Integrating Commercial Off-the-Shelf Video Games into School Curriculums

By Dennis Charsky and Clif Mims

"Many teachers have their students analyze movies using historical accounts and write a film critique. Writing film critiques helps students learn valuable aspects as well as the limitations of films by putting the films into proper historical perspective."

Games have a long history of being used for instructional purposes. Games can be defined as playful activities, with or without a computer, that have some essential characteristics (Dempsey, Lucassen, Haynes, & Casey, 1996). Game characteristics can include competition and goals, game rules (Alessi & Trollip, 2001), challenging activities (Malone & Lepper, 1987), choices (Hannafin & Peck, 1988), and fantasy elements (Cruickshank & Telfer, 1980; Lepper & Cordova, 1992). Games that take advantage of these characteristics have been shown to be a valuable instructional method and strategy for teaching a wide variety of students and content (Alessi & Trollip, 2001; Gredler, 2003; Gros, 2003; Hannafin & Peck, 1988). Creating game-based learning environments or experiences using Commercial Off the Shelf (COTS) games is becoming an increasingly tenable, valuable, and popular instructional strategy (BECTA, 2001; DeKanter, 2005; Kirkley & Kirkley, 2005; Kirriemuir, 2005A, 2006; Simpson, 2006).

COTS games are computer or video games created almost entirely for entertainment purposes, yet some COTS games are not absent of intellectual challenges or content. A few popular examples are SimCity, Age of Empires, Zoo-Tycoon, and Railroad Tycoon. This does not imply every COTS game is appropriate for use in the classroom. Teachers working with middle school, high school, or post-secondary students probably will find integrating COTS games most beneficial when the games align with the curriculum and provide intellectual challenges appropriate for their students' abilities. The researchers have constructed guidelines that will help educators effectively integrate COTS games. These are mostly anecdotal and based on the researchers' personal experiences integrating COTS games, assisting other educators integrate COTS games, and the literature associated with the integration of technology with teaching and learning, especially as it relates to games and simulations.

Play the game—extensively

Mastering the game is a must. Teachers should play the game in a variety of ways attempting different strategies, goals, win conditions, etc. The teacher's knowledge of a game is invaluable in helping students overcome frustration and troubleshooting any issues that may arise. While teachers should not teach every single aspect of the game, they will introduce many students to the game or a game of a particular genre for the first time. To reduce students' dependence on the teacher to explain all aspects of a game, teachers may choose to create a print tutorial, guide sheet, or job aide to help students learn how to play the game. Games typically come with a manual, but teachers can create a custom guide that pinpoints problem areas to overcome and/or accentuate aspects of the game, especially those pertinent to the curriculum.

Learn the game—extensively

Playing the game does not guarantee teachers will know absolutely everything there is to know about the game. Typically there are a variety of strategies, cheats, "Easter eggs" (hidden treasures), and other aspects that take time to find or learn. We suggest purchasing a strategy book or visiting a variety of venues devoted to the game, such as "fan sites" (websites developed by fans about the game), discussion boards, game review sites, or blogs. These shortcuts can greatly expedite game play on particular levels and can help teachers master the game more quickly (Gee, 2004; Prensky, 2001).

At this point, teachers need not design lesson plans or a syllabus, but should begin formulating a solid vision and a set of ideas for what their course and teaching would entail upon integrating the games. During this phase we suggest that you begin to write down, journal, blog, etc. your ideas for integrating the game.

Get administrative support

This task is crucial since teachers will need administration to assist with the purchase of necessary hardware and software, enlist the assistance of technology support, and help reassure skeptical parents and colleagues. We suggest writing a high-concept statement, which the administrator can sign verifying approval, that describes why the game is appropriate for learning, articulates your ideas for integrating the game, approximates how much computer laboratory time is needed (if you are going to teach in a computer laboratory), and estimates additional funding that may be necessary.

Get the software

Obtaining the software is probably the biggest hurdle to jump over. First, we suggest requesting donations from the game distributors (Atari, Microsoft, Electronic Arts, etc.). Contact a software company's public relations office via phone or email and share your high-concept statement with them. People in these positions will be able to get approval for donations and are usually looking for ways to promote the game.

Second, consider teaming up with local educators who are working on graduate degrees or university faculty doing research in this area. Tieing the teaching to a research project may also appeal to the software companies. If teachers cannot obtain a game for free they should look for it to go on sale soon after its initial release. A COTS game priced at $50 on the release date will typically cost $25 or less within about three months.

