Best Practices for Integrating Game-Based Learning into Online Teaching

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Abstract

This article presents ten guidelines for the effective use of video games in online teaching environments for post-secondary instructors. These guidelines include: taking advantage of existing resources, asking students to be producers instead of just consumers, avoiding being overly prescriptive, being aware of non-media-intense and non-electronic games, staying focused on learning—not technology, orienting and debriefing students as to the value of gaming activities, embracing interdisciplinarity, taking advantage of serious games, considering collaborative technologies and virtual worlds, and playtesting. Recent research in game-based learning is considered to help guide these best practices and numerous ideas for incorporating games into the virtual classroom are provided. Although empirical research about the effectiveness of online video games as educational tools is an important component for sustainability and for improving online learning games, this paper focuses exclusively on the theoretical and applied issues associated with online game-based learning. The authors contend that such teaching practices are useful for engaging with student audiences and encouraging them to take intellectual risks in comfortable and familiar territory.

Keywords: video games, engagement, play, game theory, teaching, pedagogy, applied research, game-based technology, guidelines, best practices

Background and Literature Review

Video games are an important part of the modern economic landscape. In 2007, video game sales accounted for $9.5 billion in revenue, were played by 65 percent of Americans, and were noted to be a positive part of children's lives by 63 percent of parents (Entertainment Software Association, 2008). Many college students today grow up with video games and have had these entertainment vehicles available for most of their lives. Video games are also played by various (and sometimes unexpected) demographics. The ESA additionally notes that the average game player is 35 years old and has played video games for 13 years, 40 percent of gamers are women, and 26 percent of Americans over the age of 50 played games in 2008. With such impact and diversity of audience, the question must be asked: why are we not teaching more with video games and video game technologies? Certainly, other popular non-print media such as film, television, and the Internet are in widespread use in various capacities. While these media are best known for entertainment, they have long since found legitimate academic footholds as curricular tools.

The idea of using games to teach has become more popular in recent years. In teaching and learning scholarship, gaming and online learning are sometimes discussed, but usually from within the context of other interactive technologies. For instance, Alexander (2008) writes about games as online learning objects, but also discusses emerging Web 2.0 technologies. Facer et al. (2004) discuss games and learning, but from the context of mobile devices. Charsky & Mims (2008) discuss games and education, but do not focus exclusively on online teaching. Articles such as these are important for showing how games can be used and applied to a variety of different pedagogical applications but, at the same time,

they do not give online game-based technologies the focused attention that is necessary for a comprehensive understanding of the medium as it applies to teaching and learning.
Important questions here relate to practices of integrating gameplay and pedagogy. These practices include tasks such as building lessons around moments of gameplay, understanding how decision points can represent learning moments for students in appropriately selected games, choosing an appropriate degree of graphical or scientific fidelity, anticipating negative or positive learning opportunities, reacting to and addressing misconceptions about games, building community in virtual worlds, and establishing one's own best practices for a particular course. Many of these ideas need to be considered from one's own disciplinary framework, but are there some *general* theoretical considerations that apply to most, if not all, games-based learning applications? Such perspectives are informed through a broader review of the literature.

Fortunately, more general texts that focus on gaming and learning (though not necessarily online learning) are readily available. Gee's (2003) well-known book on gaming and literacy provides a list of learning principles useful for designing course modules as well as a theoretical base for thinking about games as cultural and critical vehicles. He explains how different types of games and game genres are examples of what he calls *semiotic domains*. Semiotic domains are discourse communities with particular ideologies, rules, and procedures; video games are semiotic domains that are familiar to many college students and that provide them with opportunities to experiment and learn in ways unique to virtual environments. Gee uses the idea of semiotic domains to explain how different discourse communities use specialized vocabularies, conventions, and techniques for communication and expression. For example, common vocabulary words in gaming parlance include terms such as "noob" (a new player) and "pwned" (to be beaten soundly by another player), words understood by many gamers that have little meaning outside the semiotic domain of video games. Similarly, certain behaviors that do not make sense in the real world are given additional meaning or significance when performed by an avatar inside a game and interpreted by other gamers inside that discourse community.

One learning principle that should be of particular interest to online educators is what Gee calls the "psychosocial moratorium principle" (2003, p. 62). There is a simple description for this complicated term: in video games, players are encouraged to take risks that they would not take in the real world, because the consequences of their actions are less severe. The worst thing that can happen in a game environment is that one's character dies and must be respawned (virtually regenerated) at a save point. In the real world, deviating from one's comfort zone or acting outside social boundaries (of law, morality, etc.) can bring about much more dire circumstances. What better way to encourage students to think outside the familiar than by allowing them to do so in an engaging, but still safe, environment? Conversely, discursive risks may be somewhat elevated in game-based environments. Players may be prone to act more aggressively and to be less sensitive to differences in ideology and culture due to a lack of direct accountability. This is another avenue that can be critically explored using the gaming medium. In later work, Gee takes a turn toward the metaphysical, suggesting that "video games are good for your soul when you play them with thought, reflection, and engagement with the world around you" (2005, p. 1). This quote best represents the potential of games as curricular tools – they present many opportunities for critical reflection and analysis while keeping students engaged with a medium that they are familiar with.

