tippins, a community manager at Yahoo Developer Network, says "female game characters are a sad caricature of females, and they do a gross injustice to the women playing these games." She points out that "what women do not need are more buxom, nearly naked female characters who represent little more than either male character types with more curves and skier outfits or giggling, flirtatious and silly airheads." (Haskins, 2008)

Ten years ago, Professor Marsha Kinder from the School of Cinema-Television at University of Southern California points out that an important factor that created the transition of more females interested in gaming

> "comes from those interested in social change within the educational sphere. Since the Clinton administration has made the hard-wiring of schools an important priority, there has been a dawning realization – among politicians, educators, parents and manufacturers – that there is a desperate need for software that can appeal to both genders. Another important factor is the increasing participation of women in the discourse defining the new media – whether as activists, theorists, researchers, teachers, mothers, designers, industry spokeswomen, or entrepreneurial feminists – because we women are increasingly realizing what is at stake in this cultural battle". (Cassel & Jenkins, 1998)

How is this evolving social system affecting learning and the future workforce?

21st Century Workplace

We need to point out that those who have access and experience to video games may be better prepared for our future's workforce. Combining what James Paul Gee states in learning theories and what John Seely Brown and Douglas Thomas say, gamers would thrive in the 21st century workplace. Their views are supported from an IBM survey titled "The Online Gaming world can provide business leadership insights for the 21st century".

Harvard Business School professor Linda Hill points out that "organizations risk overlooking potential leaders because they are "invisible" – that is lack the high-profile personal characteristics such as compelling communications skills, that we associate with leadership. Ironically, these invisible leadership candidates may in fact possess characteristics – for example, modest egos that don't get in the way of collaborative work – that are ideally suited to tomorrow's business environment." (Hemp, 2008). Hill is co-authoring a book on collective genius with Greg Brandow, an executive at Pixar. Similar to multiple player games, everyone has something to contribute, which is important for innovation. The workplace will create a culture of engagement and learning, and employees will bring their whole self to work, because they are doing something that matters to them deeply.

Brown and Thomas (2008) note five attributes that a gamer disposition will thrive in in the 21st century workplace.

The five attributes are:

> 1.) "Bottom-line oriented – gamers like to be evaluated and compared with one another, through a system of points, rankings, titles, and external measures. Their goal is not to be rewarded but to improve." (Brown and Thomas, 2008) IBM survey states that "leaders focused on execution will motivate employees with on-the-spot feedback and rewards that are aligned with strategic imperatives. (DeMarco, Lesser, O'Driscoll, 2007)
>
> 2.) "They understand the power of diversity" – gamers are familiar with not being able to do it all by themselves, and rely on their team player's diverse talents and abilities to help complete the game. Rather than asking "How good am I," it's "How much have I helped the group." (Brown and Thomas, 2008)
>
> 3.) They thrive on change – Gamers are familiar with transforming the world they inhabit. They don't "simply manage change; they create it, thrive on it, seek it out." (Brown & Thomas, 2008) In the IBM survey 'visioning' will remain an important behavior for leaders of "globally integrated enterprises to master while communicating to a changing global workforce." (DeMarco, Lesser, O'Driscoll, 2007)
>
> 4.) They see learning as fun. Part of the fun for gamers is overcoming obstacles, and assembling and combining tools and resources that will help them learn. They find rewards by "converting new knowledge into action and recognizing that current successes are resources for solving future problems." (Brown and Thomas, 2008)
>
> 5.) They marinate on the "edge." Gamers are familiar with multiple layers and complex evolving social systems. They thrive on looking for a better way to solve problems. They often "reconstruct their characters in outrageous ways" to try something new. They desire to seek and explore the edges to "discover new insight or useful information that deepens their understanding of the game." (Brown and Thomas, 2008)

"Together, these five attributes make for employees who are flexible, resourceful, improvisational, eager for a quest, believers in meritocracy, and foes of bureaucracy. If your organization is receptive to these traits (and it should be), look for gamers and the disposition they will bring you."