Lastly, teaming students in pairs will cut the number of licenses needed by half and reduce your budgetary needs. You can help decrease skepticism and frustration and improve learning among non-gaming or reluctant students by teaming them with students who are more comfortable with games (Johnson & Johnson, 1996).

Get technology support

Once the games have been obtained, teachers will likely need a "tech person" to help with the installation (administrative rights may be needed to install software). The tech person can also install additional plug-ins or tweak the computer settings to make the games run smoothly.

Contact parents and your colleagues

It is important that you dispel the notion that students will be "just playing video games" in class. Teachers must convey to all interested and concerned parties that playing the game is part of the larger curriculum and class activities, which will include: [insert your ideas here]. Let all interested parties know the purpose of the activity/unit, detail specific class activities that will relate the game to the content and curriculum, and cite research to help justify using the game. Charsky (2004) integrated Civilization III into a ninth grade history class and found that students were able to understand many concepts through playing the game and completing concept mapping activities. Simpson (2006) integrated Restaurant Tycoon into a high school class and found that the game-based learning environment did not detract from students learning the subject matter or in meeting state standards.

Be prepared to assign alternative activities if a few parents/students remain uncomfortable with the idea. Send the administration copies of all communications and consider sharing evidence/learning artifacts that demonstrate the educational value of the COTS games with parents/guardians, colleagues, administrators, and other stakeholders. This might be achieved through a combination of resources such as digital images, computer printouts, a website or blog, email attachments, electronic portfolio, parent folders, bulletin boards, showcases, parents' night, etc.

Plan an adequate amount of time

Typically, COTS games are designed to take about 40 – 60 hours to play to completion. Most of the time, depending on the game being used, completing the game is a priority. Squire (2004) and Charsky (2004) found that students needed to play Civilization III for at least 15 hours in order to have a basic understanding of how to play. Many more hours would be

needed to test and confirm/reject strategies, effectively critique the game, understand the underlying simulation model, and critically analyze and understand how the game relates to the course/curriculum. We suggest that using the COTS game for six weeks is good, many months are better, the whole year might be best. Students should not play the game every single day, however; maybe three or four days a week at the start until they learn how to play the game. Then teachers can scale back in-class playing time to once or twice a week to increase the number of sessions devoted to curricular/instructional activities that tie into the game.

"Players' perceptions of the game evolve from a game to learn— to a game to play— to a game of rules— to a game of strategy."

The authors are aware that all schools operate under tight daily schedules and that consistent scheduling of computer laboratories can be a challenge; yet there does not seem to be a way around the class becoming very computer centered. Kirriemuir (2005b) created strategies for integrating COTS games in which the teacher guides students through particular scenarios, splits the class into teams, and/or uses games that have been saved at a particular state and/or modified by the teacher so students play only a portion of the entire game. While these strategies are effective, each still requires the use of computers and devoting a portion of class time to playing the game.

Modifying the game or providing a saved-game state could reduce the amount of in-class playtime, but significantly increases the amount of preparation time for the teacher who must make the modifications and/or play the game to a particular point, then distribute that saved-game state to all computers in the classroom or laboratory.

Design instructional activities that connect the game to the content

Integrating a COTS game is similar to integrating what Hooper and Rieber (1995) call an "idea technology." An idea technology provides learners with a context, problem, scenario, or experience that is very difficult if not impossible to provide students (going to Mars, becoming Mayor of Chicago, experimenting with hydrochloric acid). We recommend creating three types of activities that should be used throughout the game-related unit. These instructional activities are based on Laveault and Corbeil's (1990) work in which the board game Diplo-

macy was integrated into a college level history course. Laveault and Corbeil (1990) found that their students progressed through eight stages of learning when they played a game for learning purposes. Laveault and Corbeil supported their eight-stage theory by asserting that players progress through the first four stages via assimilation and accomodation, where play represents assimilation and imitation represents accommodation.

Players' perceptions of the game evolve from a game to learn—to a game to play—to a game of rules—to a game of strategy. Laveault and Corbeil linked each of the eight stages to Kolb's (1984) experiential learning model. Using this cyclical learning model, the player will first view the game as a concrete experience (game to learn), then move into reflexive observation (game to play), then abstract conceptualization (game of rules), and the active experimentation (game of strategy).