In *Digital Game-Based Learning*, Prensky (2001) conceptualizes digital learning games as "any marriage of educational content and computer games" (p. 145). He discusses the landmark work of Malone (1981), who created a checklist of elements for designing educational goals in games. This checklist focused on three primary elements: challenge, fantasy, and curiosity. Malone's seminal paper is firmly rooted in a history of psychological research including Csikszentmihalyi's (1975) ideas about adaptable challenge, clear criteria, personalized feedback, containment, and a broad range of challenging topics as intrinsically motivating ideas. Undoubtedly, many online teachers already use many of these features as guiding rubrics to design their online course content.

More recently, Bogost (2007) discusses the capabilities of games in terms of their procedural rhetoric, or their potential capacity for expression as persuasive technologies. He notes that games are particularly interesting as rhetorical instruments because they represent processes natively. By this, he means that human processes are represented using computer processes, an ability that can be observed in the ongoing interactions of a particular game program, e.g., moving an avatar around in a virtual world is a

continuous interactive process, whereas reading about a character walking around is mediated by language, not process. Bogost's work builds upon Murray's (1997) book in which she discusses procedurality (a focus on process or function) as a fundamental component of computing power. While Murray discusses interactive computing from a narrative perspective, her ideas are applicable to game environments as well, especially since story is such an integral part of the gaming experience.

In addition to these often cited works by Bogost, Prensky, and Gee, there are numerous other books, articles, and journal special issues that explore the connections between gaming and learning (e.g., Aldrich, 2005; Myers, 2005; Prensky, 2006; Sauvé et al., 2007, Shaffer et al., 2004; O'Connor & Phillips, 2007; Charsky & Mims, 2008). Although many of these authors approach games from a particular organizational or institutional context (Aldrich, for example, writes of games from the perspective of simulation), each work supports the notion that games are powerful media and that they are useful for more than entertainment purposes. Charsky & Mims (2008) note that many of the characteristics of games; including competition and goals, rules, challenge, choice, and fantasy; can be leveraged for a variety of instructional methods. Much more information about games and learning can be found in a comprehensive report from the Learning and Skills Development Agency (2004).

Methodological Approach

In the following section, ten practices that online instructors can use to incorporate the many positive elements of gaming are articulated. Although much will depend on the particular discipline in which one is using games, the guidelines presented here are general enough to work for a broad range of subject areas. These guidelines are created from direct personal experience with using games for education, from the ideas of scholars and practitioners writing about game-based learning, and from a careful observation of the discursive and rhetorical characteristics of games as media. While we use the general term "instructor" to refer to our audience, we intend for the term to broadly encompass other types of academic support professionals as well (e.g., instructional designers, online technology specialists, e-learning educational specialists, etc.).

From a purely practical level, this joining of pedagogy and gaming seems like quite a challenge in an online environment. After all, how can games be used as effective teaching tools in an *online* class? Course management systems generally include only primitive game capabilities--if any at all--and simply do not provide the same types of immersive virtual environments that modern computers and game consoles are capable of. Furthermore, the complexity of the gaming medium, which bridges art, engineering, interactivity, and sound in a way no communicative media has ever done before, can be staggering.

Despite these challenges, it is not impossible to use games as useful teaching tools, even in online environments. The critical idea is to use only aspects of video games, narrow and focused activities or examples, in order to engage and stimulate the interests of students. Examples can be pulled from contemporary video games, historically meaningful games, or "serious" games (Sawyer, 2002; Michael & Chen, 2006) designed to promote learning, political activism, or intellectual discussions. The suggestions offered below are culled from experience teaching using games over several years in Web-mediated format as well as from many excellent resources that exist in both printed and electronic (online) form.

The authors maintain that it is possible to use video games in online teaching, and it is not as difficult to do so as some instructors may believe. These ten guidelines are used to support this claim and to provide suggestions for using games in different types of learning environments. To apply these guidelines to a broad array of pedagogical frameworks, several examples from different disciplines are used. These examples are used to show the potential applications of game-based learning for various types of online courses.

Guideline One: Take Advantage of Existing Resources

Teaching with games is challenging for a number of reasons. First, the landscape of popular video games is constantly changing, and it is near impossible to keep up with the numerous interesting initiatives that are happening in relation to games and academic studies. Second, the technical challenges involved with using games for teaching can be daunting. For these reasons, the first

guideline discussed in this essay involves taking advantage of existing resources. Using existing resources developed by instructional pioneers allows one to spend more time on what is most important to one's class: working on curriculum and fine-tuning course content to better meet pedagogical goals. Following this approach will inevitably put an instructor in touch with other pioneers that are looking to use (or already have used) game-based learning in their own online courses. Having a handy list of colleagues available to bounce ideas off of and to query for troubleshooting issues is extremely important.