Conclusion

Gaming has come a long way. The evolution of games has brought us the potential to use three dimensional first person immersive video games to develop critical thinking skills. The demographics of gamers, from digital natives to digital immigrants, are shaping the 21st century workforce. Rather than narrowing down to a speciality, gamers are learning to have a multi-

disciplinary outlook. Epistemic and augmented reality games teach real world skills with authentic game playing that can be implented in the classroom. Bringing the relevent principles of video games into training and education is the task of instructional designers who wish to use gaming in their curriculum.

The future belongs to global collaborators thriving on change.

References

Au, W. (2008, September 10). *Where's the serious ROI in serious games?* Message posted to http://gigaom.com/2008/09/10/wheres-the-serious-roi-in-serious-games/

Bates, B. (2004). *Game design*. Retrieved November 21, 2008, from book excerpt. Web site: http://books.google.com/books?id=f7XFJnGrb3UC&dq=design+theory+of+video+gaming&pg=PP1&ots=vHv4WpCsQr&source=in&sig=_CgxjaHfbzMmGCw9l5dvkylWS_0&hl=en&sa=X&oi=book_result&resnum=12&ct=result - PPP1,M1

Bedigian, L. (n.d.). *Professor James Paul Gee shows the world the importance of video games*. Retrieved November 21, 2008, from GameZone: Your PC and Video Game Connection Web site: http://www.gamezone.com/news/07_03_03_06_17PM.htm

Brown, J., & Thomas, D. (2008). The Gamer Disposition. Retrieved November 22, 2008, from *Harvard Business Publishing: The Gamer Disposition* Web site: http://conversationstarter.hbsp.com/2008/02/the_gamer_disposition.html

Cassell, J., & Jenkins, H. (1998). *From Barbie to Mortal Kombat: gender and computer games* (pp. 226-227, 341). Cambridge, Massachusetts: The MIT Press.

Chronicle of Higher Education 2003. James Paul Gee (Interviewee). (2003) The Colloquy Live (chat) Transcript Retrieved 12/5/2008 from http://chronicle.com/colloquylive/2003/08/video/

Computer History Museum (1972) Retrieved December 5, 2008, from http://www.computerhistory.org/timeline/?category=gg.

Danc (2006). *What are game mechanics?* Retrieved November 21, 2008, from Lost Garden Web site: http://lostgarden.com/2006/10/what-are-game-mechanics.html

de Freitas, S., Savill-Smith, C., and Atwell, J. (2006). *Educational games and simulations: Case studies from adult learning practice*. London. Learning and skills research centre.

de Freitas, S. (2008). Emerging trends in serious games and virtual worlds. *Emerging technologies for learning,* 3. Retrieved November 23, 2008, from http://www.scribd.com/doc/2883075/emerging-technologies08-chapter4

DeKanter, N.(2005). Gaming Redefines Interactivity for Learning. *TechTrends*. Volume 49, Number 3.

DeMarco, M., Lesser, E., & O'Driscoll, T. (2007) *Leadership in a distributed world: Lessons from online gaming*. Retrieved November 22, 2008 from IBM
Web site:
http://www.935.ibm.com/services/us/index.wss/ibvstudy/gbs/a1028184?cntxt=a1005263

Derryberry, A. (n.d.). *Serious games: Online games for learning.* Retrieved November 22, 2008 from http://www.adobe.com/resources/elearning/pdfs/serious_games_wp.pdf

Dickey, M. (2005). Engaging By Design: How Engagement Strategies in Popular Computer and Video Games Can Inform Instructional Design. *ETR&D,* Vol. 53, No. 2, 2005, pp. 67-83 ISSN 1042-1629.

Fletcher, J.D. & Tobias, S (2006). *What research has to say (thus far) about designing computer games for learning.* Paper presented at the American Educational Research Association, Chicago, IL.

Gee, J. P. (2003). *What video games have to teach us about learning and literacy*. New York: Palgrave Macmillan.

Gee, J. P. (2007). *What video games have to teach us about learning and literacy.* New York, N.Y.: Palgrave Macmillan.