Within the final four stages the cycle repeats from concrete experience (simulation game), to reflexive observation (simulation game as a specific theory/conception of the domain), to abstract conceptualization (domain specific simulation), to active experimentation (meta-game and meta-simulation. game invention). This second cycle also denotes that the players' perceptions of the game shift from a concrete experience to a more abstract conceptualization. In essence, the players' perceptions of the game and what they will learn from that perception has evolved to a state where players can critique the game as a conceptualization of the content area, offer alternative models for the content area, and invent their own model for the content area.

Based on their findings, we have developed three types of instructional activities that may help facilitate learning throughout Laveault and Corbeil's eight stages of learning from games and simulations (see Appendix).

Type I: Learn the Game

Type I activities are designed to facilitate learning in the first three stages of Laveault and Corbeil's model on learning from games and simulations. These activities are designed to get students playing the game, overcome any initial frustrations, and establish a routine of reflection and analysis of their game play and the game itself. We recommend teachers start by adapting current activities and lessons. For example, teachers often use vocabulary worksheets that give students a list of terms to define from the text or other resource. Re-designing this common instructional activity to integrate a COTS

game would have students write definitions based off of their game play and compare those definitions to the ones given in the text or an authoritative resource.

Type I activities provide students the opportunity to record, chart/graph, and take notes on what happens in the game. BECTA (2001) has found that COTS games require students to develop an understanding of the basic game mechanics (controls, menus, maps, skills, rules) and that this understanding can ONLY develop through playing the game. Type I activities require students to track skills they develop through playing the game so that the teacher may build off of their developing understanding of the game and curriculum and the data they record in later instructional activities. For a history game it could be creating a timeline. For a construction-simulation game like Rollercoaster Tycoon it might be keeping a budget. For a role-playing game it might be journaling. In fact, any or all of these types of activities could be used depending on the game and the instructional goals of the class. Essentially, this is where students should be gathering evidence and examples that they will use later to complete Type II and III activities.

Type II: Cross over

Teachers should design activities that complement the events and game play and/or correct the errors and misconceptions that students will develop due to a game's inherent simplicities or outright mistakes. Type II activities could be akin to debriefing activities that often occur after using an instructional game or simulation (Thatcher, 1986). Debriefing activities should focus on analysis of game events and how they are similar or different from the "real" content. BECTA (2001) suggests that COTS games can provide relevant and appropriate starting points for meaningful classroom discussions. Type II activities can be thought of as bridging the gap between playing a game and playing a game while studying it and learning from and with it as an instructional resource.

For example, students are often asked to note the similarities and differences between WWI and WWII. This common instructional activity for many history courses could be re-designed by having students compare and contrast their war experience from a history-based game such as Civilization III or Age of Empires with historical facts and archives from the actual war. This could be extended by comparing the peace treaties, the types of military units, reasons for going to war, etc. These activities are great for turning the errors or oversimplifications in a game into "teachable moments" (Gikas & Van Eck, 2004).

For example, in the game SimCity, the player becomes a virtual mayor with the power to raise and lower taxes, an authority some may see as a misconception and disparage its use as an instructional resource because it could teach this misconception. However, we recommend that this misconception (and any misconception in any game) be considered a teachable moment, an entry point for class discussions about separation of governmental powers, the three branches of democracy, differences in other types of governmental structures (communism, socialism, etc.), reasons for taxes, tariff wars, and much more.

An additional factor that may add to this idea of turning misconceptions into teachable moments is that ALL students would have experienced the same misconception as part of the entire game playing experience. A game experience that is shared by all students is valuable because each student can relate to the points and counter points made by their peers. The shared game experience and complementary instruction activities can be viewed as a community of practice where the students have a common set of problems (provided by the game and instructor) and set of knowledge (also provided by the game and instructor) to apply in solving those problems (Lave & Wenger, 1991; Shaffer, 2005).

Type III: Game as a Theory of the Content

Type III activities should be similar to many culminating activities and assignments—an essay, project or presentation—except they should specifically require students to critique the entire game as a theory or model of the content under study. If the learning environment can provide a meaningful context where doing (playing the game) and knowing (the instructional activities) become inextricably linked, and that environment proves to be motivating, it may also provide an environment where our students can develop a sophisticated understanding of the content (Gee, 2004, 2005; Halverson, 2005; Shaffer, 2005). Games can become a springboard to engaging students in the levels of intellectually rigorous tasks associated with and expected when completing culminating activities that require them to synthesize knowledge and wrestle with a difficult question in a particular content area.