So, where does one look for existing resources in online game-based learning? There are, in fact, many academic initiatives that are exploring this topic in detail. One such initiative is Futurelab (2008), a not-for-profit organization designed as an incubator for learning in the 21st century. Futurelab hosts a variety of interesting learning projects, many of which are game-like, that teach a range of subjects from astronomy to landscape design. A wide range of resources, from software and development tools to technical and academic publications and literature reviews, are freely available from the organization's website.

Learning games and materials are also found in online course content repositories. A search query on the Multimedia Educational Resource for Learning and Online Teaching (MERLOT, 2008) using the query "video games" returns a listing of 29 learning objects. Broadening the query to "games" returns over 300. These learning examples range from tutorials and websites to fully developed games designed to teach specific curricula. Some course management systems include simple games like Jeopardy® clones or crossword puzzles which can be configured by the instructor to test declarative knowledge and comprehension of different types of materials. One useful resource that is available allows an instructor to configure an online quiz game (Ward, 2008, see Figure 1). This application only requires an instructor to edit a text file containing questions and answers and then upload a few files to a Web site. This site can then be linked from within a course repository or CMS.

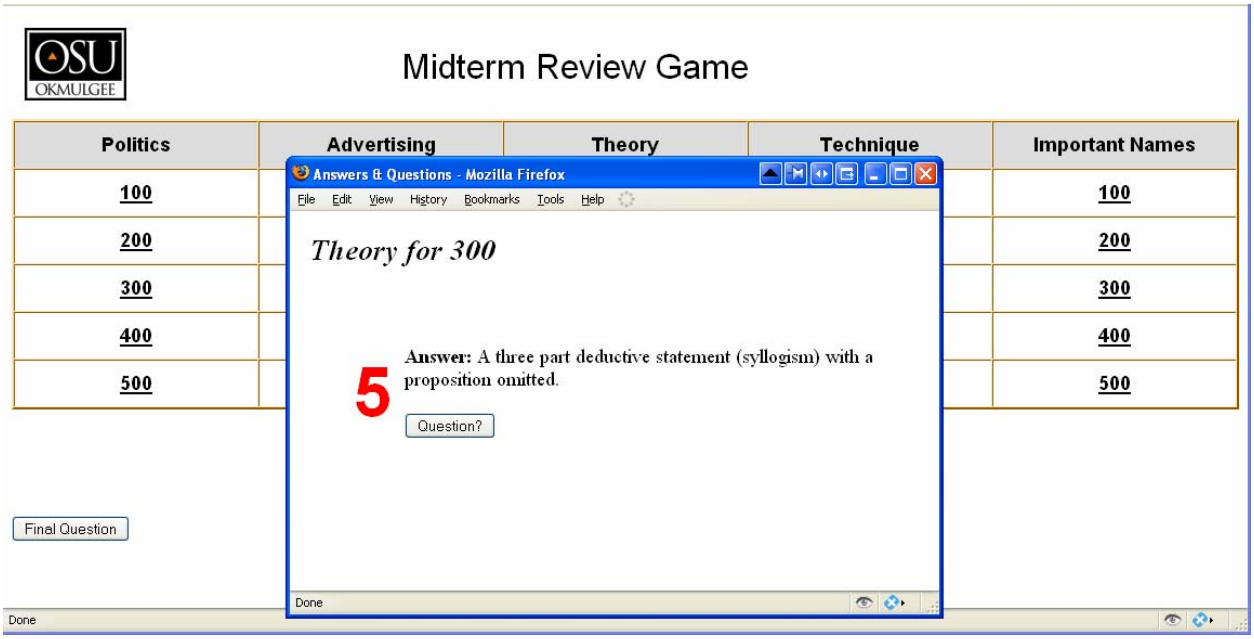

Figure 1: A Midterm Review Game

While these pre-existing learning objects may not fit exactly with one's particular course, they can be helpful in a variety of other ways, from showing what is possible with games to providing tutorials for modification and customization. The fact that MERLOT learning objects are peer reviewed adds additional credibility to these resources.

Finally, there are many websites that collect articles and critiques of games from social, cultural, or critical perspectives (e.g., http://www.socialimpactgames.com, http://www.gamepolitics.com). The articles from these sites provide interesting intellectual fodder from which to craft creative online exercises and forum

discussions. Table 1 shows some additional games that are useful for a variety of different disciplines and pedagogical applications.