Gilkas, J., & Van Eck, R. (2004). Analyzing & designing: instructional design guide (Abstract). *Educause Connect: transforming education through information technologies*, 6-7. Retrieved from
http://connect.educause.edu/Library/Abstract/IntegratingVideoGamesinth/42576?time=1227411357

Golden T Studios n.d., Golden T Studios : *Fun & Education Center. Fun to play games and encourage you to make your own games*. Retrieved 12/5/2008
From http://www.goldenstudios.or.id/

Green, C. (2002). *Pac-Man*. Retrieved 12/5/2008 from
http://dir.salon.com/story/ent/masterpiece/2002/06/17/pac_man/print.html .

Hannaford, K. (2007). *Top ten list of female video-game characters you should idolize.* Retrieved November 21, 2008, from Shiny Media: Shiny Shiny, a girl's guide to gadgets
Website: http://www.shinyshiny.tv/2007/04/top_ten_list_of.html

Haskins, W. (2008). *Where are the video games women really want?* Retrieved November 21, 2008, from TechNewsWorld: Gaming
Web site: http://www.technewsworld.com/story/64900.html?wlc=1228455795

Hemp, P. (2008). *Does your leadership development strategy include World of Warcraft?* Retrieved November 22, 2008, from Harvard Business Publishing: HRB Editors' Blog Web site: http://discussionleader.hbsp.com/hbreditors/2008/02/19/

Hemp, P. (2008). *Where will we find tomorrow's leaders?* Retrieved November 22, 2008, from Harvard Business Publishing: Harvard Business Review video interview with Linda A. Hill, Professor Harvard Business School
Web site:
http://harvardbusinessonline.hbsp.harvard.edu/flatmm/hbrextras/200801/hill/index.html

Kam, M., Ramachandran, D., Devanathan, V., Tewari, A, & Canny, J. (2007). *Localized iterative designs for language learning in underdeveloped regions: The PACE framework.* Retrieved November 16, 2008, from
http://www.encorewiki.org/display/encore/Technology+and+Education+in+Developing+Settings

Kirkley, J., Kirkley, S.E., & Heneghan, J. (2007). Building bridges between serious game design and instructional design. In B.E. Shelton & D. Wiley (Eds.), *The Design and Use of Simulation Computer Games in Education* (pp. 61-83). Rotterdam, The Netherlands: Sense Publishers

Klopfer, E., (2008). *Augmented learning: Research and design of mobile educational games*. Cambridge, MA: The MIT Press

LaChapelle, N. (n.d.). *Game design as instructional design*. Retrieved November 16, 2008 from http://connect.educause.edu/blog/HiredEd/gamedesignasinstructional/44703?time=1226726995

Krotoski, A (2005), Games for Learning. *Technology Review.* Retrieved November 23, 2008 from http://www.technologyreview.com/computing/14349/?a=f

McGonigal, J (2007, March 7). Iterative game design. Message posted to
http://thismightbeagame.blogspot.com/2007/03/iterative-game-design.html

Papert, S (1980). *Mindstorms: Children, computers, and powerful ideas*. New York: Verso.

Shaffer, D. (2006). *How computer games help children learn.* New York: Palgrave Macmillan

Shaffer, D. (2007). In praise of esitemology. In B.E. Shelton & D. Wiley (Eds.), *The Design and use of Simulation Computer Games in Education* (pp. 7-27). Rotterdam. The Netherlands: Sense Publishers.

Shelton, B. E., & Wiley, D. (2006, April). *Instructional designers take all the fun out of games: Rethinking elements of engagement for designing instructional games.* Paper presented at the American Educational Research Association (AERA) 2006, San Francisco. Retrieved November 13, 2008, from:
http://ocw.usu.edu/Instructional_Technology/Instructional_Games/AERA06_IDgames-bes_dw.pdf

Sherry, L., & Trigg, M. (1996). Epistemic forms and epistemic games. *Educational Technology*, 36(3), 38-44.

Phil Ament, (n.d.), *Pong Video Game* Retrieved 12/5/2008, from http://www.ideafinder.com/history/inventions/pong.htm.

Wikipedia The Free Encyclopedia, n.d. Retrieved 12/5/2008, from http://en.wikipedia.org/wiki/Civilization_2

Wikipedia The Free Encyclopedia(2) n.d. Retrieved 12/5/2008, from http://en.wikipedia.org/wiki/Doom_(video_game)