Type III activities are similar to having students critique a Hollywood movie used in a history class. Many Hollywood movies have some inaccuracies or can foster misconceptions, just

like a COTS game. To overcome these limitations, many teachers have their students analyze movies using historical accounts and write a film critique. Writing film critiques helps students learn valuable aspects as well as the limitations of films by putting the films into proper historical perspective. Type III activities should be designed to place the game in a proper perspective with assignments that require students to judge the validity of the underlying models and critique them in order to express their ideas to make the game more accurate and realistic.

We have two examples of type III activities. The first is for integrating SimCity into a high school government class. The second is for integrating Civilization III into a high school history class.

SimCity. The learner will evaluate SimCity as a true-to-life simulation of city government, noting both strengths and limitations, and offer solutions for making the game a more realistic simulation.

SimCity has many biases in the game that make cities flourish. The learner will describe those biases and note examples from real world cities in which those biases are true and instances in which they are false.

Civilization III. The learner will respond to the following prompts:

- Some of your classmates had civilizations that eked out a meager existence, while other civilizations rose to supreme power. Why did some "real" civilizations rise to supreme status while others did not? Use examples from real history to explain your answer.
- Follow up: Describe how the underlying simulation model in Civilization III determined whether or not civilizations rose or fell? In addition, critique your description offering alternative models or theories that would better align with real history.
- At the beginning of the term you wrote your ideas for what it means to "know" history. Attached is your previous response. Please write a new essay that better encompasses your present understanding of history. Your essay should include examples from playing Civilization III, real history, and other class activities and assignments.

The three types of instructional activities—Learn the Game, Crossover, and Game as a Theory of the Content—are a framework that teachers may find helpful in their instructional design process as they revise their current curriculum and pedagogy to become a game-based learning environment. The inspiration for the three types of instructional activities has come from a variety of methods that seek to provide an authentic learning environment (Jonassen, 1999; Shaffer, 2005), inextricably relate content to context (Shank, Berman, & Macpherson, 1999), allow for errors and learning from those errors (Hannafin, Land, & Oliver, 1999), use a variety of tools that assist learners in developing solutions from a wealth of resources (Hannafin, Land, & Oliver, 1999), and position the students in an environment that allows them to collaborate and communicate about the content in order to achieve the highest of instructional objectives (Brown, Collins & Duguid, 1989; Donavan, Bransford, & Pellegrino, 1999; Halverson, 2005; Mims, 2003).

Evaluate learning in a variety of ways

With the three different types of activities in place, it is perfectly reasonable to expect students to pass a multiple choice, true-false, or matching test for the Type I activities. Assessment activities for Type II assignments could be short answer questions or other compare and contrast assessments. Type III assessment activities could include research papers or document-based questions. In addition, teachers may choose to design longer projects or presentations that allow students to pursue their interests in particular aspects of the games and/or content. We strongly recommend using a wide variety of assessment methods so students have a variety of ways to demonstrate their knowledge and understanding (Kozma, 2000).

Enjoy

We hope that you and your students enjoy integrating COTS games into the teaching and learning process. In the end, teachers' pedagogy should have shifted to a more constructivist frame, which Hooper and Reiber (1995) and Vannatta and Beyerback (2001) have argued is more conducive to effectively integrating technology—in this particular case, COTS games. Yet, we recognize that a game-based learning environment is not for every teacher and may not work in every context or curriculum. In this current state of standards and standardized testing, we cannot guarantee that integrating COTS games will or will not improve test scores; much research is needed on this subject. COTS game are not a panacea, just a strategy with which we, and others, have had success; a strategy that may be successful for some educators, especially those educators who are already playing video games outside of work. Integrating a COTS game into a classroom is a wonderful endeavor that can pro-