Table 1: Games for Teaching

COTS Games	"Commercial off-the-shelf games". Modifiable games such as *Neverwinter Nights* and *Oblivion* can be used for a variety of teaching exercises, such as learning American History. The Queensland-based Games in Learning Project lists many potential types of COTS games.
CyberCIEGE	Used in the discipline of Information Technology and computer science to teach students about network security issues.
Dafur is Dying	Used in history, cultural studies, or special topics humanities courses to teach students about war and its consequences.
Food Force	Used in various humanities courses to teach students about world famine issues.
Global Conflict: Palestine	Used in writing and history courses to teach students about journalistic techniques and about the history of Palestine.
Planet Green Game	Used in the discipline of ecology or general earth science to teach students about global ecological issues.
Fantastic Contraption	Used in math and physics courses to teach students basic physics concepts.
Simport	Used in the discipline of engineering to help teach students about large infrastructure projects.
Burn Center	Used in the discipline of medicine to help train doctors.
Tycoon (game series)	Used to teach business students resource management and other key business concepts.
Legsim	A virtual simulation of the U.S. Congress, State legislature and the European union for students in history and government courses.
Hazmat: Hot Zone	Used to train first responders to deal with hazardous materials.
Geosense	Game used to teach students geography.

Guideline Two: Ask Students to Produce, Not Just Consume, Materials

Most students are ready and willing to be brought into the game design process. Although one might think that such a process is outside the capabilities of an average class, there are many different deliverables that can be produced on a smaller scale and tied to curricular goals. For instance, in a composition course, a group of students might use an online discussion board to brainstorm ideas for a narrative treatment about a game designed to teach about argument. Even if the game is never fully

articulated, the process of carefully thinking about the learning objectives, the gameplay mechanics, and the background story can be a rewarding experience in and of itself.

Numerous other activities could be incorporated into online courses with minimal technological investment from students. For instance, students could be directed to use a discussion forum posting to describe how they would create realistic environments for an historical role playing game. Or, their production might be of the critical sort, by speculating about the wider implications about why we play and what the games we play can teach us. Along this vein, students could take digital photographs of board games and post photoessay projects explaining how these games teach particular ideologies, e.g., a sociocultural analysis of the game of Life™ or an economic analysis of Monopoly™.

For more technically capable students, modifying games for particular learning activities becomes a possibility. In these instances, students can download tools such as level and map editors in order to "mod" existing COTS games (see Table 1) for pedagogical purposes. Many of these COTS games feature robust toolsets for player-authored creativity and these activities can be catalysts to leverage students as game designers without needing a great deal of technical skill (generally, an avid player of a particular game is able to create custom levels and branching dialog without too much trouble). Additional tips for using COTS games in both K12 and post-secondary teaching environments are found in Charsky & Mims (2008).

Guideline Three: Avoid Being Overly Prescriptive

Since games are so technically demanding and thematically diverse, it is tempting to try and minimize instructor stress by outlining in detail every game example and assignment that has use in a particular course before the first class is even held. It is surely useful to have a list of these activities and ideas, but one should also be mindful of the opportunities for discovery afforded by game-based environments. Even within the small time frame of an academic quarter or semester, new games will be released, new potential activities will afford themselves through online discussion, newly controversial game materials will be studied in the media, and new trends will become popular. It is important for the instructor using games to recognize that serendipity is something to be embraced rather than trying to control for every possible outcome.

Finkel (2000) uses the concept of inquiry-centered teaching to explain the idea of working with a class toward the understanding and explanation of a concept or problem. In inquiry-centered teaching, all class materials become part of an investigation to understand the course content as a community of learners. An inquiry-centered teaching strategy using games might suggest to students, "Here are some games that we will be using to examine and engage with the concepts of this course. There are many others out there, and we will find them together!" Or, the instructor might present a gaming challenge to small groups of students as follows: here are the online technologies we have available in this course management system. We have a discussion forum, an email system, a wiki, and a course module generator. How might your group create a highly interactive and engaging experience to teach this course's learning objectives to your peers? Students given this task could follow a variety of tacts, from crafting simple word games and crossword puzzles to devising more complex sleuthing activities that lead players through a series of clues and puzzles. Even if the groups are not able to pull off the perfect learning game, the journey they make trying to do so is still valuable and gives them a chance for reflection.

One must be cautious not to become overly enthusiastic about Guideline Three. While a certain degree of flexibility is important and necessary, a careful plan and a set of rules are also necessary to build a sound educational experience around gaming technologies. Rules are an important part of games, and Juul notes their paradoxical nature, writing "rules are the most consistent source of player enjoyment in games" (2005, p. 55). While rules often connote discipline, control, and unpleasantness in the real world, in the simulated world of gaming, rules create that ever important sense of competition and challenge that makes gameplay fun. Like many tasks in online teaching, a gaming assignment that is both engaging and manageable must be carefully planned and bounded by rules, but also be malleable enough to bend and shape with the intellectual curiosities of the virtual classroom.

Guideline Four: Be Aware of Non-Electronic or Non-Media-Intense Games

Although this article is concerned with video games, there is much of value which can be borrowed from non-electronic media. For example, play mechanics can be observed in a variety of social activities which do not involve computers. Huizinga observes, "Play is older than culture, for culture, however inadequately defined, always presupposes human society, and animals have not waited for man to teach them their playing" (1971, p. 1). Video games similarly presuppose a desire to play, but as Huizinga notes in the play of animals, there are many other ways to be playful that do not involve electronic sorts of games. The same is true of human play in general, and, the authors argue, of online teaching. For many instructors, playfulness has always been an important part of instruction, from silly icebreakers on the first day of class to creative activities and presentations visually designed to support a particular theme or time period. When time or budgetary concerns do not permit more sophisticated types of projects, more primitive games, e.g., student constructed card games or board games, serve many of the same functions as more complicated types of materials. In fact, non-electronic games are very useful during the playtesting phase (see Guideline Ten) when one needs to quickly and inexpensively determine the enjoyableness of a particular gameplay mechanic, or, in this case, of an assignment or learning module.

Existing technologies such as Microsoft PowerPoint®, though not specifically developed to serve as video game tools, can reduce the complexity of the game design process while still encouraging playfulness amongst students. We might think of these types of activities, including crossword puzzles and electronic card games, as non-media-intense games. Often, these games require nothing more than a basic mastery of office productivity software and a creative imagination. For instance, Jones (2006) writes of a scavenger hunt created to help students become familiar with the interface of her course's online course management system. Though the scavenger hunt game did not include many of the more sophisticated features of modern console games, it still encouraged students to be playful and explore the course management interface more than they normally would at that time in the course. Jones reported that this activity "significantly reduced the need for additional instructor time" and made the Web management system "less threatening for students" (p. 86).

Guideline Five: Stay Focused on Learning, not Technology

When using any type of technology in the classroom, including games, there is a potential for misuse. This occurs when the media are used too frequently or without a clear relation to stated course learning objectives. In order to stay focused and ensure one is including game technology for the right reasons, it is important for an instructor to ask two questions whenever including a game component in an online course:

1. Does this assignment lead students towards mastery, or at least better understanding, of one or more learning objectives in this course?
2. Is there a way to assess this assignment to determine whether or not it was successful?

To be fair, there are some legitimate uses for games in the virtual classroom outside published learning objectives. For example, a history instructor might post an announcement directing students to spend an hour or so visiting a free online web site such as Civilization Online. Students would be directed to play this game about civilization building with the aim of generating some enthusiasm for the subject or revealing the interdisciplinary connections (Guideline Seven) of history with other fields of study such as economics, criminal justice, or literature. Keeping in mind Guideline Three (avoiding being overly prescriptive), activities like this might lead to the creation of new student learning outcomes, e.g., students will become motivated to learn more about history and understand history within the context of other disciplines.

For the most part, though, when in the planning stage of designing a course, online instructors should always keep in mind their stated learning goals for the course and consider whether or not there is truly value added by the inclusion of particular gaming activities. Does this Jeopardy™ game really test students on their declarative knowledge about rhetorical tradition, or is its inclusion more superficial? Will playing World of Goo™ (see Guideline Eight) really make students understand engineering principles, or are there faulty logics being followed? Traditional direct assessment measures (quizzes, exams, essays) and indirect assessment measures (student self-evaluations, reflective responses, instructor evaluations)

provide valuable data that should be considered throughout the duration of the course as they become available. Instructors should realize, too, that when games *do not* operate according to established theories or scientific principles, i.e., when the games sacrifice realism for the sake of fun, which they do quite frequently, then these, too, are teachable and measurable moments.

A general process for considering games for a particular course needs to be based around the course's learning objectives. This process can be articulated in a series of steps:

- Step One: Identify why you think you need an interactive activity in your classroom. Will this add value to the students' learning?
- Step Two: Identify the learning goals of that activity.
- Step Three: Identify games that might meet these learning goals.
- Step Four: Play or review games to see which ones come closest to your criteria.
- Step Five: Incorporate the game on a trail basis.
- Step Six: Gather student feedback on use of the game.
- Step Seven: Use assessment tools and a debriefing activity to measure if the game helped improve learning. This step is further explained in Guideline Six below.

Guideline Six: Provide a Critical Lead-up and Debriefing to Game Activities

Students may be enticed by the thought of playing a video game as one of their assignments, but unless instructors provide a clear and critical introduction to the assignment and a debriefing period, students might, in the end, deem the gameplay experience as "filler" or even as an instructor's attempt to pander to their likes and desires. When assigning gameplay, instructors must have a clear purpose or objective that is clearly communicated to the students. For this assignment, you will play X game for the purpose of Y. Our learning goals here are Z1, Z2, and Z3. The instructions must be complete and comprehensible and may need to include *how* to play the game. If there is a problem being addressed, state the problem. If students are playing to critically analyze the game itself or their gameplay experience, providing them with a set of criteria for analysis will help. Instructors must consider exactly how much specific guidance students will need before--and during--the activity. Will visuals be needed? Will students need to collaborate with others? How will students be able to ask questions before, during, and after the assignment?