Stage	Assimilation	Accommodation	Conception of Game	Activities
1	Using rules as the student assimilates them.	Students learning game's rules.	Game to learn.	TYPE I & II Facilitate understanding and knowledge of the games: - Rules - Results of rules - Game strategies - Results of strategies
2	Assimilating the effects of the game's rules.	Students learning game's rules in context of game.	Game to play.	
3	Assimilating the reciprocal relationships of game's rules.	Students learning game strategies based on their understanding of the rules and their effects on the game context.	Game of rules.	
4	Assimilating game strategies by using successful strategies repeatedly; and applies those same strategies to a variety of game conditions.	Students learning the results of strategies; students are refining their understanding of the game strategies.	Game of strategy.	
5	Assimilating the reciprocal relationships of the results of various strategies.	Students learning from results of various strategies; identifies the major themes of the underlying model.	Simulation game.	TYPE II & III Facilitate understanding how the game's rules, strategies, and underlying model are related to reality and the domain /field/content represented. Facilitate ability to judge the validity of the underlying models. Facilitate ability to critique the underlying model. Facilitate ability to express ideas or improvements for the game to make it more like reality.
6	Assimilating the reciprocal relationships of the results of various strategies with their prior knowledge and domain concepts in the game.	Students learning from the results of various strategies as compared to the reality or phenomena the underlying model represents.	Simulation game as a specific theory/conception of the domain.	
7	Assimilating the game's underlying model.	Students analyzing the game's underlying model and judging whether it is a valid representation of the domain/field/content.	Domain specific simulation.	
8	Assimilating the game's underlying model with their prior knowledge and domain concepts in the game.	Students evaluate the game's underlying model by comparing it to reality; students articulate the game's strengths and weakness as a representation of the domain and how the game could be improved to better represent reality.	Meta-game and meta-simulation. Game invention.	

Adopted from: Laveault, P., & Corbeil, P. (1990). Assessing the impact of simulation games on learning: A step-by-step approach. *Simulation/games for learning, 20*(1), 42-54.

Appendix: Eight stages of learning from games and simulations.

duce an engaging and valuable learning experience for both students and teachers.

Summary

The authors believe that integrating commercial off the shelf games can be a powerful learning experience.

Based on their experience and literature review the author have crafted a list of things that instructors should consider before integrating commercial off the shelf games. The list provides practical advice for those pursuing this type of learning experience. The first six list items provide advice on getting started and navigating the transformation of the classroom to a game-based learning environment. The last four list items provide guidance for designing the class schedule and time to accommodate the new pedagogy, crafting instructional activities, and evaluating learning.

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References

Alessi, M. S., & Trollip, S. R. (2001). *Multimedia for learning: Methods and development* (3rd ed.). Boston: Allyn and Bacon.

B.E.C.T.A. (British Educational Communications and Technology Associations). (2001). *Computer games in education project*. Retrieved December 24, 2003, from http://www.becta.gov.uk

Brown, J. S., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning. *Educational Researcher, 18*, 32-42.

Charsky, D. (2004). *Evaluation of the Effectiveness of Integrating Concept Maps and Computer Games to Teach Historical Understanding*. Unpublished Dissertation, University of Northern Colorado, Greeley, CO.

Cruickshank, D. R., & Telfer, R. (1980). Classroom games and simulations. *Theory into practice, 19*(1), 75-80.

DeKanter, N. (2005). Gaming redefines interactivity for learning. *TechTrends, 49*(3), 26-31.

Dempsey, J. V., Lucassen, B. A., Haynes, L. L., & Casey, M. S. (1996). *Instructional applications of computer games*. Paper presented at the American Education Research Association, New York, NY.

Donovan, M. S., Bransford, J. D., & Pellegrino, J. W. (Eds.). (1999). *How people learn: Bridging research and practice*. Washington, DC: National Academy Press.

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

Gee, J. P. (2005). What would a state of the art video game look like? *Innovate, 1*(6), Retrieved August 11, 2005, from http://www.innovateonline.info/indes.php?view=article&id=80

Gikas, J., & Van Eck, R. (2004). *Integrating video games in the classroom: Where to begin?* Paper presented for the annual meeting of the National Learning Infrastructure Initiative, January 25-27, San Diego, CA.

Gredler, M. E. (2003). Games and simulations and their relationships to learning. In D. H. Jonassen (Ed.), *Handbook of research for educational communications and technology* (pp. 571-581). Mahwah, NJ: Lawrence Erlbaum.