Equally important to a clear and focused introduction is a debriefing activity. One way to facilitate this is to establish a list of questions about what students should have learned during the gameplay experience. Did playing the game help you to see/understand/consider X any better than before? If online students post answers to these questions, either working alone or in groups, then the instructor can, through a series of responses, help students sort through their answers and a consensus can begin to occur. The key here is for the instructor to demonstrate that playing the game has provided a unique and interactive learning opportunity that meets the goals of the course. Students should not only understand the key concepts being presented through the video game, but also understand that there is a clear and relative advantage to incorporating video game technologies in their classroom. The debriefing is meant to ensure that this happens.

Guideline Seven: Embrace Interdisciplinarity

Games are unique in that they combine image, art, story, engineering, psychology, and instructional design all together for a specific purpose: to keep the player motivated to keep playing the game. Students in different academic majors are often passionate about different things; this passion can be harnessed through the creation of interdisciplinary projects where students bring their own expertise to the table for a project or assignment. For lower level classes, such as those fulfilling general education requirements, there is often a wonderful and underused opportunity to use interdisciplinarity for class assignments and projects.

First, for applied projects, creative activities can take on particularly compelling directions in group assignments when groups are carefully organized by an instructor to include different student majors. This arrangement is common in industry, where game design teams are composed of artists, programmers, and producers working together toward common goals. Hybrid teams composed of

individuals from different backgrounds allow students entry into the different types of semiotic domains pondered by Gee (2003) and discussed previously in the literature review. Including applied work as an assignment for hybrid teams makes students additionally accountable for producing specific deliverables. These deliverables show the end result of any ideological and methodological wrestling that occurred between different team members during the assignment.

Second, in critical analysis exercises done in online discussion, students from different majors might be organized into virtual groups that analyze games from different perspectives in order to examine contemporary issues. For instance, groups of students in an introductory political science course might analyze the 2008 election from the perspective of video games, looking at examples of the games produced by different candidates and parties. Students with advertising backgrounds might make mention of Barack Obama's use of in-game advertising (the first presidential candidate ever to do so, see Figure 2) while students who have taken art courses might focus on the use of graphical stereotype as a persuasive tool by both candidates' parties.

Figure 2: Obama advertising in racing game Burnout Paradise (Au, 2008)

Other students, with backgrounds in writing or composition studies, might write about the persuasive appeals of the games in regards to logos, ethos, and pathos. The instructor then has an opportunity to contribute and refocus by noting how these different elements can combine with gameplay in order to operationalize the particular values of an ideological base in different ways. In this exercise, value is added by the interdisciplinary perspectives of the students and their diverse backgrounds. The instructor must make an effort to afford these interactions, though, as students may be inclined (due to their prior experiences) not to "rock the boat" with ideas outside the discipline of the course. When an environment of exploration is encouraged, they will feel less anxious about contributing ideas.

Guideline Eight: Get Serious With Serious Games

Sawyer's (2002) conceptualization of serious games as games with a purpose to do more than entertain also has usefulness in the online classroom (see also Michael & Chen, 2006). For instance, the concept of serious games is useful to help students understand the value of simulation in a controlled environment

as a means to understand the more complex and messy types of real-world problems they will experience in their everyday lives. Shaffer et al. discuss the potential of video games to help students discover the "situated understanding" of abstract ideas and the real problems they can be used to solve (2004, p. 5). Serious games present a great opportunity to examine complicated or controversial issues by grounding ideas to specific, yet virtual, examples.

Many of the games listed in Table 1 are serious games because the games' designers (or re-designers, in the case of game mods) made it a priority to teach their players. Taking the idea of serious gaming a step further with concrete design activities can also be helpful; students might be encouraged to develop a profile for a particular type of game character (athlete, affluent businessperson, homeless person) in order to examine stereotypes, or to write a brief gameplay idea for a game designed to challenge a player's belief system. Isbister's (2006) work examines the importance of psychological and social belief systems in regards to the interpretation of different types of game characters. She notes the importance of stereotype "priming," in which a person is inclined to think about certain stereotypical qualities, and points out that game designers rely heavily on stereotypes, which can be both a good and bad thing, depending on the context. Returning to the earlier discussed idea of Gee's (2003) psychosocial moratorium learning principle, a serious game activity designed to consider the role of stereotyping using a safe and controlled environment offers interesting possibilities.

There are many other types of serious games that offer even more direct connections to course content. Independent games are particularly good for this. For instance, the *World of Goo* (2D Boy, 2008) is an Independent Games Festival finalist video game that uses physics and simulated engineering techniques to build stretching structures composed of "goo" in order to solve puzzles and complete challenges. Such a game could be incorporated as a learning activity in which students simulate different engineering structures or attempt to locate the different laws of physics that are at play in different levels. Similarly, in an art class, *World of Goo* (Figure 3) might be used as a brainstorming tool or as a virtual playground for testing ideas and techniques. Other independent games, such as *Crayon Physics Deluxe* (Kloonigames, 2008 – see Figure 4 and this video of gameplay: http://www.youtube.com/watch?v=QsTqspnvAaI), offer different interfaces and gameplay mechanics for simulating scientific principles. Independent games such as these are rich with possibility as tools for teaching science and engineering concepts. Sometimes the game worlds will follow real world physics or the laws of natural science, while other times they will deviate from these laws in order to create a more entertaining experience. It is up to the instructor to debrief students accordingly in order to point out the learning objects and any potential inaccuracies (see Guideline Six).