Gros, B. (2003). *The impact of digital games in education*. Retrieved July 12, 2008 from http://www.firstmonday.org/issues/issue8_7/xyzgros/

Halverson, R. (2005). What can K-12 school leaders learn from video games and gaming? *Innovate, 1*(6). Retrieved July 12, 2008, from http://www.education.wisc.edu/elpa/people/faculty/halverson/LeadersLearningFromVideoGames.pdf

Hannafin, M., Land, S., & Oliver, K. (1999). Open learning environments: Foundations, methods, and models. In C. M. Reigeluth (Ed.), *Instructional-design theories and models* (pp. 115-140). Mahwah, NJ: Lawrence Erlbaum.

Hannafin, M. J., & Peck, K. L. (1988). *The design, development and evaluation of instructional software*. New York: MacMillan Publishing Company.

Hooper, S., & Rieber, L.P. (1995). Teaching with technology. In A. C. Orstein (Ed.), *Teaching: Theory into practice* (pp. 154-170). Boston: Allyn and Bacon.

Johnson, D., & Johnson, R. (1996). Cooperation and the use of technology. In D. Jonassen (Ed.), *Handbook of research for educational communications and technology* (pp. 1017-1044). New York: Simon and Schuster.

Jonassen, D. H. (1999). Designing constructivist learning environments. In C. M. Reigeluth (Ed.), *Instructional-design theories and models* (pp. 215-240). Mahwah, NJ: Lawrence Erlbaum.

Kirkley, S., & Kirkley, J. (2005) Creating next generation blended learning environments using mixed reality, video games and simulations. *TechTrends, 49*(3), 42-53, 89.

Kirriemuir, J. (2005A, March). *Topic: A survey of COTS games used in education*. Serious Games Summit, Game Developers Conference, San Francisco, CA.

Kirriemuir, J. (2005b). Commercial games in the classroom. *Interact, 31*, 20-21.

Kolb, D. (1984). *Experiential learning: Experience as the source of learning*. Englewood Cliffs, New Jersey: Prentice Hall.

Kozma, R. (2000). The use of multiple representations and the social construction of understanding in chemistry. In M. Jacobson & R. Kozma (Eds.), *Innovations in science and mathematics education: Advanced designs for technologies of learning* (pp. 11-46). Mahwah, NJ: Erlbaum.

Lave, J. & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge, England: Cambridge University Press.

Laveault, P., & Corbeil, P. (1990). Assessing the impact of simulation games on learning: A step-by-step approach. *Simulation/games for learning, 20*(1), 42-54.

Lepper, M. R., & Cordova, D. L. (1992). A desire to be taught: Instructional consequences of intrinsic motivation. *Motivation and Emotion, 16*(3), 187-208.

Malone, T. W., & Lepper, M. R. (1987). Making learning fun: A taxonomy of intrinsic motivations for learning. In R. Snow & M. Farr, (Eds.), *Aptitude, learning and instruction: III. Cognitive and effective process analysis* (pp. 223-253). Hillsdale, NJ: Erlbaum.

Mims, C. (2003). Authentic learning: A practical introduction & guide for implementation. *Meridian, 6*(1). Retrieved July 12, 2008, from http://www.ncsu.edu/meridian/win2003/authentic_learning/index.html

Prensky, M. (2001). *Digital game-based learning*. New York: McGraw-Hill.

Reiser, R. A., & Gerlach, V. S. (1977). Research on simulation games in education: A critical analysis. *Educational Technology, 17*(12), 13-18.

Shaffer, D. W. (2005). Epistemic games. *Innovate, 1*(6), Retrieved August 11, 2005, from http://www.innovateonline.info/indes.php?view=article&id=79

Shank, R. C., Berman, T. R., Macpherson, K. A. (1999). Learning by doing. In C. M. Reigeluth (Ed.), *Instructional-design theories and models* (pp. 215-240). Mahwah, NJ: Lawrence Erlbaum.

Simpson, E. (2006a, October). *Topic: Using video simulations in the content area*. Association for Educational Communications and Technology International Convention, Dallas, TX.

Simpson, E. (2006b, April). Topic: Using video games to meet the standards. Association for Supervision and Curriculum Development, International Conference. Chicago, IL.

Squire, K. (2004). Replaying history: learning world history through playing Civilization III. Retrieved January 2, 2006, from http://www.educationarcade.org/gtt/

Thatcher, D. C. (1986). Promoting learning through games and simulations. *Simulation/games for learning, 16*(4), 144-154.

Vannatta, R. A. & Beyerbach, B. (2001). Facilitating a constructivist vision of technology integration among education faculty and preservice teachers. *Journal of Research on Computing in Education, 33*(2), 132-148.