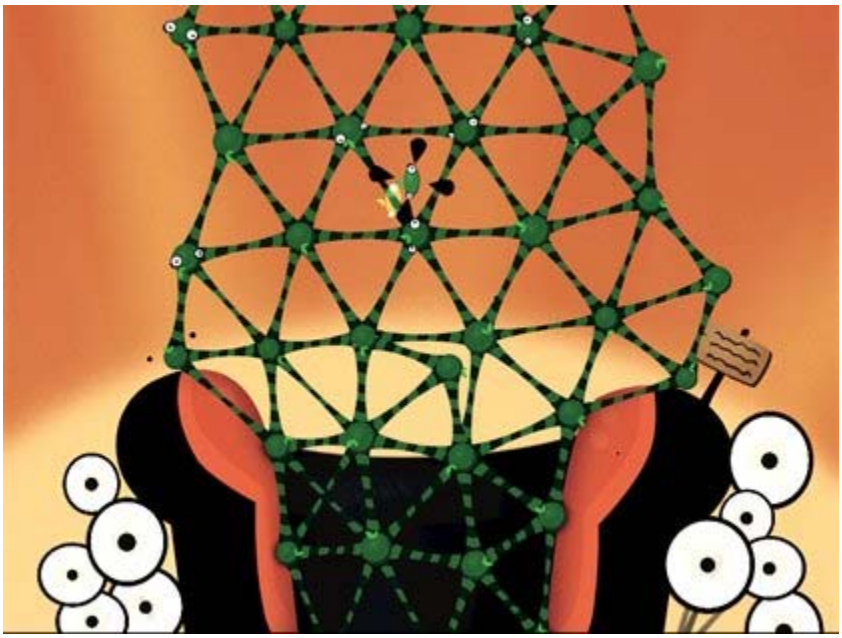

Figure 3: World of Goo (Game: 2D Boy, Image: Francis, 2008)

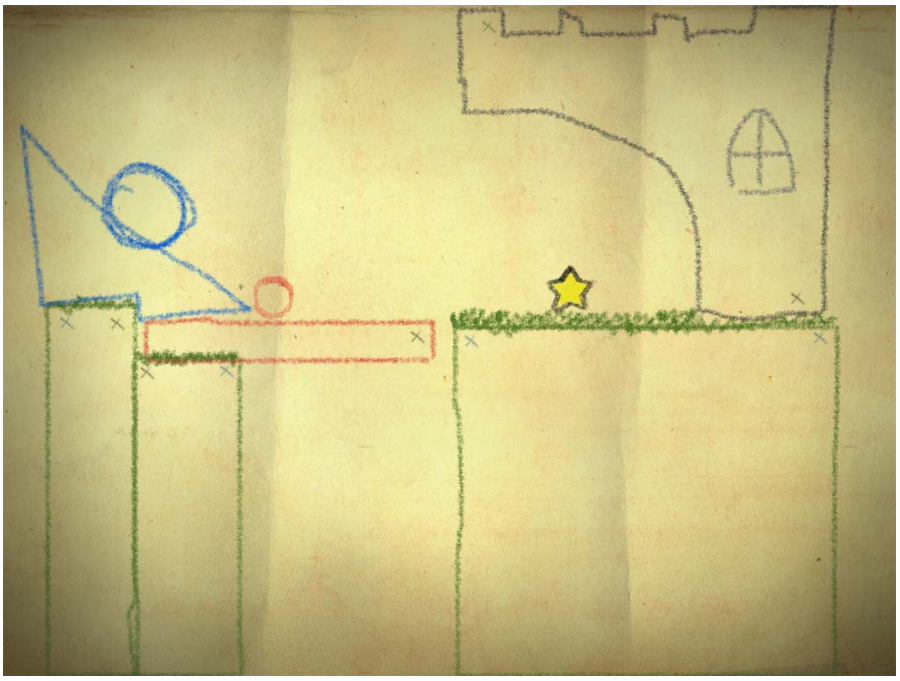

Figure 4: Crayon Physics Deluxe *(http://www.crayonphysics.com/)*

Guideline Nine: Consider Collaborative Technologies and Virtual Worlds to Manage Complexity

Working with video games in the classroom is admittedly complex, but there are a variety of tools and resources that can make an online instructor's life easier. Specifically, collaborative Web-based technologies such as wikis and blogs offer attractive possibilities for dealing with project-based work and team communication tasks. As discussed in Guideline Seven, interdisciplinary collaboration is an important element of modern game design. The same is true for game *playing*. Many popular games offer cooperative modes and team play. Students enjoy working together to problem solve, and simple technologies such as wiki pages allow students in online environments to collaborate.

One recent mixed-mode (online and face-to-face) course taught by the authors was an interdisciplinary seminar blending English and Digital Media with a focus on games as critical texts. In this class, students were asked to search for both academic terms and slang terms associated with gaming in an effort to create gaming glossaries as references for the course. Because the mixed-mode course focused heavily on interactivity for online tasks, and because this course used pedagogical materials from both English and Digital Media, the authors asked students to interact with the vocabulary and peer-review in a collaborative writing process using wiki technologies (Figure 2). A discussion board allowed for feedback from other groups, and a history mechanism kept track of changes to the page by date and time. Although this course focused specifically on analyzing video games as texts to be "read" from a variety of critical frameworks, the same type of collaborative glossary could be used for *any* discipline in which the learning of jargon or specialized vocabulary is important.

Virtual worlds can also mitigate some of the complexity of games while offering many of the same advantages. Although not all virtual worlds are games, they are certainly "game-like" in that they include virtual avatars, interactive characters, and immersive environments. Virtual worlds can include embedded games as well. For example, some games exist within 3D persistent worlds such as Second Life. Games and game reviews of this type can be found at slgames.wordpress.com, a blog dedicated to games within *Second Life*. The blog has a useful list of other games and reviews, and has expanded to include news about Web 2.0 as well. The act of having students play a game within a pre-established virtual world raises questions about how such games might fundamentally change e-learning, the same questions that the establishment of such worlds raised when they were first constructed online. While

our discussion here is not focused on these questions, it is important to note that games within these spaces provide yet another resource for the classroom and for potentially reducing the complexity of online interactive activities.

Figure 5: Collaborative Game Glossary

Guideline Ten: Playtest and Revise Frequently

The final guideline, playtesting, is a practice used by professional game designers to obtain feedback about their games (Fullerton, 2008). This feedback may come early in the design phase, after an initial prototype, or during final production when a game is almost ready for release. Playtesting in the game design industry can be as simple as asking members of the game's potential audience to sit down with the game for a few minutes and provide feedback. Or it may be formal and require a precise methodology for note-taking, feedback, and debriefing from a paid set of employees and professional game testers.

When teaching using game-based technologies, this same playtesting concept is useful for instructors but, generally only at the less formal level. When using games, it is important to test for *playfulness* as well as for instructional soundness. Instructional soundness can be measured by assessing how well your students are learning the material, while playfulness might be measured by how much the students are motivated to do so, or by how creative they are in their pursuit of the information. Many online instructors already test for instructional content by performing the typical types of peer review done with online instruction – running a syllabus by a trusted colleague, for example, or incorporating the comments from former students into the revision process for the latest assignments of a repeated course. Testing for playfulness might be as easy as playing through an independent game and noting particular areas that are useful for discussion (during online chat sessions) or critique (using asynchronous discussion boards). Are these activities fun and engaging? If not, how can they be made to be? Or it might involve asking a former student or an interested colleague to look through a gaming assignment to see if there is any room for improvement or additional clarification. Because games do have an additional degree of technical complexity, and because much of the point of using games relies upon engagement with one's audience, playtesting for fun and engagement are especially important. Fun should never be used to the point of edging out learning objectives, but if the games are not fun and engaging and do not illustrate crucial course content, then what is the point of including them in an online course?

Conclusion

In this article, the authors have made the claim that games are useful tools for teaching in online learning environments. Specifically, they suggested that games can be used not only in a variety of ways, but also in a variety of different courses and pedagogical contexts. Ten guidelines were suggested to help guide the process of using game-based technologies with online instruction. To summarize, the list of best practices presented in this paper include:

1. Taking advantage of existing resources.
2. Asking students to be producers, not just consumers.
3. Avoiding being overly prescriptive and ensuring mechanisms for serendipity.
4. Being aware of non-electronic and non-media-intense games and their value in the online classroom.
5. Focusing on learning, not technology.
6. Providing lead up and debriefing sessions.
7. Embracing interdisciplinarity.
8. Thinking about ways to use serious games.
9. Making the most of collaborative technologies and virtual worlds to help manage complexity.
10. Playtesting the course frequently and often.

By taking advantage of existing resources, instructors can access and use available materials and connect to other scholars with an interest in game technology and curricula. Asking students to be producers engages them at least as much as asking them to simply play games throughout the semester. Recognizing that gaming can be an organic process allows one to capitalize on the serendipitous moments that will emerge over the semester.

Similarly, instructors who focus on learning, orient students through a lead up and debriefing of gaming activities, organize interdisciplinary hybrid teams for design projects, and familiarize themselves with the ways to use serious games in their classrooms will find it easier to engage their students over periods of time. Exploiting collaborative technologies like wiki pages for teamwork and playtesting the course will help create learning environments that are highly interactive and fluid, environments that account for students' perception of the course and value their input. While most instructors should not rely exclusively on game technologies as the sole delivery method for online course content, games can be an exciting complement to almost any virtual or blended course. As instructors around the world continue to use games in online learning environments, and as gaming technologies continue to mature, additional best practices will need to emerge to pave the way for the next generation of online course facilitators.

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